

PROJECT MANUAL

SCIENCE LAB PROJECT

Sandburg Middle School

8428 Fort Hunt Road, Alexandria, VA 22308

April 11, 2022

IFB #22-019



FAIRFAX COUNTY PUBLIC SCHOOLS

OFFICE OF DESIGN AND CONSTRUCTION SERVICES

8115 Gatehouse Road, Suite 3400

Falls Church, VA 22042

571-423-220

SANDBURG MIDDLE SCHOOL SCIENCE LAB CONVERSION

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SECTION 00020

INVITATION TO BID

PART 1 – GENERAL

- 1.01 **Notice of IFB:** Notice is hereby given that the Fairfax County School Board (“Owner”) will receive bids electronically (see section 1.03, A.) for the Sandburg Middle School Science Lab project, before, **2 p.m. on Wednesday, April 27, 2022. Original bid bonds** will be received, and time stamped by the official bid clock (see section 1.03, B.), before **2:00 p.m., Tuesday, April 26, 2022**, at Gatehouse Administration Center, 8115 Gatehouse Road, Suite 3400, Falls Church, VA 22042-1203. In lieu of a Pre-Bid meeting a Point of Interest document will be available on April 20, 2022, for all parties.
- 1.02 **New Requirement for Electronic Submission of Bidding Documents:** In order to be eligible for consideration under this IFB, Bidders must submit bidding document (Bid Form) electronically using a procurement portal powered by Bonfire Interactive, for submission and acceptance of bidding documents. Physical delivery of original bid bond is required. To register for use of the Bonfire platform, [bidders are instructed to visit and create a free account at https:// fcps.bonfirehub.com](https://fcps.bonfirehub.com). Assistance with registration and use of the Bonfire platform is available by emailing Support@goBonfire.com or calling 1(800) 354-8010 and selecting option 2.
- 1.03 **Mandatory Procedure for Submission of Bidding Documents:** Bidders are advised of the following mandatory procedure for submission of bidding documents for this IFB #22-019:
- A. **Electronic submission of completed bid form** at <https://fcps.bonfirehub.com> before 2:00 p.m. on Wednesday, April 27, 2022.
- B. **Physical delivery of original bid bond** no later than, Tuesday, April 26, 2022, at 2:00 p.m. in a sealed, opaque envelope that is (a) labeled with Bidder’s name, “Bid Bond for IFB #22-019”, and (b) addressed as follows:
- Gatehouse Administrative Center
8115 Gatehouse Road, Suite 3400 Falls
Church, Virginia 22042-1203**
- In order to be eligible for award, Bidders must complete both items A and B, above, no later than the Due Date and Time.
- 1.04 **Virtual Bid Opening:** The Sandburg Middle School Science Lab project, IFB #22-019 bid opening will be held on Wednesday, April 27, 2022, at 2:00 p.m. via Google Meet. You may join the meeting as early as 1:45 p.m. The Google Meet link and dial-in number are set forth below.
- A. **Meeting Link and Dial-In Number for Bid Opening:**
Audio and Video: <https://meet.google.com>
Meeting Code: <https://meet.google.com/mot-ibii-wsp>
- Audio Only: Toll Free Number 1-877-848-7030 Access Code 3075047**

- 1.05 Each bidder shall bear and be responsible for all costs, fees and expenses associated with its preparation and submission of a bid in response to this IFB. In no event shall any bidder be reimbursed by the Owner for any such costs, fees, or expenses. Bid prices shall be inclusive of all labor, supplies, materials, equipment, permits, and sales or use taxes required to complete the Work in its entirety in strict accordance with the Contract Documents.
- 1.06 The procedure for withdrawal of bids and bid award public notification is set forth in the Instructions to Bidders.
- 1.07 Bids will be considered on a lump sum basis for the entire work described in the Contract Documents.
- 1.08 The Owner will not discriminate against a bidder solicitation or awarding of contracts because of race, religion, color, sex, national origin, age, disability, or any other basis prohibited by state law relating to discrimination in employment. Minority contractors and small business enterprises are invited and encouraged to submit bids in response to this solicitation. Each bidder shall indicate on its Bid Form whether it is a Small Business Firm or a Minority Business Firm, as such terms are defined in the instructions to Bidders. All responsive and responsible bidders will receive equal consideration for award.
- 1.09 Drawings and Specifications may be examined at the Owner's Office of Design and Construction Services Gatehouse Administrative Office location by appointment. Contract document sets may be obtained from the **Owner's Office of Design and Construction**. Bidding documents will be made available electronically to prospective bidders on Monday April 11, 2022 from www.fcps.edu search for Design and Construction Current Solicitations, quick on the link and scroll down to current solicitations.
- 1.10 The Contractor shall perform Substantial and Final Completion of Work on or before the respective Substantial and Final Completion dates established in Section 01010, Summary of Work. It is the intent of the Owner to assess liquidated damages in the amounts shown in Section 01010 in the event that these dates are not met.
- 1.11 Unless cancelled or rejected, a responsive bid from the lowest responsible bidder shall be accepted as submitted, except that if the bid from the lowest responsible bidder exceeds available funds, the School Board may negotiate with the apparent low bidder to obtain a contract price within available funds.

The conditions and procedures for such negotiation are set forth in the current version of School Board Policy 8240, the text of which is available for review at www.fcps.edu, search for "Policies, Regulations and Notices", click this link, then select "Find a Policy".

In summary, negotiation may be undertaken on behalf of the School Board where, and to the extent such, is deemed to be in the best interests of the School Board. Office of Design & Construction staff, along with the project's design professionals and the apparent low bidder, will develop appropriate scope modifications that do not impair the proposed function of the project. These modifications will be priced by the apparent low bidder and reviewed by the Office of Design and Construction and the project's design professionals, which may recommend an award on that basis if such is deemed to be in the best interests of the School Board and the price is within available funds.

THE COUNTY SCHOOL BOARD OF FAIRFAX COUNTY, VIRGINIA

Stella Pekarsky
Chair

Dr. Scott S. Brabrand
Superintendent of Schools

Jeffrey K. Platenberg
Assistant Superintendent
Facilities and Transportation
Services

Jessica Gillis
Executive Director, Capital Improvements and Planning
Facilities & Transportation Services

END OF SECTION

SECTION 00100

INSTRUCTIONS TO BIDDERS

1. QUALIFICATION OF BIDDER

- A. **Sandburg Middle School Science Lab.**
- B. Each bidder shall be required to be licensed pursuant to Title 54.1, Chapter 11 of the Virginia Code, as amended, before such bidder's bid may be submitted to the Owner and be eligible for consideration hereunder. Each bidder shall place its Virginia Contractor License Number on the outside of the envelope containing its proposal and in the space provided therefore on the signature page of the Bid Form.
- C. The bidder shall be qualified by experience, financing, organization, scheduling and coordination ability, and shall have the necessary labor and equipment to perform the work called for in the Contract Documents. The bidder shall have experience with work of similar type and size to that called for in the Contract Documents and such experience shall be based upon projects that have been completed within the last five years.

2. LICENSE AND REGISTRATION REQUIREMENTS

- A. All firms doing business in Fairfax County shall obtain a license as required by Chapter 4, Article 7, of the Code of the County of Fairfax, Virginia, as amended, entitled "Business, Professional and Occupational Licensing (BPOL) Tax." Questions concerning the BPOL tax should be directed to the Fairfax County Department of Tax Administration, telephone number: (703) 222-8234.
- B. Any foreign corporation transacting business in Virginia shall obtain a Certificate of Authority, as required by Section 13.1-757 of the Code of Virginia, from the Virginia State Corporation Commission, Post Office Box 1197, Richmond, Virginia 23218. The Commission may be reached at (804) 371-9733. The consequences of failing to secure a Certificate of Authority are set forth in § 13.1-758 of the Virginia Code, as amended.
- C. A current State Corporation Commission Corporate Identification number. *Effective July 1, 2010, a company is required to provide FCPS a state authorization number to transact business in the state of Virginia. To obtain a State Corporation Commission Corporate Identification number, contact the state commission at 804-371-9733 or 1-800-552-7945, or <https://www.scc.virginia.gov/index.aspx>, email: sccinfo@scc.virginia.gov or The State Corporation Commission, Post Office Box 1197, Richmond, Virginia 23209.*

3. QUESTIONS AND COMMUNICATIONS; ISSUANCE OF ADDENDA

- A. All contact between prospective Bidders and the Owner with respect to this solicitation will be formally held at scheduled meetings or will be conducted in

writing through the Owner's Office of Design and Construction Services. Except as expressly authorized herein, communications between prospective bidders, their agents and/or representatives and any representative of the Owner concerning interpretation of all or any portion of this solicitation are prohibited and may not be relied upon for any purpose. No interpretation of the meaning of these documents will be made to any bidder orally.

- B. Any question or request for an interpretation must be in writing and submitted: (i) by mail or hand delivery addressed to Architect and Owner as indicated on the cover page to this solicitation; or (ii) by fax to Alfredo Bsurto, Design and Construction Services 571-423-2267 and the Senior Buyer at 571-423-2317. In order to be eligible for consideration, a question or request for interpretation must be received on or before the deadline. Deadline will be established in the Pre-Bid Conference referenced in section 00020 ("Invitation to Bid"). Any and all such responses, interpretations and any supplemental instructions will be returned in writing to the prospective bidder requesting such interpretation, or will be in the form of written addenda. It shall be the responsibility of each bidder to ensure that all addenda are acquired. The addenda are acquired at www.fcps.edu, search for "Design and Construction", select "Design & Construction" Services-Current Solicitations', scroll to 'Current Solicitations'. Any issued addenda in connection with this project will be posted under 'Current Solicitations'. The bidder may also call the Alfredo Bsurto, Design and Construction Services 571-423-2282 and Senior Buyer at 571-423-2414 prior to bid submission in order to determine whether any addenda have been issued in connection with this solicitation." Notwithstanding any provision to the contrary, the failure of any bidder to receive any such addenda or interpretations shall neither constitute grounds for withdrawal of a bid nor relieve such bidder from any obligation under his Bid as submitted. All addenda so issued shall become part of the Contract Documents.
- C. The bidders for this Project are notified that the site for performance of the Work is "unclassified" and that, as such, complete, accurate and/or reliable information regarding surface and subsurface conditions likely to be encountered during performance of the Work is not available. Each bidder shall be provided full and complete access to the site of the Work (but only upon prearrangement with the Office of Design & Construction as to all aspects of the site visit) in order to conduct, at its expense, such tests and investigations of the site as it deems appropriate under the circumstances (and of which it has provided ten (10) days advance written notice to Owner) in order to evaluate and satisfy itself as to the surface and subsurface conditions likely to be encountered during performance of the Work.

Bidders which do not comply with the foregoing prearrangement and notice provisions shall not be permitted to visit the site or to conduct tests and investigations of the site.

It is the intent of these Contract Documents that the successful bidder for this Project shall bear full and complete responsibility for all surface and subsurface

conditions, whether known or unknown, reasonably foreseeable or not, that shall be encountered during the performance of the Work and that, as such, each bidder shall include in its bid price for the Work an amount that it deems sufficient, in its sole and absolute discretion, to protect such bidder from the increased costs of performance that it may incur as a result of its assumption of responsibility for all such surface and subsurface conditions. Notwithstanding any provision in the Contract Documents to the contrary, the successful bidder shall in no event be entitled to additional compensation, time or other relief from its obligations under the Contract Documents as a direct or indirect result of surface or subsurface conditions encountered during performance of the Work. Pursuant to the Contract Documents, the successful bidder shall waive any and all claims against the Owner and the Architect that such bidder has, or may have in the future, arising out of or in connection with surface and subsurface conditions encountered during performance of the Work. In the event that the Owner or the Architect (or any of its or their representatives) provide the bidders with access to or copies of any reports, data or other materials or information pertaining to the surface or subsurface conditions at the site of the Project, each bidder shall: (a) acknowledge that such reports, data or other materials or information were supplied without representation or warranty as to the accuracy or completeness thereof; and (b) certify that it did not rely upon any such information in tabulating its bid price for the Work.

4. BID SECURITY

- A. Each bid shall be accompanied by a bid bond in an amount equal to five percent (5%) of the total amount of the principal's bid on the form prescribed herein (Section 00301). The bid bond shall be issued by a surety company licensed to conduct business as a surety in the Commonwealth of Virginia and otherwise satisfying any further requirements with respect to sureties set forth in the General Conditions. In lieu of a bid bond, a bidder may submit a certified check, cashier's check or cash escrow in the face amount required for the bond. Such bid security shall be given as a guarantee that the bidder will enter into a contract and provide the required contract security and insurance if awarded the work.
- B. The bid security of the unsuccessful bidders will be returned on or before the date that is five (5) days after the execution of the contract or, if no such contract shall have been executed, on or before the date that is 60 days after the date of opening of the bids. The bid security of the successful bidder will be returned only after such bidder shall have executed the agreement and furnished the contract security and evidence of insurance required hereunder.
- C. If the bidder to whom the Contract is awarded refuses or neglects to execute the agreement or fails to furnish the required contract security and evidence of insurance within ten (10) days after receipt of the notice, the amount of such bidder's bid security shall be forfeited to the Owner; provided, however, that no such forfeiture shall exceed the lesser of: (i) the difference between the bid for which the bond was written and the next low bid; and (ii) the face amount of the bid bond. If the bidder to whom the contract is awarded refuses or neglects to

execute the agreement or fails to furnish the required contract security and evidence of insurance, then the award of the contract may be annulled and the Owner may: (i) award a contract hereunder to the next best bidder and such bidder shall fulfill every requirement set forth in these documents as if it were the original party to whom the award was made; or (ii) reject all of the bids submitted hereunder, as its interest may require. Except as provided herein with regard to withdrawal of bids, no plea of mistake in the bid shall be available to the bidder for the recovery of its bid security or as a defense to any action based upon such bidder's failure or refusal to execute a contract and to furnish the required contract security and evidence of insurance.

5. CONTRACT SECURITY

- A. Within ten (10) days after issuance of a Notice of Award, the successful bidder shall execute and deliver to the Owner an Agreement on the form prescribed herein and shall furnish the following: (1) two (2) original copies of the performance bond in an amount equal to 100 percent of the contract sum conditioned upon the faithful performance of the contract in strict conformity with the plans, specifications, and conditions of the contract; (2) two original copies of the payment bond in an amount equal to 100 percent of the contract sum conditioned upon the prompt and faithful payment of all persons and entities who have and fulfill contracts which are directly with the contractor for performing labor or furnishing materials in the prosecution of the work provided for in the contract; and (3) one or more certificates of insurance evidencing the types and amounts of insurance coverage required to be maintained by the Contractor under the Contract Documents.
- B. Each of the following Subcontractors shall submit Performance and Payment Bonds in the amount of one hundred percent (100 percent) of its subcontract amount. Bonds shall (i) be substantially in the form herein provided (Sections 00302 and 00303), (ii) name the Contractor as obligee, and (iii) be issued by a surety company licensed to conduct business in Virginia. Cost of said Bonds shall be included in the Contract Sum:
- 1) Electrical
 - 2) Plumbing / HVAC
 - 3) Sprinkler
 - 4) Roofing
 - 5) Structural Steel, Joists & Decks (New Schools Only)
 - 6) Site and Site Utilities
- C. Any performance or payment bond required hereunder shall be in the form included in these Contract Documents and shall be executed by a surety company that is legally authorized to transact business as a surety in the Commonwealth of Virginia and that otherwise satisfies any requirements with respect to sureties set forth in the General Conditions. In lieu of a payment and/or performance bond, the successful bidder may furnish a certified check or cash escrow in the face amount(s) required for such bond(s).

6. BIDS

- A. In order to be entitled to consideration hereunder, bids shall be made in accordance with the following instructions.
- 1) Before submitting a bid, bidders shall visit the site of the work, fully inform themselves as to all existing conditions and limitations, and shall include in the bid a sum to cover the cost of all items included in the Contract Documents.
 - 2) Bids shall be made in duplicate upon the Bid Form, a copy of which is bound herein. Bids shall be completed, including each and every item; bids shall be stated both in writing and in figures. The signatures of all persons shall be in longhand. The completed Bid form shall be without erasures or alterations.
 - 3) No Bid shall contain any recapitulation of the work to be performed, and no alternate bid will be considered unless called for. No exceptions, exclusions or qualifications, unless expressly authorized, shall be permitted on the Bid Form. No oral, telegraphic or telephonic bids, or modifications, either to the Bid Form or the Bid Envelope, shall be considered.
 - 4) Bids shall be time-stamped and deposited in the bid box in Suite 3400, 8115 Gatehouse Road, Falls Church, VA 22042, on or before the day and hour set for the opening of bids, enclosed in an opaque sealed envelope and bearing the title of the work, name of bidder and bidder's Virginia Contractor License Number.
 - 5) Bids shall be firm and irrevocable for a period of 60 days following the date of opening of the bids.

7. OPENING OF BIDS

Bids will be opened and read aloud at the time and place set forth in the Invitation to Bid. Bidders, their representatives, and other interested persons may be present at the opening of the bids. In the event that only one Bid Form is received by the Owner in response to the Invitation to Bid, the Owner may, in its discretion, decline to open such bid and return the unopened envelope to the bidder.

8. LATE BIDS

Any Bids or unsolicited materials relating to a Bid that are received by the Owner after the date and time specified for the submission of bids will not be eligible for consideration by the Owner. Bids received after the bid submission deadline will be returned to the Bidder unopened, providing that sufficient bid identification information is shown on the outside of the bid envelope.

9. WITHDRAWAL OF BIDS:

- A. A bidder may withdraw his bid from consideration if the price bid was substantially lower than the other bids due solely to a mistake in the bid, provided the bid was submitted in good faith, and the mistake was a clerical mistake as opposed to a judgment mistake, and was actually due to an unintentional arithmetic error or an unintentional omission of a quantity of work, labor, or material made directly in the compilation of a bid, which unintentional arithmetic error or unintentional omission can be clearly shown by objective evidence drawn from inspection of original work papers, documents, and materials used in the preparation of the bid sought to be withdrawn.
- If a bid contains both clerical and judgment mistakes, a bidder may withdraw his bid from consideration if the price bid would have been substantially lower than the other bids due solely to the clerical mistake, that was an unintentional arithmetic error or an unintentional omission of a quantity of work, labor, or material made directly in the compilation of a bid that shall be clearly shown by objective evidence drawn from inspection of original work papers, documents, and materials used in the preparation of the bid sought to be withdrawn.

- B. The following is the procedure for withdrawal of a bid and is stated in the advertisement for bids:

- 1) A bidder, who seeks to withdraw his bid in accordance with this provision, shall give notice in writing of his claim of right to withdraw his bid within two business days after the conclusion of the bid opening procedure and shall submit original work papers with such notice to:

Jessica Gillis, Executive Director
Fairfax County Public Schools
Office of Design and Construction
8115 Gatehouse Road, Suite 3400
Falls Church, VA 22042
Telephone Number 571-423-2280; Fax 571-423-2217
Email: jrgillis@fcps.edu

The mistake shall be proved only from the original work papers, documents, and materials delivered as required herein. The work papers, documents, and materials submitted by the bidder shall, at the bidder's request, be considered trade secrets or proprietary information subject to the conditions of subsection F of Section 2.2-4342 of the Code of Virginia.

- C. No bid may be withdrawn when the result would be the awarding of this Contract to another bidder in which the ownership of the withdrawing bidder is more than five percent (5%).
- D. If a bid is withdrawn, the lowest remaining bid shall be deemed to be the low bid. No bidder who is permitted to withdraw a bid shall, for compensation, supply any

material or labor, or perform any subcontract or other work agreement for the person or firm to whom the Contract is ultimately awarded or otherwise benefit, directly or indirectly, from the performance of the project for which the withdrawn bid was submitted.

- E. The Office of Design and Construction (D&C), acting for the School Board, shall notify the bidder in writing within five (5) business days of its decision regarding the bidder's request to withdraw its bid. If D&C denies the withdrawal of a bid, it shall state in such notice the reasons for its decision and award the contract to such bidder at the bid price, provided such bidder is a responsible and responsive bidder. At the same time that the notice is provided, D&C shall return all work papers and copies thereof that have been submitted by the bidder.

10. **CANCELLATION, REJECTION OF BIDS; WAIVER OF INFORMALITIES**

The Owner reserves the right to cancel this solicitation, to accept or reject any or all bids submitted hereunder, or to waive any informality in any one or all bids received.

11. **AWARD OF CONTRACT**

- A. The Contract will be awarded, if at all, under the terms and conditions of the Contract Documents to the lowest responsive and responsible bidder, as determined by the Owner, with due consideration given to the ability of the bidder to cooperate with separate contractors for the Project and to coordinate, schedule and complete the Work within the prescribed time period. The Owner reserves the right to award the Contract that would be in the best interests of the Owner.
- B. Public notice of the award of contract or the announcement of the decision to award a contract will be set forth on the website of Fairfax County Public Schools www.fcps.edu, search for "Bid Results", select "Design and Construction Services Current Solicitations", scroll to Bid Results. While school division staff may communicate procurement results to bidders or offerors, each bidder or offeror has the responsibility to monitor the FCPS website for its own purposes.
- C. The Owner reserves the right to require submission of references in sufficient time to make inquires regarding the responsibility of the bidder before making the award, and the right to require a recent financial statement from the bidder if the Owner deems it necessary. The Owner also emphasizes its intention not to award any contract to a bidder whose past performance shows his firm to be generally late in performance of construction contracts. The ability of the low bidder to provide the required bonds will not in and of itself establish the responsibility of the bidder.
- D. The Owner reserves the right to defer award of any Contract for a period of 60 days after the due date for the bids. Bid prices shall be binding for 60 days following the due date for proposals, unless period for award of bids hereunder is

extended by mutual consent of all parties, in which case bid prices shall be binding for such longer period as shall have been agreed upon.

- E. Under circumstances where no add alternates are included on the Bid Form, the low bidder shall be determined by the Owner based upon a comparison of the base bid amounts set forth on such Bid Forms. In the event that one or more add alternates are included on the Bid Form, the low bidder shall be determined by the Owner based upon the aggregate amount of: (i) the base bid, and (ii) any add alternates selected by the Owner. Add alternates shall be selected by the Owner based upon its authorized construction budget and the Owner's needs and requirements at the time of the bid opening. The Owner reserves the right, in its sole discretion, to select or reject any or all of the add alternates (or to select any combination of add alternates) included in the Bid Form. The Owner shall determine the low bidder for the base bid and any selected add alternates by means of a "blind" bid review process which shall operate generally as follows:
- 1) At the bid opening, a designated staff member from the Owner's Office of Design and Construction shall complete two bid tabulation sheets, the first of which shall identify each bidder by name, and the second of which shall omit the names of the bidders and shall refer to each bidder by a generic term such as "Contractor A" and "Contractor B." The Director of the Owner's Office of Design and Construction or his designee (the "Director") shall not attend the bid opening.
 - 2) Following the bid opening, school system staff shall submit only the second, anonymous bid tabulation sheet to the Director for his or her review and consideration. The Director shall determine the low bidder based on the aggregate amount of the base bid and any selected add alternates set forth on the second anonymous bid tabulation sheet, and shall circle and initial his or her choices on such form.
 - 3) Once the Director's selections have been made, the two tabulation sheets shall be compared, and the identity of the low bidder for the base bid and any selected add alternates shall be established.
- F. Any quantities set forth on the Bid Form represent estimates only and are included solely for the purpose of evaluating and comparing the bids received.
- G. A "responsive bidder" shall mean a bidder who has submitted a bid which conforms, in all material respects, to the requirements of the bidding documents.
- H. A "responsible bidder" shall mean a bidder who has the capability, in all respects, to perform fully the Contract requirements and the moral and business integrity and reliability, which will assure good faith performance and who has been prequalified, if required.

- I. The Office of Design and Construction reserves the right to require from the bidder:
 - 1) Submission of references within two (2) business days after the opening of the bids;
 - 2) A list of projects completed by bidder within the last two (2) years which are similar in size and scope to the work described in this solicitation; and/or
 - 3) Financial statements indicating current financial status, prepared in accordance with generally accepted accounting principles, by a duly licensed CPA.
- J. The successful low bidder, upon notice of award of contract, shall submit a completed "Responsible Land Disturber Certification" through FCPS, to Plan and Document Control, Office of Land Development Services (LDS), Fairfax County DPWES.

12. PROTEST OF AWARD OR DECISION TO AWARD

- A. Any bidder may protest the award or the decision to award this Contract by submitting a protest in writing to the Assistant Superintendent, or designee, for the Department of Facilities and Transportation Services 8115 Gatehouse Road, Suite 3400, Falls Church, VA 22042, no later than ten (10) days after the award or the announcement of the decision to award, whichever occurs first; however, that no protest shall lie for a claim that the selected bidder is not a responsible bidder.

The written protest must include the basis for the protest and the nature of the relief sought. The Assistant Superintendent, or designee, for the Department of Facilities and Transportation Services shall issue a decision in writing within ten (10) days of receipt of the protest, stating the reasons for the action taken.

This written decision shall be final unless the bidder appeals within ten (10) days of receipt of the written decision by instituting legal action as provided in the Code of Virginia.

Nothing in this section shall be construed to permit a bidder to challenge the validity of the terms and conditions of the Invitation to Bid.

- B. If, prior to the award, it is determined that the decision to award is arbitrary and capricious, then the sole relief shall be a finding to that effect.

If, after an award, it is determined that an award of a contract was arbitrary or capricious, then the sole relief shall be as hereinafter provided.

Where the award has been made but performance has not yet begun, the performance may be enjoined.

Where the award has been made and performance has begun, the Assistant Superintendent, or designee, for the Department of Facilities and Transportation Services may declare the Contract void upon a finding that the action is in the best interest of the school division.

Where a contract is declared void, the performing contractor shall be compensated for the cost of performance at the rate specified in the Contract up to the time of such declaration. In no event shall the performing contractor be entitled to lost profits.

- C. Pending final determination of a protest, the validity of the award shall not be affected by the fact that a protest has been filed.
- D. An award need not be delayed for the period allowed a bidder to protest, but in the event of a timely protest, no further action to award this Contract will be taken unless the Assistant Superintendent, or designee, for the Department of Facilities and Transportation Services makes a written determination that proceeding without delay is necessary to protect the public interest or that the bid will expire.

13. SUBSTITUTIONS; PRE-APPROVED SUPPLIERS

- A. Unless otherwise provided in the bidding documents, the name of a certain brand, make, or manufacturer is intended to restrict bidders to the specific brand, make, or manufacturer specified. Substitute materials proposed as equal to materials specified shall be submitted in writing to the Owner by the bidder with full substantiating data for evaluation no later than ten (10) days prior to bid opening; substitute materials shall not be considered for evaluation after this time period. Proposed substitute materials which equal or exceed the performance standard of the specified materials in the sole judgment of the Owner will be included in an "Approved Substitute Materials Bulletin" to be issued prior to the bid opening date.
- B. For purposes of this solicitation and any resulting contract, the Owner's designation of any one or more manufacturers, subcontractors and/or suppliers as "pre-approved" shall signify only that such manufacturers, subcontractors and suppliers previously have submitted work samples to the Owner that satisfied the Owner's requirements. The Owner's designation of any one or more manufacturers, subcontractors and/or suppliers as "pre-approved" shall in no event be deemed or construed to be a representation or warranty on the part of the Owner of any such manufacturer's, subcontractor's or supplier's capability of or capacity for (in terms of financial wherewithal, personnel and equipment availability, managerial ability, product quality or otherwise) performing or furnishing any portion of the Work in accordance with the requirements of this solicitation. Each bidder shall conduct such independent investigation into the

qualifications, experience and abilities of its selected manufacturers, subcontractors and suppliers, as it deems appropriate under the circumstances.

14. SMALL AND MINORITY BUSINESS ENTERPRISES

- A. The Fairfax County Human Rights Ordinances and relevant Federal and State Laws, orders and regulations require Fairfax County to ensure that its procurement practices are non-discriminatory and promote equality of opportunity for Small, Minority and Women-Owned Business Enterprises.
- B. Small Business/Organization is an independently owned and operated business which, together with affiliates, has 250 or fewer employees or average annual gross receipts of \$10 million or less averaged over the previous three years.
- C. Minority Business is a business concern that is at least 51 percent owned by one or more minority individuals or in the case of a corporation, partnership or limited liability company or other entity, at least 51 percent of the equity ownership interest in the corporation, partnership or limited liability company or other entity is owned by one or more minority individuals and both the management and daily business operations are controlled by one or more minority individuals. Such individuals shall include Asian American, African American, Hispanic American, Native American, Eskimo or Aleut.
- D. Woman-Owned Business is a business concern that is at least 51 percent owned by one or more women who are U.S. citizens or legal resident aliens, or in the case of a corporation, partnership or limited liability company or other entity, at least 51 percent of the equity ownership interest is owned by one or more women who are U.S. citizens or legal resident aliens, and both the management and daily business operations are controlled by one or more women who are U.S. citizens or legal resident aliens.

15. CONFLICT OF INTEREST

The provisions of the State and Local Government Conflict of Interests Act (Va. Code § § 2.2-3100 *et seq.*) and Article 6 of the Virginia Public Procurement Act entitled "Ethics in Public Contracting" (Va. Code Ann. § § 2.2-4367 *et seq.*) are incorporated herein by reference, and all Bidding Documents shall be deemed to incorporate appropriate reference to these provisions. The Contractor shall incorporate the above conflict-of-interest clause in each subcontract.

16. GOVERNING LAW

- A. The Contract Documents shall be governed by and construed in accordance with the laws of the Commonwealth of Virginia, without reference to conflict of laws principles. In the event that there is a conflict between any provision set forth in the Contract Documents and the Code of Virginia, and specifically Section 2.2-4300 *et seq.* (the "Virginia Public Procurement Act"), the Code of Virginia shall control. The Contractor is cognizant of the provisions of the Comprehensive

Conflict of Interest Act (Va. Code Ann. Section 2.2-3100 through 2.2-3127) and Article 6 of the Virginia Public Procurement Act entitled "Ethics in Public Contracting" (Va. Code Ann. Section 2.2-4367 through 2.2-4377).

- B. Legal Provisions Deemed Included: Each and every provision of any law 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 and if, through mistake or otherwise, any such provision is not inserted or is not correctly inserted, then upon application of either party the Contract shall forthwith be physically amended to make such insertion. The Owner does not discriminate against faith-based organizations.

17. COMPLIANCE WITH LAWS; PERMITS, FEES, AND NOTICES

The successful bidder shall be required to comply with all local, state and federal laws, rules, regulations and ordinances applicable to the contract and to the work contemplated hereby. The successful bidder shall be required to obtain, at its expense, all permits, licenses and other authorizations necessary for the prosecution of the Work, except that the Owner shall obtain, at its expense, the General Building Permit and any easement agreement necessary and indispensable to the completion of the Project. The successful bidder shall be responsible for giving all notices and complying with all laws, ordinances, rules, regulations and directives of any public authority bearing on the performance of the work.

18. CONSTRUCTION SAFETY

- A. The Contractor shall comply with the construction safety standards promulgated by the U.S. Department of Labor and by the Virginia Department of Labor and Industry.

END OF SECTION

SECTION 00300

BID FORM

Name of Bidder: _____

Bidder's Mailing
Address for Notices: _____

Bidder's Principal
Office Address: _____

Telephone No.: _____
Fax No.: _____
Email Address: _____

Bidder's Designated Contact Person: _____

TO: FAIRFAX COUNTY SCHOOL BOARD (the "Owner")
8115 Gatehouse Road, Suite 3400
Falls Church, VA 22042

RE: **Sandburg Middle School Science Lan IFB-#22-019**

Ladies and Gentlemen:

The undersigned Bidder, having examined the Drawings, Specifications and remaining Contract Documents for the above-referenced Project and having visited the site and examined all conditions affecting the Work, hereby proposes and agrees to furnish all labor, supplies, materials, and equipment and to perform all actions necessary to complete the entire Work in strict accordance with the Contract Documents for the following bid amount (to be set forth in words and in figures in the spaces set forth below):

Base Bid Amount:

_____ Dollars and _____ Cents; \$ _____

[Insert Bid Alternates, if any]

1. **Certain Agreements of the Bidder.** The undersigned Bidder hereby makes the following representations, warranties and covenants to the Owner, which representations, warranties and covenants are intended to be relied upon by the Owner in making an award of the above-referenced Contract.

A. The undersigned Bidder hereby acknowledges that time is of the essence to the Contract and agrees to commence the Work on the date set forth as the date for

commencement of the Work in the Notice to Proceed or, if no such date is specified, then immediately after receipt of the Notice to Proceed. The undersigned covenants and agrees to fully complete the Work prior to the expiration of the Contract Period, as such term is defined in the Contract Documents. The undersigned hereby declares that the Contract Period is sufficient to assure timely and satisfactory completion of the Work. The undersigned Bidder acknowledges that, in the event that the Work is not completed within the timeframes established in the Contract Documents, then he will be assessed liquidated damages in the amount set forth in Section 01010, Summary of Work, for each day that the time consumed in completing the Work exceeds the time provided therefor in the Contract Documents.

- B. The undersigned Bidder hereby certifies that the Bid Amount includes: (a) all labor, supplies, materials, equipment, and permits required to complete the Work in its entirety in strict accordance with the Contract Documents; (b) all costs associated with the successful bidder's responsibilities for coordination and cooperation with the Owner and any Separate Contractors at the site of this Project; (c) all costs associated with the successful bidder's responsibilities with regard to surface and subsurface conditions that may be encountered during performance of the Work; (d) all applicable sales and use taxes; and (e) allowances, if any, contemplated by the Contract Documents.
- C. By signing this Bid, the undersigned Bidder hereby certifies that: (i) neither the Bidder nor any employee of the Bidder who will have direct contact with students has been convicted of a felony or any offense involving the sexual molestation or physical or sexual abuse or rape of a child; and (ii), unless expressly disclosed in an attachment to this Bid on the Bidder's letterhead stationery, neither the Bidder nor any employee of the Bidder who will have direct contact with students has been convicted of a crime of moral turpitude.
- D. The undersigned Bidder hereby represents and warrants to the Owner that the Bidder: (a) has reviewed and thoroughly understands the scope, terms and conditions set forth in this solicitation; (b) has made due inquiry of the School Board as to the existence of any addenda issued in connection with this solicitation; (c) is satisfied that it has received any and all such addenda and the Bidder has taken the contents thereof into consideration when preparing and submitting this Bid; and (d) accepts full and complete responsibility for the receipt of any and all such addenda and waives any claim of mistake or error in its Proposal based upon its failure, in fact, to have received any one or more addenda.
- E. The undersigned Bidder further hereby represents and warrants to the Owner that the Bidder: (a) has been provided the opportunity to conduct, at its expense, such tests and investigations of the site as it deems appropriate under the circumstances in order to evaluate and satisfy itself as to the surface and subsurface conditions likely to be encountered during performance of the Work; (b) if successful hereunder, shall bear full and complete responsibility for all surface and subsurface conditions, whether known or unknown, reasonably foreseeable or not, that shall be encountered during performance of the Work; and (c) has included in its bid price an amount that it deems sufficient, in its sole

and absolute discretion, to protect such bidder from the additional costs of performance that it may incur as a result of its assumption of responsibility for all surface and subsurface conditions encountered during performance of the Work. The Bidder hereby acknowledges that any reports, data, or other materials or information supplied by or on behalf of the Owner and/or the Architect with regard to surface and/or subsurface conditions at the site of the Project were given without representation or warranty as to the accuracy or completeness thereof and that the bidder did not rely upon any such information in tabulating its bid price for the Work.

- F. The undersigned Bidder covenants and agrees that in the event this Bid is one of the three lowest, as determined by Owner, Bidder will deliver to the Owner, within 48 hours after the bid opening, a written list of subcontractors (including names, address, and telephone number) for the following portions of the Work:

Electrical	Food Service Equipment
Plumbing	Roofing
Mechanical	Automatic Temperature Controls
Communication and Special Systems	Casework
Site and Site Utilities	Masonry
Structural Steel, Joists and Decks	Sprinkler

2. “Preapproved” or “approved” Manufacturers, Subcontractors and/or Suppliers.

- A. For purposes of this solicitation and any contract which may result herefrom, the Owner’s designation of any one or more manufacturers, subcontractors and/or suppliers as “preapproved” or “approved” shall signify only that such manufacturers, subcontractors and suppliers previously have submitted work samples to the Owner which satisfied the Owner’s requirements for a specified portion of the Work. The Owner’s designation of any one or more manufacturers, subcontractors and/or suppliers as “preapproved” or “approved” shall in no event be deemed or construed to be a representation or warranty on the part of the Owner of any such manufacturer’s, subcontractor’s or supplier’s capability or capacity (in terms of financial wherewithal, personnel and equipment availability, managerial ability or otherwise) of performing any portion of the Work in accordance with the requirements of the Contract Documents. Each Bidder shall conduct such independent investigation into the qualifications, experience and abilities of its selected manufacturers, subcontractors and suppliers as it deems appropriate under the circumstances.

- B. The Contractor hereby acknowledges and agrees that, as between the Owner and the Contractor, the Contractor shall bear full and complete responsibility for the performance of its subcontractors, manufacturers and suppliers, regardless of whether any such subcontractor, manufacturer or supplier was designated as “preapproved” or “approved” by the Owner. The Owner’s designation of any one or more manufacturers, subcontractors and/or suppliers as “preapproved” shall in no event be deemed or construed to be a representation or warranty on the part of the Owner of any such manufacturer’s, subcontractor’s or supplier’s capability or capacity (in terms of financial wherewithal, personnel and equipment availability, managerial ability or otherwise) of performing any portion of the Work

in accordance with the requirements of the Contract Documents. The Contractor is responsible for conducting such independent investigation into the qualifications, experience and abilities of its selected manufacturers, subcontractors and suppliers, as it deems appropriate under the circumstances.

3. Miscellaneous Provisions.

- A. In the event that changes in the Work, not covered in the Contract Documents and involving added cost, are directed to be performed on a cost-plus fee basis, such fee shall be calculated in accordance with Section No. 01153, paragraph 1.06.
- B. The Owner reserves the right to defer award of Contract for a period of 60 days after the date for submission of bids, or for such longer period as shall be agreed upon by the parties in writing.
- C. The Owner reserves the right to accept or reject any proposed subcontractor, supplier, or materials/product proposed as equal to that specified herein.
- D. Minority or small business firms information:

Please check the following information relevant to your firm: (See Instructions to Bidders for definitions).

Virginia Small Business and Supplier Diversity Certification Number: _____
SWaM Certification Type

Minority Business Firm: Yes _____ No _____

Small Business Firm: Yes _____ No _____

Women-Owned Firm: Yes _____ No _____

The above information is requested for statistical purposes only. All bidders tendering responsive and responsible bids hereunder will receive equal consideration for award.

4. Fairfax County Construction Safety Resolution. The Contractor shall abide by, and shall be subject to, the Fairfax County Construction Safety Resolution, as adopted by the Fairfax County Board of Supervisors on December 8, 2003, and as excerpted and modified below.

- A. Each bid submitted for a contract for construction, alteration, and/or repairs, shall include a list of all the following actions:
 - 1) Willful violations, violations for failure to abate, or repeated violations, for which the Bidder was cited by (a) the United States Occupational Safety and Health Administration; (b) the Virginia Occupational Safety and Health Administration; or (c) the occupational safety and health plan for any other public jurisdiction; or

- 2) Three (3) or more serious construction safety violations for which the Bidder was cited by the (a) United States Occupational Safety and Health Administration; or (b) the Virginia Occupational Safety and Health Administration; or (c) the occupational safety and health plan from any other public jurisdiction.
 - 3) Termination of a contract between the Bidder and any public entity by its purchasing agent or his designee for safety violations.
- B. If the Bidder has not received or been the subject of any such violations referenced in paragraph A in the three (3) years prior to the bid submission, then the Bidder shall so indicate by certification of Safety Violations. The Bidder will also indicate on this form each state in which work was performed in the three (3) years prior to the bid submission.
- C. No construction contract, as discussed above, may be bid on by any Bidder or contractor who has been the subject of any citations for the type and number of violations listed in paragraph A, above, which have become final within three (3) years prior to bid submission.
- 1) Notwithstanding the language of paragraph C, above, any Bidder or contractor who has been the subject of a violation, as described in paragraph A(1), which has become final within three (3) years prior to bid submission, may bid, if the Bidder or contractor satisfactorily passes an eligibility evaluation, as determined by Owner.
 - 2) Notwithstanding the language of paragraph C, above, any Bidder or contractor who has been the subject of the type and number of violations as described in paragraph A(2), which have become final within three (3) years prior to bid submission, may bid, if the Bidder or contractor satisfactorily passes an eligibility evaluation, as determined by Owner.
 - 3) Notwithstanding the language of paragraph C, above, any Bidder or contractor who has previously been terminated from a County contract, as described in paragraph A(3), within three (3) years prior to the bid submission, if the Bidder or contractor satisfactorily passes an eligibility evaluation, as determined by Owner.
- D. Prior to bidding on a project under the provisions of paragraph C above, a contractor may request that a determination be made regarding its eligibility to submit a bid on a contract under the terms of this resolution. However, this request for determination and any subsequent adjudication process must be completed prior to submitting a bid on any project and the request for determination (including all information required) must be received by Owner no later than twenty-one (21) days before bids are due, unless otherwise stated in the Advertisement for Bid. The information required to be submitted by the Bidder for evaluation is stated in the County Safety Resolution and is available from the Owner's Office of Design and Construction Services. The determination of eligibility rendered by the Director of Design & Construction or his designee shall be final.

- E. No Contractor or Subcontractor contracting for any part of the contract work shall require any laborer, mechanic, or other person employed in the performance of the contract to work in surroundings or under working conditions which are hazardous or dangerous to his safety, as determined under construction safety standards promulgated by the U. S. Department of Labor or by the Virginia Department of Labor and Industry.
- F. No contractor awarded a School Board construction contract shall knowingly employ or contract with any person, company, or corporation for services pursuant to that contract if such person, company, or corporation could not have been awarded such contract due to the restrictions above.

By signing this Bid, the undersigned Bidder confirms that it has not received or been the subject of safety violations in the three (3) years prior to the date of this bid submission, and is in compliance with the requirements above.

The undersigned Bidder hereby acknowledges and agrees that the Owner has the right to reject any or all bids and to waive any informality in a bid. Except as expressly set forth in the Instructions to Bidders, this Bid, once submitted, may not be withdrawn for a period of 60 days from the date fixed for opening of the Bids.

Accompanying this Bid, at the election of the undersigned Bidder, is: (I) a certified check, (ii) a cash escrow, or (iii) a bid bond in an amount equal 5% of the total amount of the Principals's Bid.

Bidder's disclosure pursuant to Safety Resolution (as stated above):

Safety Violation(s): _____

List of public jurisdictions (states and District of Columbia) in which Bidder performed work in the 3 years prior to bid submission:

(Legal Name of Bidder)

By: _____
 (Signature of Bidder's Authorized Representative)

Printed Name: _____
 Title: _____
 Date: _____

Bidder's Virginia Contractor's License Number: _____

Bidder's Virginia State Corporation Commission ID Number (SCC ID#): _____

Fairfax County Business/Professional/Occupation License Number (BPOL #): _____

State in which Bidder's Principal Office is Located: _____

END OF SECTION

SECTION 00301

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, _____ of _____ (hereinafter called the "Principal"), and _____, a corporation organized and existing under the laws of the State of _____, with its principal office in _____, and authorized to do business in the Commonwealth of Virginia as a surety (hereinafter called the "Surety"), are held and firmly bound unto FAIRFAX COUNTY SCHOOL BOARD (hereinafter called the "Obligee") in the full and just sum which is equal to 5% of the total amount of the Principal's Bid (as that term is defined below), as submitted to the Obligee (such total amount referred to herein as the "Total Bid"), in good and lawful money of the United States of America, to be paid upon demand of the Obligee, for the payment of such sum well and truly to be made, the Principal and the Surety bind themselves, their respective successors, and permitted assigns, jointly and severally and firmly by these presents. The Total Bid is the aggregate amount (including amounts set forth with respect to any and all Alternates) set forth on the Principal's Bid Form for performance of the work described below, as submitted to and maintained by the Obligee (such Bid Form referred to herein as the "Bid"). The Surety hereby acknowledges and agrees that the Bid shall be deemed to be incorporated by reference in this Bid Bond to the same extent as if set forth fully herein.

WHEREAS, the Principal intends to submit, or has submitted to the Obligee, a Bid for the Principal to perform work for the Obligee, designated as:

(hereinafter called the "Project") and,

WHEREAS, the Principal desires to provide this Bid Bond in lieu of a certified check or cash escrow otherwise required to accompany the Principal's Bid.

NOW THEREFORE, THE CONDITIONS OF THIS OBLIGATION ARE SUCH THAT, if the Bid be accepted by the Obligee, and if the Principal shall, within ten days after the date of receipt of a written Notice of Award from the Obligee or any agency or department thereof, (i) execute a Contract in accordance with the Bid and upon the terms, conditions and price set forth therein, in the form and manner required by the Obligee, (ii) execute a sufficient and satisfactory Performance Bond in the amount of 100% of the total Contract Sum and a sufficient and satisfactory Payment Bond in the amount of 100% of the total Contract Sum, each payable to the Obligee, on a form prescribed by Obligee and with a surety satisfactory to Obligee, and (iii) provide the Obligee with copies of all required insurance policies, then this obligation is to be void; otherwise this obligation shall be and remain in full force and in the event of the failure of any or all of the foregoing requirements to be satisfied within the time period specified above, the Principal and the Surety immediately shall pay to the Obligee, upon demand, the lesser of: (a) the amount hereof and (b) the difference between the Bid and the next low bid for the Project, in each case in good and lawful money of the United States of America, not as a penalty, but as liquidated damages.

Based upon the Surety's present knowledge and information, the Surety knows of no reason why it would not issue payment and performance bonds on behalf of the Principal for the above-

referenced Project. The foregoing statement shall not be construed as a commitment on the part of the Surety to issue either or both of such bonds on behalf of the Principal.

The obligations evidenced hereby shall constitute the joint and several obligations of the Principal, the Surety, and their respective successors and permitted assigns.

Unless the context requires otherwise, capitalized terms not otherwise defined in this Bond shall have the meanings assigned to them in the Contract Documents.

[SIGNATURES ON FOLLOWING PAGE]

IN WITNESS WHEREOF, we have hereunto set our signatures and seals this _____ day of _____ 20____, all pursuant to due authorization.

_____(SEAL)
Principal (Bidder)
By: _____
Name: _____
Title: _____
Address: _____

State of _____

County/City of _____

The foregoing bond was acknowledged before me this _____, 20____, by _____, whose title is _____, on behalf of _____, the Principal

Notary Public

Title or Rank _____
Serial Number, if any _____

_____(SEAL)
Surety
By: _____
Attorney-in-Fact (attach copy of Power of Attorney)
Name: _____
Title: _____
Address: _____

State of _____
County/City of: _____

The foregoing bond was acknowledged before me this _____, 20____, by _____ whose title is Attorney-in-Fact, on behalf of _____, Surety.

Notary Public

Title or Rank _____
Serial Number, if any _____

SECTION 00302

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we, _____ of (hereinafter called the "Principal"), and _____, a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____ and authorized to transact business in the Commonwealth of Virginia as a surety (hereinafter called the "Surety"), are held and firmly bound unto the FAIRFAX COUNTY SCHOOL BOARD (hereinafter called the "Obligee") in the sum of _____ Dollars (\$_____) lawful money of the United States of America for the payment of which well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally and firmly by these presents, to perform all Work in accordance with the requirements of the Contract Documents for the Project.

WHEREAS, the Principal has entered into a certain written agreement with the Obligee, dated as of the ____ day of _____, 20____, (hereinafter called the "Contract"), for _____, which Contract is by reference made a part hereof;

WHEREAS, the Principal is obligated to furnish security with respect to its obligation to perform the work to be performed under the Contract; and

WHEREAS, the Principal desires to furnish this Performance Bond in lieu of a certified check or cash escrow otherwise required to be provided to the Obligee.

NOW THEREFORE, THE CONDITIONS OF THE ABOVE OBLIGATIONS ARE SUCH THAT, if the Principal and its successors or assigns, or any of them shall:

Well and truly and in good, sufficient, and workmanlike manner perform or cause to be performed the Contract, and each and every of the covenants, promises, agreements, warranties, and provisions to be performed by the Principal set forth therein, in strict conformity with the plans and specifications, and complete the same within the time period specified therein, all as may be amended from time to time by the parties thereto, and fully indemnify and save harmless the Obligee from all costs and damages which it may suffer by reason of the Principal's failure to do so and fully reimburse and repay the Obligee all costs and expenses which it may incur in making good any such default, then these obligations shall be null and void, otherwise they shall remain in full force and effect.

PROVIDED, HOWEVER, that this bond is subject to the following conditions and limitations:

- (a) In no event shall the Surety, or its successors or assigns be liable hereunder for a greater sum than the amount of this bond.
- (b) No action on this bond shall be brought unless within one year after: (i) completion of the Contract, including the expiration of all warranties and

guarantees; or (ii) discovery of the defect or breach of warranty, if the action be for such, in all other cases.

The Surety, for value received, on behalf of itself and its successors and assigns, hereby stipulates and agrees that the obligations of the Surety and of its successors and assigns under this bond shall not in any manner be impaired or affected by: (a) any extension of time, modification, omission, addition or amendment of or to the Contract or the work to be performed thereunder; (b) any payment thereunder before the time required therein; (c) any waiver of any provision thereof; or (d) any assignment, subletting or other transfer of all or of any part thereof or of any work to be performed or of any moneys due or to become due thereunder; and the Surety, for itself and its successors and assigns, does hereby waive any right to receive notice of any and all of such extensions, modifications, omissions, additions, amendments, payments, waivers, assignments, subcontracts and transfers.

The Surety hereby stipulates and agrees that, in the event that the Obligees declares the Principal to be in default, the Surety will promptly, at the Obligees's election: (a) perform and complete the work to be performed under the Contract in accordance with the terms, conditions and covenants set forth therein with a duly licensed and qualified contractor designated by Obligees; (b) obtain bids from qualified contractors for completing the work to be performed under the Contract in accordance with the terms, conditions and covenants set forth therein and, upon determination by the Obligees and the Surety of the lowest responsible and responsible bidder, (i) arrange for a contract between such bidder and the Obligees and (ii) make funds available directly to the Obligees, or to such contractor(s) as the Obligees shall designate, to pay the costs of completion less the balance of the contract price as such may have been adjusted by change order (such amount, including other costs and damages for which the Surety may be liable hereunder, not to exceed the penal sum set forth in the first paragraph hereof); or (c) remedy the default. The Surety further stipulates and agrees that, within 45 days after its receipt of written notice from the Obligees specifying the Obligees's election of (a), (b) or (c) above, the Surety shall have resumed performance of the work or shall have caused the performance of the work to have been resumed, in accordance with the Obligees's election. In the event the Surety fails to resume the Work within such 45 day period, the Obligees may elect to perform or arrange for the performance of the Work at the sole cost and expense of the Surety in addition to any other rights and remedies available to Obligees. As employed herein, the phrases (i) "balance of the contract price" shall mean the total amount payable by the Obligees to the Principal under the Contract after all proper adjustments have been made, less the aggregate of all amounts paid by the Obligees to the Principal thereunder and (ii) "resume the Work" shall mean the commencement and diligent performance of actual work activities at the site, as demonstrated by discernable daily progress at the rate contemplated by the Contract. All payments to be made by the Surety hereunder shall be paid within thirty (30) days after the Surety's receipt of a request or demand therefor.

The Obligees's omission to call upon the Surety in any instance shall in no event release the Surety from any obligation hereunder.

All notices, requests, demands and other communications which are provided hereunder, shall be in writing and shall be deemed to have been duly given upon the hand delivery thereof during business hours, or upon the earlier of receipt or three (3) days after posting by registered mail or certified mail, return receipt requested, or on the next business day following delivery to

a reliable overnight delivery service, if to the Principal or the Obligee, to the addresses set forth in the Contract, and if to the Surety, to the address set forth beneath its signature.

The obligations evidenced hereby shall constitute the joint and several obligations of the Contractor, the Surety, and their respective heirs, executors, administrators, successors and assigns.

Unless the context requires otherwise, capitalized terms not otherwise defined in this Bond shall have the meanings assigned to them in the Contract Documents.

[SIGNATURES ON FOLLOWING PAGE]

IN WITNESS WHEREOF, we have hereunto set our signatures and seals this _____ day of _____ 20____, all pursuant to due authorization.

_____(SEAL)
Principal (Contractor)
By: _____
Name: _____
Title: _____
Address: _____

State of _____
County/City of _____

The foregoing bond was acknowledged before me this _____, 20____, by _____, whose title is _____, on behalf of _____, the Principal

Notary Public

Title or Rank _____
Serial Number, if any _____

_____(SEAL)
Surety
By: _____
Attorney-in-Fact (attach copy of Power of Attorney)
Name: _____
Title: _____
Address: _____

State of _____
County/City of: _____

The foregoing bond was acknowledged before me this _____, 20____, by _____ whose title is Attorney-in-Fact, on behalf of _____, Surety.

Notary Public

Title or Rank _____
Serial Number, if any _____

SECTION 00303

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that we, _____ of (hereinafter called the "Principal"), and _____, a corporation created and existing under the laws of the State of _____, and having its principal office in the City of _____ and authorized to transact business in the Commonwealth of Virginia as Surety (hereinafter called the "Surety") are held and firmly bound unto FAIRFAX COUNTY SCHOOL BOARD (hereinafter called the "Obligee" in the sum of Dollars (\$_____) lawful money of the United States of America, for the payment of which well and truly to be made, the said Principal binds itself and its successors and assigns, and the said Surety binds itself and its successors and assigns, all jointly and severally, firmly by these presents to pay for all labor performed and material furnished in accordance with the Contract Documents for the Project.

WHEREAS, the Principal has entered into a certain written agreement with the Obligee, dated as of the ____ day of _____, 20__ (hereinafter called the "Contract"), for _____, which Contract is by reference made a part hereof.

WHEREAS, the Principal is obligated to furnish security with respect to its obligation to pay for all labor performed and material furnished pursuant to the Contract; and

WHEREAS, the Principal desires to furnish this Payment Bond in lieu of a certified check or cash escrow otherwise required to be provided to the Obligee.

NOW, THEREFORE, THE CONDITIONS OF THE ABOVE OBLIGATIONS ARE SUCH THAT, if the Principal and its successors or assigns, or any or either of them shall:

Pay or cause to be paid the wages and compensation for labor performed and services rendered of all persons engaged in the prosecution of the work provided for therein, whether such persons be agents, servants or employees of the Principal, and of its successors or assigns, or of any subcontractor or any assignee thereof, including all persons so engaged who perform the work of laborers or of mechanics regardless of any contractual relationship between the Principal, or its assigns, or any subcontractor or any assignee thereof, and such laborers or mechanics, but not including office employees not regularly stationed at the site of the work, and further, shall pay or cause to be paid all lawful claims of subcontractors and of materialmen and other third persons arising out of or in connection with the Contract and the work, labor, services, supplies and materials furnished in and about the performance and completion thereof, then these obligations shall be null and void, otherwise they shall remain in full force and effect.

PROVIDED, however, that this bond is subject to the following conditions and limitations:

- a. All persons who have performed or rendered services, as aforesaid, all subcontractors, and all persons, firms, corporations, including materialmen and third persons, as aforesaid, furnishing work, labor, services, supplies and material under or in connection with the Contract or in or about the performance

and completion thereof, shall have a direct right of action (subject to the prior right of the Obligees under any claim which it may assert against the Principal and its successors, and assigns and/or the Surety and its successors and assigns) against the Principal and its successors, and assigns and/or the Surety and its successors and assigns on this bond, which right of action shall be asserted in proceedings instituted in the State in which such work, labor, services, supplies or material was performed, rendered or furnished, or where work, labor, services, supplies or material has been performed, rendered or furnished, as aforesaid, in more than one State, then in any such State. Insofar as permitted by the laws of such State, such right of action shall be asserted in a proceeding instituted in the name of the Obligees to the use and benefit of the person, firm or corporation instituting such action and of all other persons, firms and corporations having claims hereunder, and any other person, firm or corporation having a claim hereunder shall have the right to be made a party to such proceedings (but not later than one year after the performance of the Contract including the expiration of any warranty or guarantee) and to have such claim adjudicated in such action and judgment tendered thereof. Prior to the institution of such a proceeding by a person, firm or corporation in the name of the Obligees, as aforesaid, such person, firm or corporation shall furnish the Obligees with a bond of indemnity for costs, which bond shall be in a form and in an amount satisfactory to the Obligees.

- b. Neither the Surety nor its successors or assigns shall be liable hereunder for any damages or compensation recoverable under any worker's compensation or employer's liability statute.
- c. In no event shall the Surety, or its successors or assigns be liable hereunder for a greater sum than the amount of this bond, or subject to any suit, action or proceeding thereon that is instituted by any person, firm or corporation under the provisions of the above section(s), later than one year after such person last performed labor or last furnished or supplied materials.

And the Surety, for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligations of the Surety and of its successors and assigns, and this bond shall in no way be impaired or affected by any extension of time, modification, omission, addition or change in or to the Contract or the work to be performed thereunder, or by any payment thereunder before the time required therein, or by a waiver of any provision thereof, or by an assignment, subletting or other transfer thereof, or of any part thereof, or of any work to be performed or of any moneys due or to become due thereunder; and the Surety, for itself and its successors and assigns, does hereby waive notice of any and all of such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers, and hereby stipulates and agrees that any and all things done and omitted to be done by and in relation to executors, administrators, successors, assignees, subcontractors, and other transferees, shall have the same effect as to the Surety and its successors and assigns, as though done or omitted to be done by and in relation to the Principal.

The Principal, for itself and its successors and assigns, and the Surety, for itself and its successors and assigns, do hereby expressly waive any objection that might be interposed as to the right of the Obligees to require a bond containing the foregoing provisions, and they do

hereby further expressly waive any defense which they or either of them might interpose to an action brought hereon by any person, firm, or corporation, including subcontractors, materialmen and third persons, for work, labor services, supplies or material, performed, rendered or furnished as aforesaid, upon the ground that there is no law authorizing the Obligee to require the foregoing provisions to be placed in this bond.

Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Principal shall promptly furnish a copy of this Bond or shall permit a copy to be made on behalf of such potential beneficiary.

The obligations evidenced hereby shall constitute the joint and several obligations of the Contractor, the Surety, and their respective heirs, executors, administrators, successors and assigns.

Unless the context requires otherwise, capitalized terms not otherwise defined in this Bond shall have the meanings assigned to them in the Contract Documents.

[SIGNATURES ON FOLLOWING PAGE]

IN WITNESS WHEREOF, we have hereunto set our signatures and seals this _____ day of _____ 20____, all pursuant to due authorization.

_____(SEAL)
Principal (Contractor)
By: _____
Name: _____
Title: _____
Address: _____

State of _____
County/City of _____

The foregoing bond was acknowledged before me this _____, 20____, by _____, whose title is _____, on behalf of _____, the Principal

Notary Public

Title or Rank _____
Serial Number, if any _____

_____(SEAL)
Surety
By: _____
Attorney-in-Fact (attach copy of Power of Attorney)
Name: _____
Title: _____
Address: _____

State of _____
County/City of: _____

The foregoing bond was acknowledged before me this _____, 20____, by _____ whose title is Attorney-in-Fact, on behalf of _____, Surety.

Notary Public

Title or Rank _____
Serial Number, if any _____

END OF SECTION

SECTION 00700

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SECTION 00700

GENERAL CONDITIONS

PART 1 - DEFINITIONS

- 1.01 Architect. The duly licensed individual or entity who has been engaged by the Owner to observe performance of the Work and to consult with and advise the Owner during the construction process. As employed herein, the term "Architect" may refer to an individual, an organization or to the Architect's authorized representative.
- 1.02 Change Order. A written order to the Contractor signed by the Owner, the Architect, and the Contractor, which authorizes a change in the Work, an adjustment to the Contract Sum, and/or an adjustment to the Contract Period. The latest edition of AIA Standard Form G701 shall be utilized.
- 1.03 Construction Schedule. The schedule for completion of the Work. The Construction Schedule shall be developed utilizing a Critical Path method of scheduling, indicating time periods allotted for the performance of all constituent parts of the Work within the Contract Period.
- 1.04 Contract or Contract Documents. The terms "Contract" and "Contract Documents" shall be used interchangeably herein and shall consist of the following:
- A. The signed Agreement;
 - B. The General Conditions of the Contract, which appear herein;
 - C. The Drawings and Specifications;
 - D. The Supplementary Conditions;
 - E. Any Addenda issued prior to execution of the Agreement;
 - F. The Notice of Award issued by the Owner to the Contractor;
 - G. The Notice to Proceed issued by the Owner to the Contractor;
 - H. Any modifications which are issued subsequent to the execution of the Agreement and which may take the form of a Work Order, a Change Order, or written interpretations issued by the Architect;
 - I. The Contractor's Payment and Performance Bonds;
 - J. The Bidding Documents, which shall include the Contractor's completed Bid Proposal Form and the Instructions to Bidders; and
 - K. All provisions required by Law or Regulation to be incorporated herein, regardless of whether any such provision is referred to or set forth expressly in these Contract Documents.

- 1.05 Contract Period. The period of time allotted in the Contract Documents for completion of the Work, as such period may be adjusted from time to time in the manner prescribed herein.
- 1.06 Contract Sum. The total amount payable to the Contractor for performance of the Work. The Contract Sum is stated in the Contract Documents and shall be subject to adjustments in the manner specified herein.
- 1.07 Contractor. The corporation, limited liability company, partnership or other person or entity that contracts with the Owner to perform the Work. As employed herein, the term "Contractor" may refer to an individual, an organization, or to the Contractor's authorized representative.
- 1.08 Critical Path. The logical and necessary sequence through which all Work items must be completed within their respective timeframes or the completion date for the Project will change. A delay in the completion of any Work item that is on the Critical Path necessarily causes a corresponding delay to the Date of Substantial Completion.
- 1.09 Date of Final Completion. The date certified by the Architect as the date upon which the Work is completely finished, which event shall be achieved by the Contractor within the time period specified in Section 01010, Summary of Work.
- 1.10 Date of Substantial Completion. The date certified by the Architect as the date upon which the Work has been sufficiently completed to allow the Work to be utilized by the Owner for the purpose for which it was intended. Such event shall be achieved by the Contractor within the time period specified in Section 01010, Summary of Work.
- 1.11 Day. The term "day" shall mean "calendar day."
- 1.12 Defective. An item described herein as "defective" shall be deemed to be unsatisfactory, faulty, or deficient in that it does not conform to the requirements of the Contract Documents, or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents, or has been damaged prior to the Date of Final Completion of the Work (unless responsibility for the protection thereof has been assumed by the Owner as of an earlier date).
- 1.13 Director, Office of Design and Construction. The official in charge of day to day construction matters for the Owner. The Director may designate a representative to act on his or her behalf.
- 1.14 Float. The period of time between the early start date and the late start date, or the early finish date and the late finish date of any of the activities set forth on the Construction Schedule. The Owner shall have and retain exclusive ownership of the Float.
- 1.15 Laws and/or Regulations. Any and all laws, rules, regulations, ordinances, codes, and/or orders of any and all governmental bodies, agencies, authorities, and/or courts, which are applicable to the Work (or any aspect thereof) and are in effect at any time or from time to time during the Contract Period.

- 1.16 Notice. Notice shall mean written notice. Written notice shall be deemed to have been duly served on the Contractor if delivered by U.S. Mail, hand delivery, or facsimile transmission to the Contractor's office at the Project or to the business address or fax number of the Contractor as stated in its Bid Form Proposal; or if delivered in person to the Contractor, to the Contractor's foreman or superintendent for the Project, or any officer or director of the Contractor. Unless otherwise specified herein, Notice shall be deemed to have been duly served on the Owner if delivered by U.S. Mail, hand delivery, or facsimile transmission (with a duplicate copy transmitted by another means of delivery authorized hereunder) to the Office of Design and Construction Services, Fairfax County Public Schools, Gatehouse Administration Center, 8115 Gatehouse Road, Suite 3400, Falls Church, Virginia 22042, fax number (571)-423-2317.
- 1.17 Notice to Proceed. A written notice from the Owner to the Contractor, which gives consent for commencement of the Work. Unless otherwise provided, Work shall commence on the date specified in the Notice to Proceed.
- 1.18 Overhead. All costs of administration, field office and home office costs (including extended costs), general superintendence, office engineering and estimating costs, other required insurance, materials used in temporary structures (not including form work), additional premiums on the Performance and Payment Bonds of the Contractor, the use of small tools, scheduling costs, cumulative impact costs and all other costs incidental to the performance of a change in the Work or to the cost of doing business. Small tools are defined as any tool with a replacement value less than \$1,000.
- 1.19 Owner. The School Board of Fairfax County, Virginia, its authorized representatives and employees.
- 1.20 Project. The entire improvement of which this Contract and the Work contemplated hereby forms a part. The Project may include construction and/or other activities that are to be performed by the Owner or by one or more Separate Contractors.
- 1.21 Separate Contractor. Any corporation, limited liability company, partnership or other person or entity that contracts with the Owner to perform one or more portions of the Project, other than the Work.
- 1.22 Shop Drawings. All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for the Contractor and are submitted by the Contractor to illustrate a portion of the Work. Shop Drawings are not Contract Documents.
- 1.23 Site. The area upon or in which the Contractor's operations are performed and such other areas adjacent thereto as may be designated as such by the Architect. The Site may be shared by the Contractor with the Owner and with Separate Contractors and their subcontractors.
- 1.24 Subcontractor. Any corporation, limited liability company, partnership or other person or entity, other than an employee of the Contractor, who contracts with the Contractor to

furnish or who actually furnishes labor, materials, services or equipment, or any combination thereof to the Contractor in connection with the Work.

- 1.25 Submittal Schedule. A schedule for submission to the Architect of all required shop drawings, equipment data, and the like, which reflects lead times of critical submittals and is coordinated with the Construction Schedule for timely progress.
- 1.26 Sub-Subcontractor. Any corporation, limited liability company, partnership or other person or entity, other than an employee of a Subcontractor, who contracts with a Subcontractor to furnish, or who actually furnishes labor, materials, service or equipment, or any combination thereof to a Subcontractor in connection with the Work.
- 1.27 Surety. Any entity that has executed as Surety the Contractor's performance and/or payment bonds securing performance of the Work contemplated by this Contract and/or providing for protection of claimants who have and fulfill contracts to supply labor or materials to the Contractor in connection with the Work.
- 1.28 Work. Everything explicitly or implicitly required to be furnished or performed under the Contract Documents. The Work may represent the whole, or a necessary and interdependent part of, the Project.

Number and Gender of Words. Whenever the Contract so admits or requires, all references to one number shall be deemed to extend to and include the other number, whether singular of plural, and the use of any gender shall be applicable to all genders.

PART 2 - EXECUTION AND INTENT OF THE CONTRACT

- 2.01 Execution of Contract Documents. Four (4) copies of the Contract Documents shall be signed by both the Owner and the Contractor.
- 2.02 Familiarity with Site. The Contractor's execution of the Agreement shall constitute a representation that the Contractor has visited the Site, become familiar with local conditions under which the Work is to be performed, and correlated personal observations with the requirements of the Contract Documents.
- 2.03 Order of Precedence. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work, including without limitation, all labor, materials, equipment and furnishings required in connection therewith. The Contract Documents are complimentary, and what is required by one shall be as binding as if required by all. In the event of any conflict, error or ambiguity in or among the various Contract Documents, such documents shall be accorded the following order of precedence:

Change Orders
Notice to Proceed
Notice of Award
Addenda
Supplementary Conditions

General Conditions
Agreement
Instructions to Bidders
Drawings and Specifications
Payment and Performance Bonds
Bid Form

Except as otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

- A. the provisions of any standard, specification, manual, or code of any technical society, organization or association (whether or not specifically incorporated by reference in the Contract Documents); or
- B. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

2.04 Division of Work. The subdivision of the Drawings and Specifications into divisions, sections and articles is for the purpose of ease of reference only and shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade. The Contractor shall be responsible for segregating the Work among the various trades, if necessary or desirable in its discretion.

- A. The Specifications shall serve to amplify the requirements of materials and methods. The mention in any section of the Specifications of any article or operation requires that the Contractor shall provide all such items indicated on, or reasonably inferred from, the Drawings, furnishing for such purpose all labor, materials and equipment required in connection therewith. Omission of any article or operation does not relieve the Contractor of the responsibility for completion of the Work intended by the Drawings and Specifications to be included in the Contract.

2.05 Contract Interpretations. The Owner or the Contractor may request contract interpretations in writing from the Architect. Such requests for interpretations must be submitted sufficiently in advance of the date upon which the interpretation is actually required by the Owner or the Contractor to allow the Architect to issue the interpretation so as not to delay the progress of the Work. Written interpretations so requested shall be issued by the Architect in a manner commensurate with the timely execution of the Work, shall be consistent with the intent of the Contract Documents, and shall be in accordance with established progress schedules.

2.06 Copies and Ownership of Drawings, Specifications and Other Documents.

- A. The Contractor will be furnished **five (5)** sets of Drawings, Specifications and other documents prepared by the Architect (the "Architect's Documents") free of

charge. Additional sets may be purchased by the Contractor at the cost of reproduction.

- B. Neither the Contractor nor any Subcontractor or supplier or other person or organization performing or furnishing any of the Work:
1. shall have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the Architect's seal; or
 2. shall reuse any of such Drawings, Specifications, other documents, or copies on extensions of the Project or any other project without written consent of the Owner and the Architect.

PART 3 - ARCHITECT

- 3.01 Contract Administration. The Architect shall provide administration of the Contract in accordance with the Contract Documents and the Agreement between the Owner and the Architect.
- 3.02 Owner's Representative. The Architect shall serve as the Owner's representative during construction, until final payment is due, and with the Owner's concurrence, from time to time during the Correction Period described in Paragraph 12.05(B). The Architect shall advise and cooperate with the Owner and shall act on the Owner's behalf in accordance with the Contract Documents. The Owner shall issue instructions to the Contractor or, at its option, elect to have the Architect issue instructions to the Contractor.
- 3.03 Observation of Work. The Architect shall have access to the Work and shall visit the Site periodically in order to determine the progress of the Work and to assess the quality of the completed Work. Based upon its on-site evaluations, the Architect will advise the Owner of the progress of the Work and will endeavor to guard the Owner against defects and deficiencies in the Work. The Architect shall not have control over or charge of and shall not be responsible for construction methods, techniques, procedures, sequences or safety measures employed in connection with the Work. The Architect shall not be responsible for the failure of the Contractor, Subcontractors, or Sub-subcontractors to perform the Work in accordance with the Contract Documents.
- 3.04 Payment Certifications. Based upon the Architect's observations and evaluations of the Contractor's Applications for Payment, the Architect shall review and certify the amounts due the Contractor. The Architect may, in its discretion, revise the applications for payment to show the actual value of Work completed in accordance with the Architect's observations of the Work. The Contractor agrees to be bound by the Architect's revisions to the applications for payment.
- 3.05 Interpretation of Contract Documents. The Architect shall interpret the Contract Documents in accordance with Paragraph 2.05, and shall serve as the impartial judge of the performance of the Work.

- 3.06 Rejection of Work. The Architect and/or the Owner shall have the authority to reject Work that is defective or that otherwise does not conform to the requirements of the Contract Documents. The Architect and/or the Owner shall have the authority to order special inspections or tests, regardless of whether or not the Work has been fabricated, installed or completed. No responsibility or duty of the Architect and/or the Owner to the Contractor, Subcontractors, or Sub-subcontractors shall be created by this authority or by good faith decisions rendered in the exercise of this authority.
- 3.07 Preparation of Change Orders; Review of Submittals. The Architect shall prepare Change Orders, shall perform inspections to determine the Dates of Substantial and Final Completion, shall review all required documents submitted by the Contractor, and shall issue Certificates of Substantial Completion and Final Payment in accordance with the provisions of Paragraphs 12.04 and 12.05.
- 3.08 No Contractual Relationship. No contractual relationship shall exist or be deemed to exist between the Architect and the Contractor.
- 3.09 Ownership of Drawings and Specifications. Original Drawings and Specifications are the property of the Architect. Notwithstanding such fact, however, the Project is the property of the Owner, and the Architect may not use the Drawings and Specifications for any purpose not relating to the Project without the Owner's consent. The Owner shall be furnished with such reproductions of Drawings and Specifications as the Owner may reasonably require. Upon completion of the Work or any earlier termination of the Agreement pursuant to Part 17, the Architect will revise the Drawings to reflect changes made during construction and the Architect will promptly furnish the Owner with one complete set of reproducible record prints. All such reproductions shall be the property of the Owner who may use them without the Architect's permission for other projects, for additions to this Project, and/or for completion of this Project by others.

PART 4 - THE OWNER

- 4.01 Owner Representative. The Owner shall provide one or more representatives to observe the Work; provided, however, that the presence of the Owner's representatives shall in no way constitute an approval of means, methods or materials which do not conform to the requirements of the Contract Documents.
- 4.02 Rejection of Work. The Owner shall have the right to reject Work in accordance with Paragraph 3.06.
- 4.03 Completion and Correction of Work. The Owner shall have the right to complete or correct the Work in accordance with Paragraphs 4.05 and 12.05(D).
- 4.04 Review of Payment Applications. The Owner shall have the right to review, revise, and approve the Architect's certifications concerning payment.
- 4.05 Right to Supplement Contractor's Work Force. In the event that the Contractor fails (in the opinion of the Owner) within 3 days following Notice from the Owner: (a) to correct defective Work; or (b) to supply labor, materials, or equipment that is necessary to

complete the Work in strict accordance with the requirements of the Contract Documents, then the Owner shall have the right to (i) order the Contractor to stop the Work or a designated portion thereof; and/or (ii) supplement the Contractor's forces, in each case to the extent deemed necessary and advisable by the Owner and until such time as, in the opinion of the Owner, the cause of the order or action shall have been corrected. The Owner shall have the right to: (a) correct the deficiencies set forth in the Notice, either with its own forces or with a separate contractor engaged by the Owner to perform such corrections; (b) deduct the cost of correcting such deficiencies (including costs for additional services in connection therewith) from amounts then or thereafter due the Contractor under the Contract Documents; and (c) order the Contractor to re-start at a designated time all or any portion of the Work stopped by the Owner. If the amounts then or thereafter due the Contractor are insufficient to cover the cost of correcting the deficiencies, then the difference shall be payable by the Contractor to the Owner upon written demand. The Architect's determination of cost hereunder shall be final and binding upon the parties. The Owner's exercise of the right to correct deficiencies shall be in addition to, and shall in no way prejudice or limit, any other remedies available to the Owner. In the event that it is determined for any reason that grounds for stopping all or any portion of the Work did not exist, then, at the election of the Owner, the rights and obligations of the parties hereunder shall be the same as if the Notice directing the Contractor to stop the Work had been delivered under the provisions of Paragraph 17.06 hereof; provided, however, that the Contractor in such event shall be deemed to have received seven days prior written Notice of termination. Any compensation determined to be due the Contractor pursuant to Paragraph 17.06 shall be offset by the cost of correcting the Work. The Contractor shall in no event be entitled to receive anticipated profits or consequential damages of any kind in connection with any termination or action hereunder.

- 4.06 No Discrimination Against Faith-Based Organizations. The Owner does not discriminate against faith-based organizations on the basis of the organization's religious character, or impose conditions that (i) restrict the religious character of the faith-based organizations, except as provided by law, or (ii) impair, diminish or discourage the exercise of religious freedom by the recipients of such goods, services or disbursements.

PART 5 - CONTRACTOR

5.01 General Duties and Obligations.

- A. Contractor Responsibilities. The Contractor shall perform all the Work and, except as otherwise expressly provided herein, shall furnish, at its own cost and expense, all labor, materials, equipment, and other facilities as may be necessary and proper for performing and completing the Work. The Contractor shall be responsible for the entire Work until completed and finally accepted by the Owner.
- B. Quality Workmanship. Unless otherwise provided herein, the Work shall be performed in accordance with the best modern practice and with materials and

workmanship of highest quality, all as determined by and entirely to the satisfaction of the Owner and the Architect.

- C. **Supervision and Construction Procedures.** The Contractor shall supervise and direct the Work and coordinate the Work with that of Separate Contractors, if any, using its best skill and attention. Unless otherwise expressly provided, the Contractor shall be solely responsible for and shall have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract. Unless otherwise expressly provided, the means and methods of construction shall be such as the Contractor may choose; provided, however, that the Contractor shall employ adequate and safe procedures, methods, structures and equipment. Neither the Architect's approval nor its failure to exercise its right of approval shall relieve the Contractor of its obligation to accomplish the result intended by the Contract, nor shall the Architect's approval or failure to approve create a cause of action for damages. Notwithstanding the rights and remedies available to the Owner and the Architect hereunder, including without limitation, their respective rights to monitor the progress of the Work and to accept or retract acceptance of Subcontractors, the Contractor expressly acknowledges and agrees that it is in charge of and in control of the Work.
- D. **Contractor's Review of Documents.** The Contractor shall study and review the Contract Documents and shall compare them with each other and with any information made available by the Owner. If the Contractor finds a conflict, error, ambiguity or discrepancy in or among the Contract Documents, the Contractor shall immediately call it to the attention of the Owner and the Architect in writing before proceeding with the Work affected thereby. The Owner promptly shall resolve the matter in writing. Work performed by the Contractor after issuance of the Notice to Proceed and prior to written resolution thereof by the Owner shall be performed at the Contractor's sole risk.
- E. **Contractor's Verification.** The Contractor shall be responsible for verifying all dimensions, quantities and details set forth in the Contract Documents and shall notify the Owner and the Architect in writing of all errors, omissions, conflicts and discrepancies. The Contractor acknowledges and agrees that all equipment, materials, finishes, and other such listings are provided for the convenience of the Architect and the Contractor and are not guaranteed to be complete. The Contractor hereby assumes all responsibility for the making of estimates of the size, kind, quantity, and quality of materials, supplies and equipment included in Work.
- F. **Differing Site Conditions.** It is the intent of these Contract Documents that the Contractor shall bear full and complete responsibility for all surface and subsurface conditions, whether known or unknown, reasonably foreseeable or not, that shall be encountered during the performance of the Work. Notwithstanding any provision in the Contract Documents to the contrary, the Contractor shall in no event be entitled to additional compensation, time or other relief from its obligations under the Contract Documents as a direct or indirect

result of any surface or subsurface conditions encountered during performance of the Work. Consequently, the Contractor hereby waives any and all claims against the Owner and/or the Architect (and any of their members, officers, employees and authorized representatives) that the Contractor has, or may have in the future, arising out of or in connection with. (i) any surface and subsurface conditions encountered during performance of the Work; and (ii) any inaccurate or incomplete reports, data or other materials or information given to the Contractor by or on behalf of the Owner or the Architect that pertains to the surface or subsurface conditions at the Site of the Project. The Contractor covenants and agrees that it shall not make any claim for additional compensation from the Owner as a result of any such subsurface conditions.

- G. Notice to Owner and Architect. The Contractor shall submit to the Owner and the Architect in writing all items required to be brought to the Owner's and/or Architect's attention or to be submitted for approval. These items must be submitted sufficiently in advance of the date upon which the information or approval is actually required by the Contractor to allow the Owner and Architect to take appropriate actions so as not to delay the Work. The Contractor shall not have any right to an extension of time due to delays caused by its failure to submit any item in a timely fashion.

5.02 Character and Competency.

- A. Certain Representations, Warranties and Covenants. The Contractor represents that it is a duly organized and licensed entity which employs qualified and experienced personnel who specialize in performing the type of construction services required hereunder. The Contractor agrees to provide a sufficient number of personnel who are suitably qualified and experienced and who are in all respects acceptable to the Owner to perform the Work in an efficient and timely manner. The Contractor represents that it is capable in all respects (including the possession of sufficient financial resources to provide fully for the payment of employees) of performing the Work and agrees to provide construction services of high quality. The Contractor agrees to diligently and conscientiously devote its resources to the performance of the Work. The Owner, upon written Notice to the Contractor, and in the Owner's sole discretion, shall have the right to direct the Contractor to remove an employee permanently from the Site for any reason.
- B. Direct Contact Certification. The Contractor hereby certifies that. (i) neither the Contractor nor any employee of the Contractor who will have direct contact with students has been convicted of a felony or any offense involving the sexual molestation or physical or sexual abuse or rape of a child; and (ii) absent prior Notice to the Owner, neither the Contractor nor any employee of the Contractor who will have direct contact with students has been convicted of a crime of moral turpitude. The foregoing certification shall be binding upon the Contractor throughout the Contract Period and the Contractor hereby covenants and agrees to provide the Owner with immediate Notice of any event or circumstance that renders such certification untrue. The Contractor will ensure that no worker shall

perform Work in occupied areas during school hours unless prior written approval has been granted by the Owner and proper safety precautions have been exercised to isolate the area of the Work.

- C. Prohibited Activities; Removal from Site. Alcoholic beverages, illegal drugs, and weapons are prohibited on the Site and shall constitute grounds for immediate removal from the Site of the Project. The Contractor shall ensure that neither its employees nor those of any Subcontractor shall fraternize in any manner with any student of Fairfax County Public Schools at the Site of the Work. The Owner shall have the right to remove from the job Site any person whose presence the Owner deems detrimental to the best interests of the Fairfax County Public Schools. Any individual who is removed from the Site pursuant to this paragraph may not return to such Site or to that of any other project of Owner without the prior written permission of the Director of the Owner's Office of Design and Construction.
- D. Contractor's Use of Premises. See Section 01010, Summary of Work, for detailed requirements regarding Contractor's use of premises.

5.03 Permits, Fees and Notices.

- A. Compliance with Laws and Regulations; Required Permits. The Contractor shall comply with all Laws and Regulations and shall obtain, at its expense, all permits, licenses and other authorizations necessary for the prosecution of the Work, except that the Owner shall obtain, at its expense, the General Building Permit and/or any easement agreement necessary and indispensable to the completion of the Project.
- B. Conflict with Laws and Regulations. The Contractor shall be responsible for giving all Notices and complying with all Laws and Regulations. In the event that the Contractor determines that the Contract Documents, or any of them, do not conform in any respect with any Law or Regulation, he shall promptly inform the Architect of such fact in writing. Any required change shall be adjusted by Work Order and incorporated into a subsequent Change Order. If the Contractor performs any Work knowing it to be in conflict with any Law or Regulation without prior notification to the Architect and Owner, the Contractor shall accept all responsibility and bear all costs relating thereto.
- C. VDOT Permits. When applicable, the Contractor shall be responsible for acquiring any Virginia Department of Transportation ("VDOT") permits required for the Project. The Contractor shall be responsible for all application fees, bonding costs and inspection fees associated with such permits. When applicable, the Owner shall pay the Civil Engineer of Record for any costs incurred for additional engineering services required by VDOT in order to obtain these permits.

5.04 Responsibility for Those Performing the Work. The Contractor shall be responsible and accountable to the Owner for the acts and omissions of its employees in connection with

the performance of the Work and for any Subcontractors or other persons or entities performing any of the Work under a contract with the Contractor or a contract with a Subcontractor.

- 5.05 Drawings and Specifications at the Site. The Contractor shall maintain one copy of all Drawings, Specifications, Addenda, approved Shop Drawings, Change Orders and other Modifications at the Site of the Project. All of the documents are to be kept in good order and marked to record all changes made during construction. The documents shall be made available to the Owner and Architect during performance of the Work. Upon completion of the Work, the Drawings, together with all changes and revisions made during construction of the Project, shall be delivered to the Architect.
- 5.06 Construction Schedule.
- A. Preparation of Construction Schedule. The Contractor, promptly after receipt of the Notice of Award, shall prepare and submit to the Owner and the Architect, for their review and approval, the Construction Schedule. The Construction Schedule, as approved, shall. (i) provide for the expeditious and diligent performance of the Work within the Contract Period; and (ii) be revised as necessary, in the opinion of the Owner, to accommodate and to reflect the progress of the Project as a whole.
 - B. Submittal Schedule. The Contractor shall prepare and keep current, for the Architect's approval, a schedule of submittals (the "Submittal Schedule") which is coordinated with the Construction Schedule and allows the Architect reasonable time to review all submittals.
 - C. Compliance with Schedules. The Contractor shall conform at all times to the most recent Construction Schedule and Submittal Schedule.
 - D. Additional Scheduling Requirements. Additional scheduling requirements are contained in Section 01310 of the General Requirements.
 - E. No Reliance on Silence of Owner or Architect. The Owner's or Architect's silence as to a submitted Construction Schedule that fails to meet or satisfy, in any respect, any milestone dates or other time limitations set forth in the Contract Documents shall not relieve the Contractor of its obligation to meet those time limits, nor shall it render the Owner or Architect liable to any Separate Contractor who suffers damages, increased costs or delays as a result thereof. Similarly, the Owner's or Architect's silence with regard to a Construction Schedule submitted by the Contractor that shows performance in advance of such time limits or milestones shall not create any rights in favor of the Contractor, a Separate Contractor or any other person or entity for performance in advance of such time limits or milestones.

5.07 Shop Drawings.

- A. Submission of Shop Drawings. The Contractor shall prepare and submit to the Architect Shop Drawings and similar submittals required by the Contract Documents with reasonable promptness and in accordance with the Submittal Schedule so as not to cause a delay in the Work or in the activities of the Owner or of Separate Contractors. Submittals presented by the Contractor that are not required by the Contract Documents may be returned without action.
- B. Review Process. The Contractor shall not perform any portion of the Work requiring submittal and review of Shop Drawings or similar submittals until the respective submittal has been approved by the Architect. Such Work shall be performed in strict accordance with the approved submittals.
- C. Verification and Coordination. By approving and submitting Shop Drawings and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.
- D. Deviation from Contract Documents. The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and the Architect has given written approval to the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings or similar submittals by the Architect's approval thereof.
- E. Attention to Revisions. The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings or similar submittals, to revisions other than those requested by the Architect on previous submittals.
- F. Informational Submittals. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents.
- G. Additional Shop Drawing Requirements. Additional requirements are contained in Section 01340 of the General Requirements.

5.08 Inspections of Work in Place. The Contractor shall be responsible for inspection of portions of Work already performed hereunder to determine that such portions are in proper condition to receive subsequent Work.

5.09 Required Tests and Inspections. The Contractor shall give the Owner and the Architect sufficient prior Notice of the date and time of required tests and inspections. Unless otherwise provided in the Contract Documents, the Contractor shall be responsible for all costs associated with such tests or inspections.

5.10 Use of Site. The Contractor shall confine the Work to areas permitted by the Contract Documents and any applicable laws, ordinances or permits and shall not unreasonably encumber the Project with any materials or equipment.

5.11 Indemnification.

A. The Contractor hereby assumes all liability for and agrees to indemnify and hold harmless the Owner and the Architect and its or their respective Members, officers, authorized representatives and employees (each of whom shall be referred to herein as an "Indemnified Party") from and against any and all claims, losses, costs, damages, penalties, liabilities and fees (including reasonable attorneys' fees) and expenses resulting from: (i) any material breach of the representations, warranties, covenants and agreements of the Contractor contained in the Contract Documents; (ii) any injuries to persons or property caused by the negligence or other wrongful conduct of the Contractor, any Subcontractor, or any of its or their respective employees or authorized representatives; (iii) any claims filed by the Contractor (or by a Subcontractor, if permitted by law) that are adjudicated in favor of the Owner; or (iv) any other claim arising in any other manner out of or in connection with the performance of this Contract by or on behalf of the Contractor.

Notwithstanding the foregoing, the Contractor will in no event be obligated hereunder to indemnify or hold harmless any Indemnified Party against liability for damage arising out of bodily injury to persons or damage to property suffered in the course of the Work, caused by or resulting solely from the negligence of such Indemnified Party.

B. In the event that a claim is brought against an Indemnified Party by (a) the Contractor or an employee of the Contractor; (b) any Subcontractor or supplier or any employee thereof; (c) any person or entity engaged by or through the Contractor or any Subcontractor or supplier to furnish or perform any portion of the Work; or (d) any person or entity for whom the Contractor or any Subcontractor or supplier may be vicariously liable, then the indemnification obligations set forth in Section 5.11(A) shall not be limited in any respect by any limitation on the type or amount of damages, compensation, benefits or other remuneration payable by or for the Contractor or any Subcontractor, supplier or other such person or entity under any laws, rules, regulations or plans of any nature governing workers' compensation, disability benefits or other employee benefits.

C. Claims on Behalf of Subcontractors. No claim of any nature shall be made against an Indemnified Party by or on behalf of a Subcontractor unless the Contractor first shall have. (i) evaluated such claim thoroughly and determined it to be meritorious; (ii) issued a written Notice to the Subcontractor finding the Subcontractor's claim to be meritorious and setting forth any additional compensation or additional days to be paid or granted to the Subcontractor on account of such claim; and (iii) paid the Subcontractor in full for such claim. In presenting such a claim, the Contractor shall provide the Owner and the Architect

with a copy of the written Notice to the Subcontractor and with evidence of payment in full of the Subcontractor's claim. No such claim shall exceed the amount actually paid to the Subcontractor by the Contractor.

The Contractor covenants and agrees not to bring a claim against an Indemnified Party for indemnity based upon a Subcontractor's claim except as specifically permitted in this subsection.

- D. Liability Unaffected. Nothing contained herein shall in any manner create any liability against the Owner on account of any claim for labor, services, or materials, or of Subcontractors, and nothing herein contained shall affect the liability of the Contractor or its Sureties to the Owner or to any workmen or materialmen upon bonds given in connection with this Contract. The Contractor hereby acknowledges and agrees that, as between the Owner and the Contractor, the Contractor shall bear full and complete responsibility for the performance of its Subcontractors, manufacturers and suppliers, regardless of whether any such Subcontractor, manufacturer or supplier was designated as "preapproved" by the Owner.
- 5.12 Conflict of Interest. The provisions of the State and Local Government Conflict of Interests Act (Va. Code Ann. " 2.2-3100, *et seq.*) and Article IV of the Virginia Public Procurement Act entitled "Ethics in Public Contracting" (Va. Code Ann. " 2.2-4367, *et seq.*) as the same may be amended from time to time, are incorporated herein by reference. The Contractor shall incorporate the foregoing conflict of interests clause in each subcontract entered into in connection with the Work.
- 5.13 Non-discrimination. The Contractor hereby covenants and agrees as follows:
- A. The Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin, except where religion, sex or national origin is a bona fide occupational qualification reasonably necessary to the normal operation of the Contractor. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.
- B. The Contractor, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, will state that such contractor is an equal opportunity employer.
- C. Notices, advertisements and solicitations placed in accordance with federal laws, rules or regulations shall be deemed sufficient for the purpose of satisfying the requirements of this Paragraph 5.13.

The Contractor will include the provisions of the foregoing Paragraph 5.13 (A), (B) and (C) in every subcontract or purchase order of over \$10,000, in order that the provisions contained herein will be binding upon each Subcontractor or vendor in connection with the Work.

- 5.14 Subcontractor Bonds. The Contractor hereby covenants and agrees to require such bonds of any subcontractors as may be specified in the Instructions to Bidders.
- 5.15 Safety and Health Program. The Contractor shall establish and maintain a program to protect the safety and health of all persons (employees, visitors, public) at the Site. Such program shall designate a qualified individual as responsible for implementation of the program, and establish procedures for coordinating safety and health activities with Separate Contractors at the Site. The program shall comply with all Laws and Regulations, including but not limited to the Virginia Occupational and Health Standards for the Construction Industry, 29 CFR Part 1926.20 and 1926.21, and the American National Standards Institute, A10.38-2000 and A10.33-1998 (R2004).
- 5.16 Drug-Free Workplace Requirement. During the performance of the Work, the Contractor agrees to. (i) provide a drug-free workplace for the Contractor's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the Contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the Contractor that the Contractor maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each subcontractor or vendor. For purposes hereof, a "drug-free workplace" shall mean the Site.

PART 6 - SUBCONTRACTORS

- 6.01 Absence of Contractual Relationship. Nothing contained in the Contract Documents shall operate to, or otherwise have the effect of, creating a contractual relationship between the Owner or the Architect, on the one hand, and any Subcontractor or Sub-subcontractor on the other.
- 6.02 Award of Subcontracts and Other Contracts for Portions of the Work.
- A. List of Subcontractors. Unless otherwise specified in the Contract Documents, within ten (10) days after receipt of the Notice of Award of the Contract, the Contractor must submit a written statement to the Architect and the Owner setting forth the name, address, and telephone number of each proposed Subcontractor and Sub-subcontractor and the portion of the Work and/or materials which each such Subcontractor or Sub-subcontractor is proposed to perform or provide, as the case may be. The Contractor also must furnish any other information (including but not limited to an OSHA Form 300) to establish to the satisfaction of the Owner and the Architect that the proposed Subcontractor has the necessary facilities, skill, integrity, safety records, past experience and financial resources to perform the Work in strict accordance with the terms and conditions of the Contract Documents. The Architect shall advise the Owner of its opinion with regard to each proposed Subcontractor and Sub-subcontractor.

- B. Review by Owner. If the Owner finds, in its sole and absolute discretion, that a proposed Subcontractor or Sub-subcontractor is not qualified, then the Contractor will be notified promptly of such decision in writing. If no such Notice is provided within 20 days after the Contractor's submission of a written statement, then the Owner shall be deemed to have accepted the Subcontractor. The Owner may retract its acceptance of any Subcontractor in the event such Subcontractor evidences an unwillingness or inability to perform its portion of the Work in strict accordance with the requirements of the Contract Documents. Notice of such retraction will be given in writing to the Contractor. Upon receipt of notification of such rejection or retraction, the Contractor shall submit a new Subcontractor for the Owner's review. Any increase or decrease in the Contract Sum resulting from the required substitution shall be adjusted by appropriate Change Order; provided, however, that. (i) no increase in the Contract Sum will be allowed for substitutions unless the Contractor has submitted a list of proposed Subcontractors in accordance with the provisions hereof; and (ii) no such increase shall exceed the amount set forth with respect to such Work, plus 10%.
 - C. Rejection of Subcontractor. The Contractor shall not enter into a contract for performance of any portion of the Work with any Subcontractor who has been rejected by the Owner and/or the Architect.
 - D. Subcontracts. Upon request, the Contractor promptly shall file with the Owner a complete copy of any one or more of its subcontracts. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind Subcontractors to the Contractor in accordance with the terms of these Contract Documents insofar as applicable to the Work of Subcontractors, and to give the Contractor the same power to terminate any subcontract that the Owner may exercise to terminate the Contractor under the provisions of these Contract Documents.
 - E. Responsibility for Subcontractors. The Owner's review or acceptance of Subcontractors as described herein shall not relieve the Contractor of any of its responsibilities, obligations and liabilities hereunder. The Contractor shall be solely responsible to the Owner for the acts, defaults, or omissions of its Subcontractors and of its Subcontractors' officers, authorized representatives and employees.
- 6.03 Subcontractor and Sub-subcontractor Agreements. Work performed by Subcontractors and Sub-subcontractors shall be set forth in a signed, written agreement between the parties. Each such agreement shall:
- A. be consistent in all respects with these Contract Documents and shall neither. (i) contain a provision which negates, conflicts with or otherwise compromises the requirements of the Contract Documents; or (ii) contain a provision which limits or otherwise adversely affects the rights of the Owner and the Architect as such rights are defined in the Contract Documents;

- B. require timely processing of applications for payment and of claims for additional costs, damages, or time, in order that the Contractor may in turn promptly process such applications or claims in conformance with the Contract Documents;
- C. waive the rights of either party against the other in regard to claims for fire or other peril covered by the property insurance described in Paragraph 14.02. Such waiver shall not exclude either party from rightful access to the proceeds of such insurance; and
- D. make specific reference to this Paragraph 6.03 of the General Conditions as a mutually binding provision.

6.04 Payments to Subcontractors.

- A. Within seven (7) days after receipt of payment from the Owner, the Contractor shall:
 - 1. Pay each Subcontractor for the proportionate share of the total payment received by the Contractor attributable to Work performed by such Subcontractor; or
 - 2. Notify the Owner and the Subcontractor in writing of the intention to withhold all or part of the amounts due a Subcontractor pursuant to Paragraph 6.04(A)(1) above, and state the reason in reasonable detail for such withholding.
- B. In the event the Contractor fails to submit a timely Application for Payment, and that failure is due exclusively to the actions of the Contractor, the Subcontractor shall have the right to be paid by the Contractor upon demand the amounts due as described in Paragraph 6.04(A)(1).
- C. The Contractor shall pay interest on amounts owed to the Subcontractor which remain unpaid seven (7) days after the Contractor's receipt of payment from the Owner; provided, however, that amounts owed the Subcontractor which have been withheld properly pursuant to Paragraph 6.04(A)(2) shall not accrue interest. Interest on amounts due the Subcontractor and unpaid shall accrue at the rate of .5 percent per month; provided, however, that the Contractor's obligation to pay interest hereunder shall in no event be construed to be or otherwise become an obligation of the Owner. Claims for reimbursement by the Owner for interest charges owed by the Contractor to any Subcontractor shall not be allowed.
- D. Insurance proceeds received by the Contractor under the insurance policies described in Part 14 shall be equitably distributed to the affected Subcontractors in accordance with their respective interests in the underlying claim.

- E. Information concerning percentages of completion of Work performed by a Subcontractor as shown in Application for Payment may be made available to that Subcontractor upon mutual agreement with the Architect and the Owner.
- F. The Contractor shall include in each subcontract a requirement that each Subcontractor shall be bound by and subject to the provisions of Paragraph 6.04(A) through 6.04(D) above in regard to payments made by such Subcontractor to its Sub-subcontractors.

PART 7 - SEPARATE CONTRACTS

- 7.01 **Owner's Right to Award Separate Contracts.** The Owner reserves the right to award one or more separate contracts in connection with other portions of the Project or other construction or operations at the Site. The Contractor hereby acknowledges that for all or some of the Contract Period such Separate Contractors may be present at the Site. The Contractor hereby assumes the risk of delays and disruptions caused by the presence of Separate Contractors at the Site and hereby covenants and agrees that it shall not make a claim against the Owner for additional compensation as a result of the activities of such Separate Contractors, unless such activities give rise to an "unreasonable delay" as set forth in Part 11 hereof.
- 7.02 **Covenant to Coordinate and Cooperate.** As part of the Work and at no additional cost to the Owner, the Contractor covenants and agrees at all times during its performance of the Work to coordinate such performance with the activities and operations of any Separate Contractors. The Contractor shall use its good faith best efforts to cooperate, coordinate and consult with the Owner and all Separate Contractors in the performance of the Work. The Contractor shall connect and coordinate the Contractor's construction and related operations with the construction and related operations of any Separate Contractors to the extent necessary to achieve the timely and satisfactory completion of the Work and in such a manner as to avoid delaying, interfering with, or otherwise placing undue burden upon the activities of any Separate Contractor. The Contractor shall afford the Owner and each Separate Contractor reasonable opportunity for introduction and storage of their materials and equipment and reasonable access to the Site for performance of their respective activities.
- 7.03 **No Interference with Separate Contractors.** The Contractor shall not take any action, or omit to take any action, that will delay, interfere with, or otherwise unduly burden the activities of a Separate Contractor or that will obstruct reasonable access by any Separate Contractor to the site of such Separate Contractor's activities and operations.
- 7.04 **Scheduling with Separate Contractors.** Upon request by the Owner, the Contractor shall meet with the Owner and any Separate Contractors at times designated by the Owner in order to review the Construction Schedule and the schedules of the Separate Contractors and to coordinate and conform those schedules. The Contractor promptly shall make any revisions to the Construction Schedule that are required, in the Owner's sole discretion, to serve the interests of the Project as a whole. The Construction Schedule, as revised, shall then constitute the schedule to be used by the Contractor until subsequently revised.

- 7.05 Report of Discrepancies. Whenever the Contractor's Work depends for proper execution or results upon construction or operations by a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect in writing any apparent discrepancies or defects in such construction or operations performed by a Separate Contractor that would render it unsuitable for such proper execution and results. Failure of the Contractor to report such apparent discrepancies and/or defects shall constitute an acknowledgment that the 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.

PART 8 - MISCELLANEOUS PROVISIONS

- 8.01 Governing Law. The Contract Documents shall be governed by and construed in accordance with the laws of the Commonwealth of Virginia, without reference to conflict of laws principles.
- 8.02 Successors, Assigns and Legal Representatives. Except as provided in Part 6 hereof with respect to Subcontractors, this Agreement shall not be assigned, sublet or transferred, in whole or in part, by operation of law or otherwise, by either of the parties hereto except with the prior written consent of the other. Unless specifically stated to the contrary in any written consent to an assignment, no assignment shall operate to release or discharge the assignor from any duty or responsibility under this Agreement. The Owner's consent to a particular subcontract or assignment shall in no event constitute a waiver of the Owner's right to consent to any further or additional subcontracts or assignments.
- 8.03 Entire Agreement. The Contract Documents constitute the entire agreement among the parties pertaining to the Work and supersedes all prior and contemporaneous agreements and understandings of the parties in connection therewith. The Contract Documents may not be modified or amended orally or by course of conduct. Any modification or amendment shall be set forth in a written Change Order executed by the Owner and the Contractor.
- 8.04 Royalties and Patents. The Contract Sum includes all royalties and costs arising from patents, trademarks, and copyrights in any way involved in the Work. Whenever the Contractor is required or desires to use any design, device, material or process covered by letters of patent or copyright, the Contractor shall indemnify and save harmless the Owner and Architect, their officers, agents and employees from any and all claims for infringement by reason of the use of any such patented design, device, tool, material, equipment, or process to be performed under the Contract, and shall indemnify the Owner and the Architect, their officers, agents, authorized representatives, and employees for any costs, expenses and damages which may be incurred by reason of any such infringement at any time during the prosecution and after the completion of the Work. Notwithstanding the foregoing, the Contractor shall not be liable hereunder to the extent that any infringement arises by virtue of a design or implementation supplied to the Contractor by the Owner or the Architect.

8.05 Contractual Claims.

- A. If the Contractor wishes to make a contractual claim, whether for extra compensation, damages or any other relief, he shall provide Notice to the Owner and to the Architect in accordance with the provisions of Paragraph 8.09 hereof. The Contractor's failure to comply strictly with the requirements of Paragraph 8.09 shall result in waiver of the claim
- B. Resolution of any outstanding claims, counterclaims, disputes and other matters in question arising out of or relating to the Contract Documents to the extent not resolved by the parties hereto, shall be decided by a court of competent jurisdiction in the Commonwealth of Virginia; provided, however, that nothing contained herein shall be construed to invalidate the finality of the Owner's decisions. The Owner and the Contractor hereby waive any right they may have to a jury trial in connection with the resolution of any such claim, counterclaim, dispute or other matter arising out of or in connection with the Contract Documents. In any such court proceeding, the Owner shall have the right to bifurcate or otherwise reserve the court's determination regarding issues of: (i) the Owner's entitlement to recovery from the Contractor of the Owner's attorney's fees and costs; and (ii) the quantum of any such recovery, until after a decision or other disposition by the court in the underlying matter.

8.06 Tests and Inspections.

- A. The Contractor shall give the Owner and Architect sufficient prior Notice of the date and time of required tests or inspections. The Contractor shall be responsible for all costs associated with such tests or inspections, unless otherwise specifically excluded from the scope of Work defined in the Contract Documents.
- B. If, during the course of the Work, the Architect or Owner decides it is reasonable and necessary to perform supplemental inspections or testing not required by law or Contract Documents, then the Contractor will be instructed in writing to arrange for such testing. It shall be the responsibility of the Contractor to give timely Notice of such inspections or testing to the Owner and Architect. If the supplemental testing or inspections reveal defective or non-complying Work, then the Contractor shall be responsible for all costs associated with the performance of the tests or inspections, any additional costs required to rectify the defective or non-complying Work, and any costs for additional architectural services related thereto. If the Work is found to be in compliance with the requirements of the Contract Documents, then the Contractor shall be entitled to an equitable adjustment in for the reasonable associated costs of the testing or inspections.
- C. The Contractor shall be responsible for securing all certificates or records of additional tests or inspections, and distributing them to the Owner and Architect in a timely manner.

- D. Performance of required or supplemental inspections and testing by persons or organizations other than the Contractor, Subcontractors, or Sub-subcontractors, shall not compromise performance of the Work in compliance with the Contract Documents.
- 8.07 Conflict with Provisions of Laws or Regulations.
- A. In the event that there is a conflict between a provision of these Contract Documents and that of any Law or Regulation, such conflicting Law or Regulation shall control.
 - B. All legal provisions required by law to be included in the Contract Documents shall be deemed to be a part hereof, whether actually set forth or not herein.
- 8.08 No Claims Against Individuals. No claim whatsoever shall be made by the Contractor against any officer, Member, authorized representative or employee of the Owner or the Architect for, or on account of, anything done or omitted to be done in connection with this Contract, and the Contractor shall be strictly liable for all costs, attorneys fees and expenses incurred by any individual or entity who is sued in violation of this Paragraph.
- 8.09 Disputes.
- A. Notice of Claim. If the Contractor wishes to dispute that any Work required, necessitated, or ordered by the Architect or the Owner, or otherwise to claim any action required or ordered by the Architect or the Owner to be taken or not taken violates the terms and provisions of this Contract, then he shall proceed with such Work and/or comply with such requirement or order without delay and shall, within five days after the earlier of (a) commencing such Work or (b) receiving Notice of such requirement or order, notify the Owner and the Architect, in writing, of his claim with respect thereto and request a final determination thereof. In order to invoke the procedures of this Paragraph, the Contractor's request must. (i) refer specifically to this Paragraph by number; (ii) in the case of the Owner, be hand-delivered both to the office of the Director, Office of Design and Construction and to the Project Manager at the Site; (iii) contain a full explanation of the basis of the Contractor's position, and the rationale for Contractor's request, including actual photocopies of all materials or documents (other than Contract Documents) referred to in the Contractor's request; (iv) detail the quantum of any relief requested by the Contractor and provide verified substantiation of all such amounts; (v) describe in detail any other relief requested; (vi) describe in detail all efforts the Contractor has made to mitigate any alleged loss or otherwise avoid the claim; and (vii) be signed by an officer of Contractor under oath. No request for a Change Order, request for change proposal, or other requested modification shall be sufficient, on its own or collectively to satisfy or to defer the commencement of the Notice requirements set forth herein.
 - B. Claim Review Process. The Owner shall issue a written determination with regard to any such claim on or before the date that is 14 days after the date of its

receipt of the Contractor's written request; provided, however, that in the event that the Owner determines, based upon the size or complexity of the claim at issue, that additional time is required for the issuance of a response, the Owner shall issue written Notice of such finding to the Contractor within 14 days following the date of its receipt of the Contractor's written request and shall issue a written determination with regard to such claim on or before the date that is 60 days after the later of (i) the date of the Owner's receipt of the Contractor's written request or (ii) the Contractor's submission of all supplemental information where such has been requested by the Owner. The Contractor's failure to submit promptly any supplemental information requested by the Owner shall result in the waiver of the claim. In order to reserve its right to claim compensation for such Work, or damages resulting from such compliance, the Contractor shall, within five days after receiving Notice of the Owner's determination and direction, notify the Owner and the Architect, in writing, that the Work is being performed, or that the determination and direction is being complied with, under protest. Failure of the Contractor to so notify the Owner and the Architect as provided herein shall constitute a waiver and release of the Contractor's right to claim compensation for any Work performed under protest or damages resulting from such compliance. Should Owner fail to issue a written determination within the time periods specified herein, such failure shall be deemed to be a denial of the claim entitling the Contractor to institute legal action with respect to the claim without further administrative review by Owner. In no event shall Contractor be permitted to make a total cost claim or the like against Owner, nor any other claim which fails to conform strictly to the above standards or to Virginia law; any such claims shall be deemed to be null and void.

- C. Undisputed Amounts; Claims for Extension of Time. All monies owed and not in dispute will be made available to the Contractor in accordance with the Contract Documents. Any request for an extension of time in connection with disputed Work shall be governed by Part 11 hereof.
- 8.10 Benefit of Agreement. The Contract Documents shall be enforceable and binding upon, and shall inure to the benefit of, the parties hereto, their respective successors and permitted assigns. Nothing contained herein, express or implied, is intended to or shall confer upon any other person any rights, benefits or remedies of any nature whatsoever under or by reason of this Agreement.
- 8.11 No Estoppel. Neither the Owner, nor any officer, Member, employee, or authorized representative thereof, will be bound, precluded, or estopped by any action, determination, decision, acceptance, return, certificate, or payment made or given under or in connection with this Contract by any officer, employee, Member or authorized representative of the Owner or of the Architect, at any time either before or after final completion and acceptance of the Work or any payment therefor. The Owner may, at any time and from time to time. (a) show the true and correct classification, amount, quality, or character of the Work performed, or that any determination, decision, acceptance, return certificate or payment is incorrect or was improperly made in any respect, or that the Work or any part thereof does not in fact conform to the requirements of the Contract Documents; (b) demand and recover from the Contractor any

overpayment made to him or such damages as the Owner may sustain by reason of the Contractor's failure to comply with the requirements of the Contract Documents; or (c) both of the foregoing clauses (a) and (b).

8.12 No Waiver of Rights. No act or omission on the part of the Owner (including but not limited to those matters set forth in A through D below) shall be deemed to constitute a waiver of any right, duty, obligation or other provision set forth in these Contract Documents:

- A. inspections conducted by the Owner, the Architect, or any of their respective employees, officers, Members or authorized representatives;
- B. orders for the payment of money;
- C. payments for, or acceptance of, all or any part of the Work;
- D. extensions of time or changes to the Contract Documents, Specifications or Drawings.

In order to be effective, any waiver by the Owner must be in writing and must expressly use the term "waiver," or a variation thereof. In no event shall any waiver of any breach of this Contract be held as a waiver of any subsequent breach of this Contract. The terms of this Contract shall be in addition to, and not a limitation on, any and all rights and remedies which the Owner has or may have at law or in equity. The Owner will have the right to enjoin the Contractor against any breach of the terms of this Contract without any showing that such relief is necessary to avoid irreparable injury or that there is no adequate remedy at law.

PART 9 - CHANGES IN THE WORK

9.01 Minor Changes.

- A. Owner's Right to Make Changes. The Owner reserves the right to make such additions, deletions, or changes to the Work as may be necessary in its sole and absolute discretion to complete the Work; provided, however, that no such additions, deletions or changes shall materially affect the substance hereof or materially change the Contract Sum. This Contract shall in no way be invalidated by any such additions, deletions or changes. No claim shall be made by the Contractor for loss of anticipated profits resulting from any such addition, deletion, or change to the Work.
- B. Construction Conditions. Construction conditions may require minor changes in the location and installation of the Work and equipment to be furnished and other Work to be performed hereunder. The Contractor, when ordered by the Architect, shall make such adjustments and changes in the locations and Work as may be necessary without additional cost to the Owner, provided such adjustments and changes do not materially alter the character and quantity of the Work as a whole, or the Contract Sum, and provided further that Drawings and

Specifications showing such adjustments and changes are given to the Contractor by the Owner or Architect within a reasonable time before work involving such adjustment and changes is begun. The Owner and the Architect shall be the sole judges of what constitutes a minor change for which no additional compensation shall be allowed.

- C. Time Extension for Minor Changes. The Contractor shall be entitled to an extension of time for such minor changes only for the number of days which the Architect may determine to be necessary to complete such changes and only to the extent that such changes actually delay the completion of the Project, and then only if the Contractor shall have strictly complied with all the requirements of the Contract Documents.

9.02 Extra Work.

- A. Order for Extra Work. The Owner may, in its sole and absolute discretion, at any time by issuance of a Work Order or Change Order and without notice to the Sureties require the performance of such Extra Work as it deems necessary or desirable. A Work Order or a Change Order covering Extra Work shall be valid only if issued in writing and signed by the Owner and the Architect, and the Extra Work so ordered must be performed by the Contractor. The Contractor hereby covenants and agrees to perform such Extra Work on the terms and conditions set forth in the applicable Work Order or Change Order, as the case may be, and hereby waives any claim, suit or cause of action of any nature based, in whole or in part, upon the allegation that any Extra Work ordered hereunder and/or any Work omitted pursuant to Paragraph 9.03 hereof, individually or in the aggregate, constitute a cardinal change to, or other material deviation from, the Contract Documents and/or the Work contemplated thereby. Any attempt by the Contractor to alter or modify a Change Order or to reserve a claim thereunder shall be void and of no legal effect. Each Change Order, when executed, shall constitute full and final compensation for all matters directly or indirectly related to or arising from the changes to the Work ordered thereby (the "Changed Work"), including, but not limited to, all Overhead and all other direct and indirect costs associated with the Changed Work and any and all adjustments (of whatever nature) to the Contract Sum or to the Contract Period attributable to the Changed Work.
- B. Compensation for Extra Work. The amount of compensation to be paid to the Contractor for any Extra Work set forth in a Work Order or a Change Order shall be determined as follows:
1. By such applicable unit prices, if any, as are set forth in the Contract; or
 2. If no such unit prices are set forth, then by a lump sum or other prices mutually agreed upon by the Owner and the Contractor; or
 3. If no such unit prices are set forth in the Contract and if the parties cannot agree upon a lump sum or other unit prices, then by the actual and

reasonable costs as determined by the Architect in accordance with Section 01153 of the General Requirements.

- C. Full and Final Compensation. Regardless of the manner in which the adjustment to the Contract Sum on account of Extra Work is determined, such adjustment shall be deemed to include all amounts, whether direct, indirect or consequential, resulting from the performance of the Extra Work, including but not limited to all Overhead. The adjustment to the Contract Sum, if any, shall constitute the final, full and mutual accord and satisfaction for all costs related to such change.
- D. Notice and Records of Extra Work. At least one day prior to the performance of Extra Work hereunder, the Contractor shall provide Notice to the Owner and Architect setting forth: (1) his intention to perform Extra Work; (2) the nature of the Extra Work and the precise location, time of commencement, duration, and basis therefor; and (3) Subcontractors involved therein. Unless such Notice of Extra Work is provided in the manner prescribed herein, such Extra Work shall not be compensated. Records of Extra Work performed hereunder, if any, shall be submitted by the Contractor to the Owner at the end of each day on which such Extra Work shall have been performed. Duplicate copies of accepted records shall be made and signed by both the Contractor or its representative and the Owner's representative, and one copy shall be retained by each.
- E. Payment Requests. Payment requests for approved and duly authorized Extra Work shall be submitted by the Contractor upon a certified statement supported by receipted bills. Such statements shall be submitted for payment by the Owner in the month in which such Extra Work was performed and in accordance with Paragraph 12.03 hereof.
- F. Time Extension for Extra Work. The Contractor shall be entitled to an extension of time for Extra Work duly authorized by the Architect only for the number of days required, in the opinion of the Architect, to complete such Extra Work, and then only if the Contractor has strictly complied with all the requirements of the Contract Documents.

9.03 Omitted Work.

- A. Omission of Work by Owner. The Owner may at any time by a written order and without notice to any Surety require the omission of such Work as the Owner may find necessary or desirable in its sole and absolute discretion.
- B. Order for Omission of Work. Order An order for omission of Work shall be valid only if signed by the Owner and the Architect and the Work so ordered must be omitted by the Contractor. The amount of any credit due the Owner as a result of any such omission of Work shall be determined in accordance with Paragraph 9.02(B)(1), (2) and (3) above.

9.04 Suspension of Work.

- A. Suspension of Work by Owner. The Owner may suspend the Work by written order in order to. (i) coordinate the activities and operations of the Contractor with that of any Separate Contractors; (ii) expedite completion of the Project, even though completion of the Work may be delayed thereby; or (iii) serve the best interests of the Owner or of the Project as a whole. No single suspension by the Owner shall exceed 10 days.
- B. Order for Suspension of Work. An order for suspension of the Work (or any portion thereof) shall be signed by the Owner and the Architect, shall identify the Work that is to be suspended by the Contractor, and shall set forth the effective dates of such suspension. Such order (and the effective dates of the suspension) may be updated by the Owner from time to time during the course of the suspension.
- C. Compensation for Suspension. In the event of a suspension of the Work (or any portion thereof) hereunder, the Contractor shall accept as full compensation for such suspension. (i) the actual costs incurred by the Contractor on this Project for demobilization and remobilization, as documented to the satisfaction of the Owner and the Architect; and (b) an extension of time for completion of the Work for such number of days as the Owner and the Architect shall determine that the suspension shall have actually and adversely impacted the Critical Path for the Work.

9.05 Audit. The Owner and its authorized representatives shall, until the expiration of three years from the date of final payment under these Contract Documents, have the right to examine and copy those books, records, accounts, documents, papers and other supporting data which involve transactions related to this Contract or which otherwise permit adequate evaluation of the cost or pricing data submitted, along with the computations and projections used therein (the "Records"), and the Contractor hereby covenants to maintain the Records in good order for such time and to deliver promptly the Records to the Owner within 5 days after its written request. In the event that the Contractor fails to comply with this Paragraph 9.05, then the Owner, in addition to any other available remedies, shall have the right to withhold payment of amounts otherwise due the Contractor until such time as the Contractor shall have complied fully with the obligations set forth herein.

PART 10 - CHANGE ORDER AND WORK ORDER PROCEDURES

10.01 Definitions.

- A. Change Order. Refer to the definition in Paragraph 1.02.
- B. Work Order. Refer to the definition in Paragraph 1.28.
- C. Overhead. Refer to the definition in Paragraph 1.18.

10.02 Change Orders. See Section 01153 of the General Requirements.

PART 11 - TIME

11.01 Time of Start and Completion; Liquidated Damages.

- A. Commencement and Performance of Work; Time of the Essence. The Contractor shall commence the Work within ten (10) days after the date stated as the date to proceed in the Notice to Proceed. Time being of the essence with respect to this Contract, the Contractor shall prosecute the Work diligently, using such means and methods of construction as will secure its full completion in accordance with the requirements of the Contract Documents, and will complete the Work within the Contract Period. By executing the Agreement, the Contractor confirms that the Contract Period constitutes a reasonable period for performing the Work. The Contractor shall proceed expeditiously with adequate forces, scheduling and resources to complete the Work within the Contract Period. The actual Dates of Substantial and Final Completion will be established by the Architect after inspections have been conducted in accordance with Paragraphs 12.04 and 12.05 hereof.
- B. Liquidated Damages. The Owner and the Contractor hereby acknowledge and agree that time is of the essence with respect to this Contract and that in the event the Contractor fails to complete the Work within the Contract Period, the Owner will incur actual and considerable monetary damage, the actual amounts of which are uncertain and not readily ascertainable. The stipulated amount per day set forth in the Summary of Work (Section 01010) is reasonably in proportion to the probable loss to the Owner and that amount per day is hereby agreed upon as the liquidated damages for each day that the time consumed in completing the Work exceeds the time allowed. This stipulated amount shall in no event be considered to be a penalty or otherwise than as the liquidated and adjusted damages to the Owner because of the delay, and the Contractor and its Surety hereby agree that the stated sum per day for each such day of delay shall be deducted and retained out of the monies which may become due hereunder and if not so deductible, the Contractor and its Surety shall be liable therefor.

11.02 Extension of Time.

- A. Extension of Time. The parties to this Contract wish to provide a framework for resolving issues in connection with any delays that may occur on this Project. No extension beyond the date of completion fixed by the terms of the Contract will be effective unless granted in writing and signed by the Owner's representative.
- B. Contractor's Notice of Delay. Notice of delay must be given in writing to the Director of the Owner's Office of Design and Construction, with copies to the Architect and to the Owner's on-Site project manager within 5 days after the commencement of the delay and in strict accordance with the General Conditions. Each such Notice shall. (i) be submitted in written, narrative form on the Contractor's letterhead; (ii) be identified as a "Notice of Delay;" (iii) shall

describe, in reasonable detail, the nature of the delay encountered; (iv) shall have appended to it a copy of this Paragraph 11.02; and (v) shall set forth the date of the commencement of the delay. An update to the Construction Schedule shall in no event be deemed to be sufficient, on its own and unless submitted as part of an application for extension of time as provided herein, to satisfy the Notice of requirements set forth in this Paragraph 11.02. In case of a continuing cause of delay, only one Notice shall be required.

- C. Contractor's Application for Extension of Time. The Contractor's application for any extension of time shall be in writing and addressed to the Director of the Owner's Office of Design and Construction, with copies to the Architect and to the Owner's on-site project manager, not more than 20 days after the commencement of the delay. Any such application for extension of time shall. (i) be on the Contractor's letterhead; (ii) describe in reasonable detail the reasons for and causes of the delay; (iii) demonstrate in a clear and convincing fashion the extent to which, if any, the delay impacts the Critical Path for the Project; (iv) contain a justification for each additional day which is requested; (v) be identified as an "Application for Extension of Time; and (vi) have appended to it a copy of this Paragraph 11.02(A), together with copies of any documents referenced therein. If the delay should continue for longer than 20 days, the Contractor must submit the substantiation and support for such delay no less frequently than in 20 day increments. Any application for extension of time which does not conform in every respect to the requirements of this Paragraph 11.02(A) shall be deemed to have been waived.
- D. Basis for Extension of Time. If such an application is made, the Contractor shall be entitled to an extension of time for delay in completion of the Work if obstructed or delayed in the commencement, prosecution or completion of any part of the Work on the Critical Path by any act or delay of the Owner, or by riot, insurrection, war, pestilence, acts of public authorities, fire, earthquakes, or by strikes, or other causes, which causes of delay mentioned in this Paragraph, in the opinion of the Owner, are entirely beyond the expectation and control of the Contractor.
- E. Measurement of Delay. The Contractor shall, however, be entitled to an extension of time for such causes only for the number of days of delay which the Architect may determine to be due solely and exclusively to such causes and only to the extent that such occurrences actually and adversely impact the Critical Path for the Work, and then only if the Contractor shall have strictly complied with all of the requirements of these Contract Documents.
- F. Delay for Abnormal Weather Conditions. The Contract Period will be adjusted to account for unusually severe and abnormal weather conditions that prevent or inhibit the Contractor's performance of the Work and lengthen the Critical Path indicated on the Construction Schedule (such unusually severe and abnormal weather conditions referred to herein as "Inclement Weather"). The occurrence of Inclement Weather shall be established by reference to climatological data compiled by the U.S. Department of Commerce National Oceanic and

Atmospheric Administration for Washington-Dulles International Airport or Washington National Airport, whichever is closest to the Site of the Project.

- G. Procedure for Protesting Denial of Extension of Time. In the event that the Contractor is denied an extension of time hereunder, he may contest such decision by notifying the Architect, the Director of the Owner's Office of Design and Construction and the Project Manager in writing within four days after the issuance of such denial, stating in detail its reasons for disagreement and submitting all information necessary for a final determination by the Owner pursuant to Paragraph 8.09 hereof. The Contractor shall provide the Architect and the Owner with all substantive information that supports the Contractor's claim for an extension of time. The Contractor must address all elements of the denial of such time extension. No claim for an extension of time under this provision will be valid unless submitted as stated herein.
- H. Supplier and Subcontractor Delays. Except as expressly set forth in Section 11.02(J), delays caused by the failure of the Contractor's materialmen, manufacturers, and dealers to furnish approved shop drawings, materials, fixtures, equipment, appliances, or other supplies on time or the failure of Subcontractors to perform their Work in conformity with the approved Construction Schedule shall not constitute a basis for an extension of time.
- I. Remedy for Delay. Except as expressly set forth in Section 11.02(J) hereof, no claim for payment, compensation or adjustment of any kind (other than the extensions of time provided for herein) shall be made or asserted against the Owner by the Contractor for costs or damages caused by hindrances or delays from any cause, whether such hindrances or delays be avoidable or unavoidable, and the Contractor shall make no claim for damages by reason of any such hindrances or delays, and will accept in full satisfaction of such hindrances or delays an extension of time to complete performance of the Work as specified.
- J. Owner-Caused Delay. Notwithstanding the provisions of Section 11.02(I), nothing contained herein is intended to, or shall have the effect of, waiving, releasing or extinguishing any rights of the Contractor to recover costs or damages for an unreasonable delay in performing this Contract, either on its behalf or on behalf of a Subcontractor, if and to the extent that such delay is caused by acts or omissions of the Owner, its agents or employees, and due to causes within their control. In order to seek costs or damages in connection with any such unreasonable delay, the Contractor must comply fully with each of the requirements set forth in Section 11.02(B) hereof, and shall identify each Notice of delay and application for extension of time submitted thereunder, respectively, as a "Notice of Delay and Additional Costs" and as an "Application for Extension of Time and Additional Costs." Each Notice of Delay and Additional Costs shall contain, in addition to the requirements set forth in Section 11.02(B). (i) a description of the nature of the monetary loss or damage associated with the unreasonable delay; (ii) an explanation as to why the delay is deemed to be "unreasonable;" (iii) a clear demonstration of how such unreasonable delay was caused solely and exclusively by acts or omissions of the Owner, its agents and

employees, and due to causes within their control; and (iv) a detailed description of all efforts the Contractor has made to mitigate any alleged loss or otherwise avoid the claim. In addition to the requirements set forth in Section 11.02(B), each Application for Extension of Time and Additional Costs shall demonstrate in a clear and convincing fashion. (i) that the delay was "unreasonable;" and (ii) the extent, if any, to which the delay was caused by acts or omissions of the Owner, its agents or employees, and due to causes within their control. In the event it is determined that the Contractor (either on its behalf or on behalf of a Subcontractor) is entitled to costs or damages on account of such an Owner-caused unreasonable delay, the amount thereof shall be determined as set forth in Section 11.02(K).

- K. Contractor's Liquidated Damages. The parties recognize the difficulty in calculating damages incurred by the Contractor resulting from unreasonable delays caused by acts or omissions of the Owner, its agents and/or employees, and due to causes within their control. As such, the parties hereby agree that the amount set forth in the Summary of Work (Section 01010) shall be the liquidated damages for each and every day that the Contractor and/or any Subcontractor(s) incurs compensable costs or damages for unreasonable delays in performing this Contract and that this figure represents a reasonably accurate forecast of the daily aggregate, anticipated actual damages in the event of an unreasonable delay. The parties hereby acknowledge and agree that the liquidated damages provided for hereunder represent full and final compensation for all losses, costs and damages incurred in the aggregate by the Contractor and its Subcontractors (if any) in connection with an unreasonable delay and that neither the Contractor nor any Subcontractor will in any event submit a claim or seek further or additional compensation in excess of the stated amount. The Contractor shall include in each of its subcontract agreements for the Project a liquidated damages provision similar to that set forth herein.
- L. Reimbursement of Owner's Costs and Expenses. In the event that the Contractor makes a claim against the Owner for costs or damages due to unreasonable delays caused by the Owner, its agents and/or employees and such claim is determined to be false or to have no basis in law or otherwise is resolved in favor of the Owner, in whole or in part, then the Contractor shall be liable to the Owner for a percentage of all the costs the Owner incurs in investigating, analyzing, negotiating, and litigating the claim. The percentage for which the Contractor shall be liable shall be equal to the percentage of the Contractor's total delay claim that is determined through litigation or administrative procedures to be false or to have no basis in law or otherwise resolved in favor of the Owner.
- M. Phased Construction. Where portions of the Work have been phased in order to accommodate Owner's use of existing premises, and the beginning date and ending date for the performance of the phased Work have been stipulated, and the beginning date must be changed to accommodate unforeseen circumstances, then the ending date shall accordingly be adjusted so that the amount of time allotted for the phased Work shall not change.

PART 12 - PAYMENTS AND COMPLETION

12.01 Prices.

- A. Contract Sum. For the Contractor's complete performance of the Work, the Owner agrees to pay, and the Contractor agrees to accept, subject to the terms and conditions hereof, the Contract Sum, taking into consideration any deductions based on award of a combination of alternates, if applicable, plus the amount required to be paid for Extra Work ordered under Paragraph 9.02 hereof, less credit for any Work omitted pursuant to Paragraph 9.03 hereof.
- B. Unit Prices; Estimated Quantities. The amount awarded as a unit price for any unit price Contract item shall represent payment in full for all the material, equipment and labor necessary to complete, in conformity with the Contract Documents, each unit or item of Work shown, specified, or required with respect to such unit price Contract Item. With respect to unit price items, the number of units actually required to complete the Work under the Contract may be less or more than stated in the bid. The Contractor agrees that no claim will be made for any damages or for loss of profits or overhead because of a difference between the quantities of the various classes of Work assumed and stated in the bid as a basis for comparing bids and the quantities of Work actually performed.
- C. No Other Payments Due. No payment other than the amount awarded will be made for any class of work included in a lump sum Contract item or a unit price Contract item, unless specific provision is made therefor in the Contract Documents.

12.02 Submission of Schedule of Values. See Section 01370 of the General Requirements. The Schedule of Values, once accepted by the Architect, may be used for checking the Contractor's applications for partial payments hereunder but shall not be binding upon the Owner or the Architect for any purpose whatsoever.

12.03 Partial Payments.

- A. Applications for Partial Payment. On or about the first of each month, the Contractor shall make and certify an estimate of the amount and fair value of the Work performed during the preceding month and may apply for partial payment. The Architect may, in his discretion, revise the estimate to show the actual value of Work completed in accordance with the Architect's observation of the Work. The Contractor agrees to be bound by the Architect's revisions to its applications for partial payment. Whenever the monthly estimate, after approval by the Architect, shows that the value of the Work completed during the period covered by the payment request exceeds \$1,000.00, the Architect will issue a Certificate of Payment for such Work. Such Certificate will authorize payment by the Owner in an amount equal to the value of the Work completed less any sums retained or deducted by the Owner under the terms of the Contract Documents, and less retainage of 5 percent of payments claimed. Within 45 days after receipt of each Certificate of Payment, the Owner shall pay the Contractor in accordance with

the applicable Certificate and the Contract Documents. Unless withheld in accordance with Paragraph 12.03(B) hereof, amounts not paid when due shall accrue interest at a rate of .5% per month. The Owner may, in its sole and absolute discretion, reduce the amount of retainage withheld, in the latter stages of the Project. For additional requirements, see Section 01152 for other Requirements.

- B. Withholding Payment. The Owner may withhold payment to the Contractor hereunder to such extent as may be necessary in the opinion of the Architect to protect the Owner due to loss because of:
1. defective Work not remedied;
 2. third party claims (including Separate Contractor Claims) filed or reasonable evidence indicating probable filing of such claims;
 3. failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
 4. reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
 5. damage to the Owner or another person or entity (including a Separate Contractor);
 6. reasonable evidence that the Work will not be completed within the Contract Period;
 7. persistent failure to carry out the Work in accordance with, or to otherwise observe the requirements of, the Contract Documents; or
 8. liability, damage, or loss due to injury to persons or damages to the Work or property of Separate Contractors, or the subcontractors of others, caused by the act or neglect of the Contractor or any of its Subcontractors or Sub-subcontractors.
- C. Owner's Application of Withheld Amounts. The Owner shall have the right, as an authorized representative for the Contractor and without the Surety's consent, to apply any such amounts so withheld in such manner as the Owner may deem proper to satisfy such claims or to secure such protection. The application of these amounts shall be deemed payments for the account of the Contractor and shall reduce the Owner's obligation to the Contractor accordingly.
- D. Payment for Materials and Equipment. Unless otherwise provided herein, no partial payment will be made for any materials or equipment supplied hereunder before they are. (i) incorporated in the Work in a permanent manner as required by the Contract Documents, (ii) properly stored at the Site of the Project or (iii) properly stored in a bonded warehouse to the satisfaction of the Owner.

- E. **Equipment and Materials Stored On Site.** The cost of equipment and materials delivered and stored at the Site of the Project and tested for adequacy may be included in the Contractor's application for partial payment; provided, however, that the Contractor shall furnish written evidence satisfactory to the Owner that the Contractor is the owner of such materials or equipment at the time of payment therefor by the Owner and that such equipment is being stored and maintained in accordance with the Contract Documents and the manufacturer's recommendations. The amount to be paid by the Owner for such equipment and nonperishables will be 90 percent of the documented invoice cost to the Contractor as supported by receipted bills, which shall be furnished to Owner at the time the request for payment is made. Such payment shall not relieve the Contractor of full responsibility for completion of the Work and for protection of materials and equipment until incorporated in the Work in a permanent manner as required by the Contract Documents.
- F. **Payment Affidavits.** Before any payment will be made under this Contract, the Contractor and every Subcontractor, if required, shall deliver to the Architect a written, verified statement, in satisfactory form, showing in detail all amounts then due and unpaid by the Contractor to all laborers, workers, and mechanics, employed under the Contract for the performance of the Work at the Site of the Project, for daily or weekly wages, or to other persons for materials, equipment, or for supplies delivered at the Site of the Project during the period covered by the payment request.
- G. **No Improper Payments.** Upon the request of the Architect, as a prerequisite for payment pursuant to the terms of this Contract, the Contractor shall give the Owner a statement that no employee of the Owner has received or has been promised, directly or indirectly, any financial benefit, by way of a fee, commission, finder's fee or in any other manner, or any other remuneration arising from or directly or indirectly related to this Contract. All parties agree that the Owner shall have the right, in its sole and absolute discretion, to withhold payment to the extent of any such fee or commission. The Contractor shall not be entitled to interest and shall not have any claim on account of any payments being withheld under this Paragraph 12.03 G.

12.04 Substantial Completion.

- A. **Notice of Substantial Completion; Inspection by Architect.** When the Contractor considers that the Work, or in the case of phased construction, such portion thereof which the Owner agrees in writing to accept separately, is substantially complete, the Contractor shall provide the Owner and the Architect written notification of such fact. The Contractor shall conduct a "pre-punch" inspection, and shall submit a written and dated "pre-punch" list prior to requesting the formal Punch List Inspection by the Owner and the Architect. (The Contractor shall have the Job Superintendent and a representative from each of the major sub-contractors present at the Punch List Inspection) Upon receipt of the Contractor's "pre-punch" list and concurrence of the Owner's Field Inspector, the Architect and the Owner shall conduct the Punch List Inspection and shall

prepare a comprehensive list of items to be completed and/or corrected. The Contractor shall proceed promptly to complete and correct items on the list. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Subsequently, the Architect and the Owner will make an inspection to determine whether the Work, or such designated portion thereof, is substantially complete. If the Architect's inspection discloses any item, whether or not included on the list, which is not in accordance with the requirements of the Contract Documents, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. The Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

1. Phased construction. Where the Work shall be performed in phases, Owner acceptance of each phase shall not occur until all of the following activities have taken place:
 - a. The Contractor shall perform a "pre-punch" inspection, shall notify the Owner upon completion of the inspection, and shall supply the Owner with a written and dated copy of its "pre-punch" list, which shall compile all deficiencies in the work observed by the Contractor.
 - b. The Owner and Architect shall review the "pre-punch" list, and shall determine whether or not a "punch list" inspection shall take place.
 - c. Upon such determination, the Owner, the Architect and the Contractor (including the Job Superintendent and a representative from each of the major sub-contractors) shall conduct the "punch list" inspection and shall compile a list of deficiencies for correction by the Contractor. The Contractor shall correct the deficiencies contained in the "punch list" in the time period indicated in Paragraph 12.04(B).
 - d. The Contractor shall not proceed to the next construction phase until all items on the "punch list" have been corrected, and the Owner has agreed in writing to allow the Contractor to proceed to the next phase.

B. Punch List:

1. The Contractor shall have a maximum of sixty (60) days after the date of issuance of any punch list to complete all of the Work items contained thereon. Where the Project consists of discrete construction phases, the Contractor shall have a maximum of fourteen (14) days after the date of each punch list for each phase to complete the Work contained on the list. If the Work is not completed within the designated period, the sum of

\$50.00 per day per punch list item will be deducted from the Contract Sum until the Date of Final Completion.

2. In the event that the Contractor refuses or fails to complete any one or more punch list items within the time period specified herein, then the Owner shall have the right (but not the obligation) to complete any such Punch List item with its own forces or with such other contractors as it deems advisable and to charge the account of the Contractor and its Surety therefore. This right of completion shall be in addition to, and not in lieu of, any remedy provided by another section of these Contract Documents. In the event the Owner exercises its right hereunder to complete all items on a Punch List, the \$50.00 daily amount shall not thereafter continue to be assessed for that Punch List item, although nothing contained herein shall be construed to eliminate or reduce the daily amount then accrued.
- C. **Certification By Architect.** When the Work, or any Owner-designated portion thereof, is substantially complete, the Architect shall prepare and issue a Certificate of Substantial Completion (substantially in the form of AIA Document 6704) which shall establish the date of Substantial Completion, the responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate of Substantial Completion. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work, or such designated portion thereof, unless otherwise provided in the Certificate of Substantial Completion. The Certificate of Substantial Completion shall be submitted to the Owner and to the Contractor for their written acceptance of responsibilities assigned to each of them therein.
- D. **Payment by Owner.** Upon Substantial Completion of the Work, or such Owner-designated portion thereof, and upon application by the Contractor and issuance of a Certificate of Substantial Completion by the Architect, the Owner shall make payment, less retainage, for such Work or such portion thereof as provided in the Contract Documents.

12.05 Final Inspection.

- A. **Notice of Final Completion; Inspection by Architect.** Upon written notification by the Contractor that the Work is finally complete, and upon the Contractor's submission of a final application for payment, the Architect will conduct a final inspection of the Work. When the Architect determines that the Work has been satisfactorily completed and the Contract Documents fully performed, he shall promptly prepare and issue a Final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of its observations and inspections, the Work has been completed in accordance with the Contract Documents and that the amount stated in the Final Certificate of Payment, less the Correction Retainage (as defined below), is due and payable.

- B. Payment by Owner; Correction Retainage. The Owner shall, within 45 days after receipt of the Final Certificate of Payment, pay the Contractor the amount stated therein, less a percentage of the Contract Sum based upon the following schedule:

Cost of Contract (\$5,000 minimum)	Retained %
Up to and including \$ 50,000	1.00%
Above \$50,000 to \$750,000 inclusive	0.75%
Above \$750,000 to \$1,250,000 inclusive	0.60%
Above \$1,250,000 to \$2,000,000 inclusive	0.50%
Above \$2,000,000 to \$3,000,000 inclusive	0.425%
Above \$3,000,000	0.4%

Such retained sum (the "Correction Retainage") shall be held by the Owner for a period of one year from the Date of Substantial Completion (the "Correction Period") as collateral security for the prompt and complete correction and/or performance by the Contractor of any and all Work determined by the Owner, in its sole and absolute discretion, to be defective, incomplete or to have been improperly performed. The Owner shall pay to the Contractor the Correction Retainage, less any amounts expended in accordance with Paragraph 12.05(D), within thirty days after the expiration of the Correction Period.

- C. Correction of Work by Contractor. In the event the Work, or any portion thereof, is determined during the Correction Period to be defective, incomplete or to have been improperly performed, the Contractor shall, within three days after written Notice from the Owner, commence to remove all defective and deteriorated Work and materials and replace it with Work and materials that conform in all respects with the requirements of the Contract Documents and to complete all incomplete work in accordance with the Contract Documents within 14 days or such longer period as shall be requested by the Contractor and agreed-upon by the Owner.
- D. Contractor's Failure to Correct Work. In the event the Contractor fails to commence the removal, replacement, completion or correction of such Work within three days after the date of written Notice from the Owner and to complete such Work within the time period established in Paragraph 12.05(C), then the Owner will cause such work to be performed by other contractors and will deduct the cost of such Work from the Correction Retainage. In the event that the Correction Retainage is insufficient to cover such costs, then the Owner shall charge the Contractor and its Surety for the amount of the deficiency and the Contractor and/or the Surety shall pay such amount to the Owner in full on or before the date that is thirty days after the expiration of the Correction Period.
- 12.06 Final Payment Request. Neither final payment nor any retainage shall become due until the Contractor submits the following items to the Architect. (i) an affidavit that payrolls, bills for materials and equipment, and all other indebtedness in connection with the Work for which the Owner might be responsible have been paid or otherwise satisfied; (ii) a certificate evidencing that insurance required by the Contract Documents to remain in force following 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 provided to the Owner; (iii) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents; (iv) consent of the Surety to final payment; and (v) if required by the Owner, other data establishing the payment or satisfaction of obligations (such receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract) and such guaranties and indemnities all in such form and detail as may be required 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, in its sole and absolute discretion, sufficient to indemnify the Owner against any claim or lien. If any such claim 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 claim, including all costs associated therewith, including reasonable attorneys' fees.

- 12.07 Effect of Final Payment. The Contractor's acceptance of final payment constitutes a waiver of all claims against the Owner in connection with the Project, except for the Contractor's claim to the Correction Retainage, if any, when due. No payment, final or otherwise, shall operate to release the Contractor, or its Surety, from any obligations under the Contract.

PART 13 - PROTECTION OF PERSONS AND PROPERTY

- 13.01 Safety Program. The Contractor shall be responsible for instituting, maintaining and supervising prudent safety procedures, as well as for complying with all safety laws, regulations, ordinances and other directives of jurisdictional authorities in order to prevent injury, damage or loss to:

- A. All employees involved in performance of the Work;
- B. All students, teachers, administrative personnel, and employees, and other persons in proximity to, or otherwise affected by the Work;
- C. The Work, materials and equipment to be incorporated therein, whether in storage on or off the Site;
- D. Property at the Site or in proximity to the Work and which is designated to be maintain by the Contractor;
- E. Property that is located on-site or in proximity to the Work and is designated to be altered, renovated or relocated by the Contractor.

- 13.02 Use of Explosives. The use of explosives shall be allowed only. (i) when necessary for the performance of the Work; (ii) when prior Notice is given to, and when the approval is received from, the Owner; and (iii) when conducted by qualified personnel in accordance with applicable safety laws and regulations.

- 13.03 Protection of Work. During performance of the Work and until final acceptance thereof, the Contractor shall be under an absolute obligation to protect the finished and

unfinished Work against any damage, loss, or injury. The Contractor shall take proper precautions to protect the finished Work from loss or damage, pending completion and final acceptance of all Work included in the Contract. Such precautions shall not relieve the Contractor from any and all liability and responsibility for loss or damage to the Work occurring before final acceptance by the Owner. Such loss or damage shall be at the risk of and borne by the Contractor, whether arising from acts or omissions of the Contractor or others and whether or not covered by the Contractor's builder's risk insurance. In the event of any such loss or damage, the Contractor shall repair, replace, and make good the Work without extension of time. Therefore, the Contractor shall take special precautions throughout all its operations to guard against fire and shall reduce the amount of inflammable materials stored at the Site to the minimum amount consistent with the proper handling and storing of such materials.

- 13.04 Safety Representative. The Contractor shall select one or more on-site personnel whose duty shall be accident prevention. One such person shall be the Contractor's superintendent, unless otherwise designated by the Contractor in writing to the Owner and the Architect.
- 13.05 Structural Overload. The Contractor shall not structurally overload or permit any part of the Work to be overloaded so as to endanger its safety or the safety of others.

PART 14 - INSURANCE

14.01 Contractor's Statutory and Legal Liability Insurance.

- A. During the Contract Period, the Contractor shall, at its own expense, purchase and maintain insurance to provide coverage for claims resulting from the Contractor's performance of the Work. Such coverage shall extend to work performance by Subcontractors, persons or organizations directly or indirectly hired by the Contractor or any Subcontractor in connection with the Work, or any other persons or organizations who may cause liability to be incurred by the Contractor or any Subcontractor in connection with the Work. Such coverage shall include the following:
1. Claims arising under workers' compensation, disability benefit, or other related benefits programs.
 2. Claims resulting from bodily injury, occupational illness or death of any employee performing the Work.
 3. Claims resulting from bodily injury, illness, disease, or death of any person in contact with the Work but who is not engaged as an employee.
 4. Claims arising under personal injury liability coverage for injury to any employee, which are directly or indirectly attributable to its employment for performance of the Work.

5. Claims arising under personal injury liability coverage for injury to any person not an employee, which are attributable to performance of the Work.
 6. Claims arising for damage or destruction of tangible property, including loss of use of the affected property as a result of such damage or destruction.
- B. During the Contract Period, the Contractor shall, at its own expense, purchase and maintain the following insurance in the minimum limits specified with companies properly licensed to do business in the Commonwealth of Virginia, rated not less than A-/VII by A.M. Best Company and satisfactory to Owner. The Contractor shall maintain and provide proof of General Liability and Umbrella Excess Liability insurance for at least one (1) year following completion of the project. The Owner, "The Fairfax County School Board, its members, officers, authorized representatives and employees", shall be designated on each policy as "The Fairfax County School Board" as an additional named insured except for workers' compensation where the correct certificate of insurance coverage shall be furnished.
1. Workers' Compensation including Occupational Disease and Employer's Liability Insurance.
 - a. Statutory. Amounts and coverage as required by District of Columbia, Maryland, and Virginia Workers' Compensation Law, including provision for voluntary D. C. benefits as required in labor union agreements, and including the "All States" endorsement.
 - b. Employer's Liability.

Bodily Injury by Accident - \$100,000 Each Accident
Bodily Injury by Disease - \$500,000 Policy Limit
Bodily Injury by Disease - \$100,000 Each Employee
 2. Commercial General Liability Insurance. Contractor shall provide coverage written on ISO occurrence form CG 00 01 10 01 (or a substitute form providing equivalent coverage) to include the following:
 - a. Contractual liability as required by the indemnification provision of Paragraph 5.11.
 - b. Personal injury liability, including offenses related to employment.
 - c. Coverage of explosion, collapse, or underground hazards.
 - d. Broad form property damage liability, including completed operations coverage.

- e. Additional insured endorsement shall include coverage for Owner with respect to liability arising out of the completed operations of Contractor.
- f. Additional Insured coverage shall apply as primary insurance and shall be non-contributory with respect to any other insurance or self-insurance programs afforded to Owner.
- g. Status of the Owner as an insured shall not restrict coverage with respect to the escape of pollutants at or from a site owned or occupied by the Owner.
- h. There shall be no endorsement or modification limiting the scope of coverage for liability arising from pollution.
 - i. Limits of Commercial General Liability Insurance.
 - (1) \$1,000,000 bodily injury and property damage per occurrence;
 - (2) \$1,000,000 personal injury and advertising injury per person;
 - (3) \$2,000,000 products/completed operations aggregate; and
 - (4) \$1,000,000 aggregate products and completed operations; and
 - (5) \$2,000,000 general aggregate, per project.
 - ii. Business Auto Liability Insurance. (Includes owned, non-owned and hired vehicles.)
 - (1) Contractual liability coverage shall be included with respect to all auto rentals or lease agreements.
 - (2) Limits of \$1,000,000 combined bodily injury and property damage per accident.
 - iii. Umbrella Excess Liability Insurance. Unless a different dollar limit is prescribed for this division of the Work in Section 01010, the lesser of \$5,000,000 or that amount which, when added to requirements of Paragraphs 14.01(B)(1), 14.01(B)(2), 14.01(B)(3) and 14.01(B)(4), total \$5,000,000. (For example, a \$4,000,000 umbrella in excess of the \$1,000,000 limits under the sections listed above shall meet the limits requirements of this

paragraph). Coverage terms and conditions under the Umbrella Excess Liability Insurance policy shall be at least as broad as underlying coverages.

- i. The limits of liability of the insurance described in Paragraph 14.01(B) may be superseded if the limits prescribed by law are greater.
- j. Owner's Liability Insurance. The Owner may, at its own expense, purchase and maintain its own liability insurance to protect against claims which may arise in connection with the Work, or the Owner may self insure such risks.

14.02 Property Insurance.

- A. The Contractor shall purchase and maintain property insurance upon the entire Work at the Site to the full insurance value thereof. This insurance shall include the interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Work, and shall insure against all risks of loss. Such insurance shall include, but not be limited to, coverage for the following:
 1. Loss by explosion of boilers during testing (any exclusion applicable to such loss shall be waived).
 2. Partial or complete occupancy by the Owner (any exclusion applicable to occupancy shall be removed).
 3. Loss without coinsurance penalty (coinsurance or similar "insurance to value" requirements shall be eliminated).
 4. Coverage of property in transit and unscheduled locations sufficient in limits to adequately cover maximum anticipated values at risk.
 5. Coverage of Contractor's labor, overhead and profit.

A copy of this policy of insurance shall be available upon written request by the Owner.

14.03 Notice of Insurance.

- A. Proof of insurance, satisfactory to Owner, for each type of coverage listed herein shall be provided within 10 days after the Contractor's receipt of the Award Letter, and no Work shall proceed unless all such insurance is in effect. The Contractor shall not allow any Subcontractor to commence Work on its subcontract until all such insurance of the Subcontractor has been so obtained

and approved by the Contractor and found to be in accordance with the requirements set forth herein. The Contractor certifies by commencement of the Work that its insurance and that of Subcontractors is in effect and meets the requirements set forth herein.

14.04 Notice of Cancellation.

- A. All of the aforesaid insurance policies must be endorsed to provide that the insurance company shall give 30 days prior written Notice to the Owner if the policies are to be terminated or if any changes are made during the life of the Contract which will affect in any way the insurance requirements set forth herein.

14.05 Copies of Insurance Policies.

- A. Before commencing the Work, the Contractor shall cause its insurance carrier to provide the Owner with a certified copy of each policy that he and each of its Subcontractors shall carry in accordance herewith, together with receipted bills evidencing proof of premium payment.

14.06 No Waiver.

- A. Nothing contained herein shall have effect or shall be deemed to effect a waiver of the Owner's sovereign immunity under law.

PART 15 - CONTRACT SECURITY

15.01 Contract Security.

- A. The Contractor shall execute and deliver to the Owner Performance and Payment Bonds on the forms provided herein, each in an amount equal to the Contract Sum. The Performance and Payment Bonds shall be executed by a solvent and responsible surety company licensed to conduct business in the Commonwealth of Virginia, named in the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Federal Register by the Audit Staff Bureau of Accounts, U.S. Treasury Department, and acceptable to the Owner. These bonds shall be issued and countersigned by a local authorized representative of such surety company who is a resident of the Commonwealth of Virginia, regularly commissioned and licensed in the Commonwealth and producing satisfactory evidence of the authority of the person or persons executing the bonds to execute them on behalf of the Surety. The Performance and Payment Bonds shall serve as security for the faithful performance of this Contract, and for the payment of all persons performing labor and furnishing materials and services in connection with this Contract. The premiums on the Performance and Payment Bonds shall be paid by the Contractor and shall be included in the Contract Sum.
- B. If at any time the Owner shall become dissatisfied with any Surety or Sureties upon the Performance and Payment Bonds, or if for any other reason such bond

shall cease to be adequate security for the Contractor, the Contractor shall within five days after notification of such fact, substitute acceptable bonds in such form and sum and signed by such other sureties as may be satisfactory to the Owner. The premiums on such Bonds shall be paid by the Contractor and shall be included in the Contract Sum. No further partial payments shall be deemed due nor shall be made until the new sureties have qualified.

- C. The Contract Documents may require one or more of the Subcontractors to furnish payment and/or performance bonds.

PART 16 - UNCOVERING AND CORRECTION OF WORK

16.01 Uncovering of Work.

- A. If a portion of the Work is covered contrary to the Architect's request or to the requirements contained in the Contract Documents, the Contractor shall, at its own expense and upon the written request of the Architect or Owner, uncover and replace such Work without an adjustment to the Contract Period.
- B. If a portion of the Work has been covered which the Architect has not specifically requested to observe prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such Work is not in accordance with the Contract Documents, the costs of uncovering and replacing such Work shall be deducted from amounts then or thereafter due the Contractor and, if such amounts are insufficient to cover such costs, then the Contractor shall pay any such deficiency promptly following written demand by the Owner.

16.02 Correction of Work.

- A. The Contractor shall promptly correct any Work which is defective or otherwise fails to conform to the requirements of the Contract Documents (the "Rejected Work"), whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Contractor shall bear all costs associated with the correction of any Rejected Work, including additional testing and inspections and compensation for the Architect's services and expenses made necessary thereby.
- B. The Contractor's obligation to correct defective or non-complying Work shall continue for a period of one (1) year after the date of Substantial Completion. The time period of this obligation may be extended by terms of warranties or other circumstances where required by law. The Contractor shall correct the Work in accordance with Paragraph 16.02(A) promptly following receipt of a written request by the Owner.

- C. Nothing contained herein shall affect the Owner's right to correct nonconforming Work pursuant to Paragraph 12.05(D) hereof.

16.03 Acceptance of Defective or Nonconforming Work.

The Owner reserves the right to accept any defective or noncomplying Work; provided, however, that in such event the Contract Sum shall be reduced by an appropriate and equitable amount to account for such defect or noncompliance. Such adjustment shall be effected whether or not final payment has been made pursuant to Paragraph 12.05 hereof.

PART 17 - CONTRACTOR'S DEFAULT & TERMINATION

17.01 Owner's Right and Notice.

- A. The parties agree that:

1. if the Contractor fails to begin the Work when required to do so; or
2. if, at any time during the progress of the Work, the Contractor is not prosecuting the Work with reasonable speed and diligence, or is delaying the Work unreasonably or unnecessarily; or
3. if the force of workmen or the quality or quantity of material furnished is not sufficient to insure completion of the Work within the Contract Period and in strict accordance with the Contract Documents; or
4. if the Contractor fails to make prompt payments to suppliers or to Subcontractors for Work performed in connection with the Contract; or
5. if the Contractor fails to cooperate in good faith with the Owner and/or any Separate Contractor, or in any manner of substance fails to observe the provisions of this Contract; or
6. if any of the Work, machinery, or equipment is defective and is not replaced as herein provided;

then the Architect shall certify such fact or condition to the Owner and the Owner, without prejudice to any other rights or remedies it may have hereunder, shall have the right to declare the Contractor in default in whole or in part. In the event the Owner elects to declare the Contractor in default, the Owner shall notify the Contractor and its Sureties by written Notice describing the nature of the default and providing the Contractor a right to cure such default within three calendar days after the date of the Notice, or within such longer period as the Owner, in its sole and absolute discretion, may prescribe. In the event the default is not cured within the time period specified by the Owner, the Owner shall have the right to take any actions necessary to correct or complete the Work, as set forth in Paragraph 17.03 hereof.

17.02 Contractor's Duty upon Default. Upon Notice from the Owner that he is in default hereunder, the Contractor shall discontinue all further operations in connection with the Work, or such specified part thereof, and shall immediately vacate the Site, or such specified part thereof, leaving untouched all plant, materials, equipment, tools, supplies and job site records, and shall cooperate fully with the Owner by providing the Owner with any keys or access devices used to gain entry to the Site.

17.03 Completion of Work after Default.

A. If the Contractor defaults or neglects to perform the Work in accordance with the Contract Documents and fails within a three (3) day period after receipt of written Notice from the Owner to commence and continue correction of such default or neglect, the Owner may, without prejudice to the other rights the Owner may have, correct such defaults or deficiencies by such means and in such manner, by contract with or without public letting, or otherwise as it may deem advisable, utilizing for such purpose without additional cost to the Owner such of the Contractor's plant, materials, equipment, tools and supplies remaining on the Site, and also such Subcontractors as it may deem advisable and may take any or all of the following actions:

1. delete part or parts of the Work from the Contract and contract to have it performed by others;
2. supplement the Contractor's work force;
3. withhold payments due the Contractor and use such payments to satisfy any claims for monies owed by the Contractor in connection with the Project, in accordance with Paragraph 12.03(B);
4. replace or repair any defective Work, machinery or equipment;
5. terminate the Contractor.

B. The Contractor and his Sureties shall bear all costs associated with completing or correcting the Work, including without limitation, the cost of reletting, the amount of any liquidated damages, and any and all costs incurred in connection with the actions listed in this Paragraph 17.03. Any costs incurred in connection with completing or correcting the Work shall be deducted from the amounts then or thereafter due the Contractor. In the event such amounts are not sufficient to cover the costs incurred in connection with completing or correcting the Work, the Contractor and its Surety shall pay to the Owner the amount of any deficiency.

17.04 Partial Default. In the event the Owner declares the Contractor in default in accordance with the provisions of Paragraph 17.01 hereof with respect to a portion of the Work, the Contractor shall discontinue such portion of the Work declared in default, shall continue performing the remainder of the Work in strict conformity with the terms of the Contract and shall not hinder or interfere with any other contractor or persons whom the Owner

may engage to complete the Work for which the Contractor was declared in default. The costs of such completion shall be paid by the Contractor and its Sureties as provided in Paragraph 17.03(B).

17.05 Owner's Right to Terminate for Cause. The parties agree that:

- A. if legal proceedings have been instituted by others than the Owner in such manner as to interfere with the progress of the Work and to potentially subject the Owner to the peril of litigation or outside claims; or
- B. if the Contractor is adjudicated bankrupt or makes an assignment for the benefit of creditors; or
- C. if in any proceeding instituted by or against the Contractor, an order is made or entered granting an extension of the time of payment, composition, adjustment, modification, settlement or satisfaction of its debts or liabilities; or
- D. if a receiver or trustee is appointed for the Contractor or the Contractor's property; or
- E. if the Contract or any part hereof is sublet without the prior written consent of the Owner; or
- F. if the Contract or any rights, monies, or claims hereunder are assigned in whole or in part by the Contractor, otherwise than as herein specified; or
- G. if the Work to be done under this Contract is abandoned; or
- H. if the Contractor fails to cure any default declared pursuant to Paragraph 17.01 within the time period specified therefor;

then such fact or condition shall be certified by the Architect to the Owner and thereupon, without prejudice to any other rights or remedies the Owner may have, the Owner shall have the right to terminate the Contract immediately upon written Notice to the Contractor.

If, after issuance of a Notice of termination of the Contract under the provisions of this Paragraph 17.05, it is determined for any reason that the Contractor was not in default under the provisions of Paragraph 17.05(A) through 17.05(H), or that cause for such termination otherwise did not exist under the provisions of Paragraph 17.05(A) through 17.05(H), then the rights and obligations of the parties shall be the same as if the Notice of termination had been delivered under the provisions of Paragraph 17.06 hereof; provided, however, that the Contractor in such event shall be deemed to have received seven days prior written Notice of termination. Any compensation thereupon owing to the Contractor under Paragraph 17.06 shall be offset by the cost of remedying any defective Work performed by or on behalf the Contractor. In no event shall the Contractor be entitled to recover anticipated profits or consequential damages of any kind in connection with any termination of these Contract Documents.

17.06 Owner's Right to Terminate for Convenience. The Owner shall have the right to terminate this Contract at its own convenience for any reason by giving seven days prior written Notice of termination to the Contractor. In such event, the Contractor shall be paid an amount equal to the lesser of. (1) the actual cost of any Work, labor or materials actually performed or in place and the actual cost of any labor, equipment or materials ordered in good faith which could not be canceled, less the salvage value thereof, plus 10%; or (2) the pro rata percentage of completion based upon the Schedule of Values (as described in Paragraph 12.02) plus the actual cost of any labor, equipment or materials ordered in good faith which could not be canceled, less the salvage value thereof. Each subcontract shall contain a similar termination provision for the benefit of the Contractor and the Owner. The Contractor shall not be entitled to receive anticipated profits on unperformed portions of the Work or consequential damages. The Owner and its authorized representatives shall have the right in accordance with the provisions of Paragraph 9.05 to verify any amounts claimed by the Contractor to be due under this Paragraph.

PART 18 - MISCELLANEOUS SPECIAL CONDITIONS

18.01 Laying Out Work.

- A. The Contractor shall, upon entering the Site of the Project for the purpose of commencing the Work, locate all general reference points and take all such action as is necessary to prevent their destruction; lay out the Work, except where otherwise required by Contract Documents, and be responsible for all lines, elevations, measurements of buildings, grading, paving, utilities and other Work executed by him under the Contract. The Contractor shall exercise proper and reasonable care in verifying figures shown on the Drawings before laying out the Work and will be held responsible for any error resulting from its failure to exercise such care.
- B. The Contractor shall establish permanent bench marks referenced to finish floor lines. Contractor shall employ a licensed surveyor who shall, after masonry corners have been set, certify over its seal to the Owner that the building is located properly in relation to property lines and in accordance with Drawings.

18.02 Inspection and Approval of Site Improvements.

- A. On-site and off-site improvements shall conform to the County of Fairfax Design and Construction Standards.
- B. The Contractor shall notify the Owner's field representative three days prior to the beginning of all street or storm sewer work.
- C. All work shall be staked out by a certified surveyor and cut sheets shall be submitted to the Department of Public Works with a copy to the Owner's Field Representative.

- D. The Contractor shall perform the Work in such a manner as to prevent the washing of any soil, silt or debris onto adjacent properties and he shall be held responsible for any damage resulting from its failure to prevent the washing of such materials upon adjacent properties for a period of one year after final acceptance of the completed Work.
- 18.03 Partial Use or Occupancy. The Contractor shall permit the Owner to use and occupy any completed or partially completed portion or unit of the Project prior to final acceptance by the Owner.
- The Owner's use and occupancy shall not constitute final acceptance of the Work and shall in no event relieve the Contractor of its obligation to maintain the insurance coverage described in Part 14 hereof.
- 18.04 Release of Bonds. The Surety providing the bonds in connection with the Project shall obtain a written release from the Owner prior to the expiration date of the bonds.
- 18.05 No Asbestos. No materials or equipment containing asbestos shall be utilized in the construction of the Project.

END OF SECTION

SECTION 01010(C)

SUMMARY OF WORK (RENOVATIONS)

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings and general provisions of contract including General Conditions and other Division One through Division Sixteen Specifications Sections, apply to this section, with special attention to the following:

- A. Temporary Trailer Allowance: Section 01020
- B. Applicable Standards: Section 01091
- C. Temporary Utilities: Section 01510
- D. Construction Aids: Section 01520
- E. Barriers: Section 01530
- F. Temporary Controls: Section 01560
- G. Cleaning: Section 01710
- H. Selective Demolition: Section 02070

1.02 SCOPE OF WORK COVERED BY CONTRACT DOCUMENTS

- A. Selective removal of folding partitions, new partition, door, casework and finishes. Modification of HVAC, plumbing, electrical systems as indicated on the drawings.

1.03 SCOPE OF WORK COVERED BY A SEPARATE CONTRACT

- A. The following work and materials will be provided under a separate contract and shall not be included in the contractor's bids.

A separate contract will be providing and Installing:

- 1. All plastic laminate cabinets (items #1,2,4,5,6,7,8,&17 on the drawings)
- 2. All structure to support the pipe chase tunnels behind the cabinets.
- 3. All epoxy tops, ledges, sinks.
- 4. Epoxy sinks included strainers installed.
- 5. Wood mounting block for fire extinguisher (fire extinguisher is by others).
- 6. Item #12 Fire blanket cabinet.
- 7. Metal frames at (2) Prep sinks.

A separate contract will be providing material/equipment ONLY (assembly & installation by the plumber):

1. Item #9 Emergency Shower.
2. Item #10 deck mounted eyewash.
3. Item #13 water tempering valve cabinet.
4. Faucets.
5. Prep Room acid neutralization tank.
6. Tempering valve for the deck mounted eye wash.

B. Normal operations shall be maintained during the course of the school year.

1.04 CONTRACT METHOD

A. Construction of the Work under a single lump sum contract.

1.05 CONTRACTOR USE OF PREMISES

A. Limit use of premises for Work and for construction operations.

1.06 CONTRACTOR'S DUTIES

A. Except as specifically noted, provide and pay for:

1. Labor, materials, and equipment.
2. Tools, construction equipment, and machinery.
3. Water, heat, and utilities including electrical power required for construction.
4. Other facilities and services necessary for proper execution and completion of work.

B. Temporary Power and Lighting: Provide in accordance with Section 01510

C. Pay legally required sales, consumer and use taxes.

D. The Owner shall obtain and pay for the General Building Permit. The Contractor shall obtain and pay for all other permits required by law for the execution of this Work.

E. The Contractor shall also obtain and pay for certificates, inspections including but not limited to Fire Marshal's review and inspection fees and other legal fees required, both permanent and temporary, including plumbing, mechanical, sprinkler, electrical and highway permits. NOTE: Sewer frontage or availability and water frontage and tap-on fees or charges will be paid by Owner.

1.07 COORDINATION

- A. Perform survey of existing site and building prior to commencing demolition work or other work affecting existing facilities.
- B. Coordinate performance of work with school principal and staff in order to minimize disruption of normal activities during school hours. Operations requiring access to the existing facility that would cause such disruption will be scheduled for evening hours, summer recess or school holidays.
- C. Coordinate the work for the various sections of Specifications to ensure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later.
- D. Verify that the characteristics of elements of interrelated operating equipment are compatible; coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- E. Coordinate space requirements and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduits, as closely as practicable; make runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- F. In finished areas conceal pipes, ducts, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.

1.08 FIELD ENGINEERING

- A. Provide field engineering service; establish grades, lines, and levels, by use of recognized engineering survey practices.
- B. Control datum for survey is that established by Owner-provided survey. Locate and protect control and reference points.

1.09 REFERENCE STANDARDS

- A. For Products specified by association or trade standards, comply with requirements of the standards, except when more rigid requirements are specified or required by applicable codes.
- B. The date of the standard is that which was in effect as of the Bid date, unless a specific date is indicated.

- C. Obtain copies of standards when required by Contract Documents. Maintain copy at job site during progress of the specific work. Refer to Section 01091, Applicable Standards.

PART 2 - SCHEDULE OF COMPLETION

2.01 CONSTRUCTION TIME

- A. The Work shall be substantially complete and certified by the Architect on or before August 5, 2022. The work shall be finally complete on or before August 12, 2022.
- B. Liquidated Damages:
 - 1. Total Project: Should the Work not be performed on or before the times stated, there will be deducted from the Contract Balance the sum of five hundred dollars (\$500) per consecutive calendar days, as Liquidated Damages, but not as a penalty, for each day's delay after expiration of such period, and until final completion of the Work and its acceptance by the Owner.
 - 2. Work phases: Should the Work of each phase not be performed on or before the completion dates established by the Work Sequence, there will be deducted from the contract balance the following sums for each phase, per consecutive calendar days, as Liquidated Damages, but not as a penalty, for each days delay after expiration of the completion dates, and until acceptance by the Owner:
 - 3. Submittals required under section 01340: Should submittals not be received by the architect within the time periods indicated in Section 01340, there will be deducted from the contract balance the sum of one hundred dollars (\$100.00) per consecutive calendar days, per submittal, as liquidated damages, but not as a penalty, for each day beyond the allowable time periods.

(List Phase or Phases and Dollar amount of Liquidated Damages per day.)

2.02 WORK SEQUENCE

- A. Construct work in accordance with Project Schedule established under Section 01310; coordinate the schedule and operations with the Owner's Representative. There shall be no shutdown of electricity, water, sanitary/storm sewers, or heat during the life of the project unless approved in writing by the Owner. The Contractor is responsible for providing temporary air conditioning or heating for those areas which are scheduled to be occupied for school use and the

Contractor has demolished the existing air conditioning or heating system. Maintain minimum corridor temperature at 68°F during heating season.

<u>Portion of Work</u>	<u>Date of Commencement of Work</u>	<u>Date of Substantial Completion</u>
Entire Work	June 14, 2022	August 5, 2022

- B. Commencement of each phase of work in existing classrooms shall not occur until sufficient materials and equipment are available for the particular phase, and sufficient numbers of workmen are available to execute the work in the time period indicated.

- C. Work Shifts: Where required by construction schedule and in order to ensure completion of work phases during the time periods indicated, the contractor shall operate two (2) separate, full time, work shifts per day, employing trades, skills and specialties including, but not limited to, the following:
 - 1. General labor
 - 2. Cleaning staff
 - 3. Special systems technicians
 - 4. Electrical
 - 5. Sprinkler
 - 6. Plumbing
 - 7. HVAC
 - 8. The contractor may modify this list to include other trades, skills and specialties as necessary to comply with the construction phasing schedule.

- D. Where night shifts are in operation, the Contractor shall be allowed four (4) ten-hour night shifts per week, Monday through Thursday, during the school year. Friday nights and Saturday nights shall be available for school use during the school year.

PART 3 - USE OF PREMISES

3.01 CONTRACTOR'S USE OF PREMISES

- A. Contractor shall coordinate use of premises under direction of Owner's Representative.

1. The Contractor shall maintain a drug free workplace for all his employees and subcontractors. The possession and/or use of drugs and alcohol are strictly forbidden on school property, and shall constitute grounds for immediate removal from the project site (Refer to Section 00700, General Conditions, 5.02C and 5.16).
 2. Smoking, use of improper language and fraternization by contractor's employees with students and staff are prohibited and shall constitute grounds for immediate removal from the project site (Refer to Section 00700, General Conditions, 5.02C).
- B. Contractor shall assume full responsibility for protection and safekeeping of Products under this Contract stored on the site.
- C. Contractor shall move any stored Products, under Contractor's control, which interfere with operations of the Owner.
- D. Contractor shall, at his option, obtain and pay for the use of additional storage or work areas needed for operations.
- E. Contractor shall limit his use of the existing building for work and for storage to allow for:
1. Owner Occupancy
 2. Public Use
- F. Contractor shall provide temporary toilet facilities for use by his employees and other workers associated with the project. Contractor shall provide and maintain enough toilets to comply with OSHA and ANSI standards: 20 or less workers require 1 toilet, 20 or more require 1 toilet and 1 urinal per 40 workers, 200 or more require 1 toilet and 1 urinal per 50 workers. Toilets that are not maintained in a usable, sanitary condition shall not be considered "provided" or "available". The use of existing facilities is not permitted.
- G. In order to work overtime, a minimum of five (5) workers, excluding foreman and superintendent, must be available and willing to work. No overtime shall be allowed if this minimum crew size cannot be guaranteed.

3.02 WORK IN, OR ADJACENT TO, EXISTING OR OCCUPIED AREAS

- A. Integrity of Existing Facility
1. Conduct operations to maintain the existing building in a secure, weather tight condition.
 2. Repair damage to existing structures, equipment and furnishings resulting from the Contractor's operations within the building and on the site.

3. Where corridor ceilings have been removed and sprinkler mains have been installed to serve renovated space or new additions, sprinkler heads shall be temporarily installed and activated in the upright position and shall remain in the upright position until the ceiling concealment inspection has occurred, and the finished ceilings in those corridors can be completed.
- B. Safety and Integrity of Occupied Areas
1. Where corridors shall be maintained for occupant use, no construction materials shall be stored or stockpiled. No Construction materials shall be stored in a manner that restricts means of egress which are required to remain open for use by building occupants.
 - a. A minimum clear corridor width of 72" shall be maintained in all active corridors.
 2. All existing emergency exit lights and fire alarms shall remain operational in occupied areas.
 3. Means of egress for occupied areas shall be maintained with hard surfaced, non-slip walkways, ramps or other platforms. Use temporary handrails, barricades or canopies in accordance with Construction Phasing Plan requirements and requirements of Section 01520.
 4. No work such as welding, soldering, or cutting, which is considered hazardous to the building occupants, shall take place in occupied areas during school operating hours.
 5. Contractor shall take all necessary safety precautions to clearly delineate the construction areas with temporary barricades, dust partitions, and temporary construction fences as appropriate (See Section 01520, Construction Aids and Section 01530, Barriers).
 6. Temporary partitions shall be dustproof partitions extending from floor to underside of deck. Doors through these partitions shall be lockable and self-closing.
 7. Use temporary fencing to isolate on-site staging areas, storage yards and construction access ways. All temporary storage areas and construction trailers shall be enclosed with 6' high construction fences. Refer to 2.03, Temporary Enclosures, Section 01520.
 8. No pneumatic, gas powered or other noise producing equipment, or other equipment powered by flammable fuels shall be allowed in occupied or renovation areas before or during normal school hours. Use of this

equipment shall be permitted after normal school hours and weekends only. Comply with OSHA 1926.850.

a. Temporary heat shall be supplied by electric heaters only.

9. No hoisting shall be allowed over the school building during normal school hours or other times when the building is occupied for school related activities or other events.
10. Fire extinguishers are required in all construction areas. Comply with OSHA 1923.150.
11. Do not perform any work, including demolition, during normal school hours (or during times when school related activities or other events are being conducted) that could cause the fire alarm to be inadvertently activated. Do not perform any work during these times that could negatively impact operational sprinkler systems.
12. Roofing tanker trucks shall not be placed near windows and/or fresh air intakes of occupied areas. No roofing shall take place above occupied areas.
13. Where VAT (vinyl asbestos tile) and/or other asbestos containing materials (ACM) require removal prior to installation of new VCT flooring or where other work disturbs ACM, such removal shall be done under separate contract by Fairfax County Public Schools, except as noted in Section 02070 (See Section 02070, Selective Demolition).
14. All painting performed by spray application shall be done only when the building is unoccupied.
15. Do not locate masonry saws near any window or door opening or near a fresh air intake. Locate saws in fenced construction areas only.
16. Use of school supplies or school equipment by the Contractor is prohibited.
17. Where existing windows and/or doors are removed, and new replacement windows and/or doors are not available, the Contractor shall provide secure plywood coverings over the openings. No wall openings of any kind, no matter how small, shall be left uncovered after completion of a work shift.
18. No loud construction activities shall be allowed during school hours. Workers shall not operate radios, CD players, or "boom boxes" in the school building.

C. Scheduling and Operations

1. Schedule deliveries to avoid conflicts with morning student arrivals and afternoon student departures. Coordinate with the school to determine actual starting and ending times and approximate time periods for arrival and departure. No deliveries shall be allowed during these periods.
2. No work shall be allowed in corridors in occupied areas during school operating hours. Work such as cutting, demolition and patching, use of ladders and scaffolding, and presence of construction materials in these corridors between the hours of 6:00 AM and at least 30 minutes after scheduled release of students shall not be allowed.
3. For each work phase, the Contractor shall remove and temporarily store all loose equipment, furniture and boxes within the rooms being renovated in an approved, designated location on the site. The school will be responsible for boxing and tagging all items prior to removal and storage. At the completion of the work phase, the Contractor shall move the stored items to their final location as directed by the Owner's Field Representative. The Contractor can expect the following inventory as typical equipment for removal, storage and relocation, which includes but is not limited to:
 - a. Classrooms: Approximately 30 desks, 30 chairs, 1 teacher wardrobe unit, teacher desk and chair, 2 file cabinets and 2 bookcases.
 - b. Computer Labs: Approximately 30 computer desks and 30 chairs.
 - c. Itinerant and Miscellaneous Offices: Approximately 1 desk, 1 chair, 1 credenza and 1 bookshelf for each office.
4. Do not start demolition of occupied space until the materials required for renovation are on the project site. The list of materials includes: floor finishes and base, millwork (pencil sharpener blocks, map rack blocking, etc), paint, doors and hardware, windows and venetian blinds, ceilings, power and lighting, HVAC equipment and controls, clocks, sound system, fire alarm system, security system, intercommunications system, telecommunications system, and sprinkler system.
5. Do not install doors unless all hardware and vision panel glass for the doors is on the project site.
6. Contractor shall postpone or reschedule work to a later shift and/or weekends and holidays whenever such work would disrupt or interfere with student testing, such as SAT (Scholastic Aptitude Test) or SOL (Standards of Learning) tests. Contractor shall coordinate with school staff or Liaison for actual dates and times of testing.

D. Systems Maintenance

1. Dust and mop corridors every morning before teachers arrive. Dust and mop any areas made dirty by construction operations on a daily basis.
2. Contractor shall immediately remove construction equipment and debris and clean any work zone located in an occupied area, once the work is completed or halted for a significant period of time.
3. Contractor shall provide consistent and frequent (daily) vacuuming to minimize and control dust levels in work areas (See Section 01710, Cleaning).

E. Systems Maintenance

1. Where the sequence of work requires work to be continuously performed in existing corridor ceiling spaces in occupied areas, tie all light fixtures at each corner of fixture to existing joists above, tie all smoke detection devices as close to structure as possible, and secure all security, intercommunications, telecommunications, and other active wiring which is not housed in conduit.
2. Do not remove existing wiring such as CATV, intercommunications, telecommunications, etc until the new wiring is in place and operational.
3. Prior to installation, Contractor shall obtain approval from Owner's Field Representative to run temporary wiring.
4. Inspect and change filters in HVAC equipment frequently during construction and prior to occupancy by Owner. Owner will not occupy any renovated area unless the entire HVAC system (including exhaust systems and automatic temperature controls) is operational.
5. All PRVs shall be fully operational at all times. Do not demolish any existing PRVs until replacement units are on site and new wiring is installed and ready for connection.

3.03 OWNER OCCUPANCY

- A. The Contractor shall schedule his operations for completion of portions of the Work, for the Owner's occupancy upon Substantial Completion of the entire Work.
- B. The Contractor agrees to permit the Owner to use and occupy a portion or unit of the project prior to formal acceptance of the total project by the Owner, provided the Owner:

1. Secures written consent of the Contractor (except in the event in the opinion of the Architect, the Contractor is chargeable with unwarranted delay in final cleanup of punch list items or other contract requirements, the Owner may occupy without Contractor's consent);
 2. Secures endorsement from the insurance carrier and consent of the surety to permit occupancy of the building or use of the project during the remaining period of construction.
- C. Owner will occupy the premises during the normal 10-month school year for the conduct of his normal operations. Cooperate with Owner's Representative in all construction operations to minimize conflict and to facilitate continued owner usage.

PART 4 - PRECAUTIONS AND SAFETY

4.01 SPECIAL REQUIREMENTS

- A. Fire Protection: Provide and maintain an adequate number of hand fire extinguishers at convenient and appropriate locations during construction. Avoid all accumulations of flammable debris by removing rubbish promptly. Take all other precautions necessary to prevent fire. Supervise closely the storage of paint materials and other combustible products.
1. Existing fire alarm and detection system must remain operable at all times during construction.
- B. Accident Prevention and Safety: Comply will all applicable laws, ordinances, rules, regulations and orders of governing authorities having jurisdiction for the safety of persons and property to protect them from damage, injury or loss. Erect and maintain, as required by conditions and progress of the work, all necessary safeguards for safety and protection, including fences, railings, barricades, lighting, posting of danger signs and other warnings against hazards. Where prevention of construction accidents is not regulated by code or ordinances, comply with AGC's "Manual of Accident Prevention in Construction." Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Project. All scaffolds shall be built in accordance with all requirements of local, state and Federal laws and regulations.
- C. Crisis Preparedness – “Shelter in Place”
1. FCPS has developed a “Shelter in Place” procedure to protect students, teachers, administrative staff and construction workers in the event that a dangerous chemical or biological agent is released into the environment during occupied hours.

2. Upon notification by Public Safety Officials, all individuals on school grounds shall be directed to move indoors. All windows and doors shall be closed and locked. All heating, ventilating and air conditioning systems shall be shut down.
 3. "Shelter in Place" emergencies are generally of short duration (several minutes to one or two hours). All individuals shall remain inside until Public Safety Officials have deemed that the area is safe.
 4. It is the General Contractor's responsibility to familiarize his employees and subcontractors with the school's "Shelter in Place" plans and procedures. Note that once an emergency has been declared, no workers, subcontractors or suppliers who may be in transit to the job site shall be allowed into the area until the emergency is over.
- D. ID Badges: The Owner shall supply identification badges which shall be worn by all tradesmen working on this project. No employees of the Contractor, subcontractors or sub-contractors, material suppliers or other persons associated with the project shall enter the existing school building or school property without an approved identification badge. Failure to comply with this requirement will be cause for immediate and permanent removal of the employee(s) in question from this and any other school building. Contractor shall maintain an identification badge log and record each badge number and to whom it was given and when.
1. Badge shall be a minimum 2" x 3 1/2".
 2. Visible at all times.
 3. Bright color (orange, lime green, etc.)
- E. See paragraph 3.02, this Section, for additional specific precautions or restrictions related to safety.

END OF SECTION

SECTION 01040

SUPERVISION AND COORDINATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract including General Conditions and other Division 1 Specification Sections, apply to the work of this Section.

1.02 RELATED WORK

- A. Section 01153: Change Order Procedures.
- B. Section 01340: Shop Drawings, Product Data and Samples.
- C. Section 01410: Testing Laboratory Services.
- D. Section 01720: Project Record Information.

1.03 DESCRIPTION OF WORK

- A. Contractor shall employ and pay for the services of a full time, qualified Project Manager, located at the project site, dedicated solely to the project, for the duration of the construction work.
- B. This contract will require the Contractor to utilize two shifts for part or all of the project. The Contractor shall employ and pay for the services of two full time, qualified Project Superintendents (one for each shift) for the duration of the construction work.
- C. Qualifications of Project Manager and Project Superintendents:
 - 1. Experienced in field work of the type required for this Project.
 - 2. Submit name and address to Architect/Engineer.

1.04 PROJECT MANAGER'S RESPONSIBILITIES

- A. Implement Change Order procedures in accordance with Section 01153.
- B. Assist Project Superintendent(s) with schedules, material deliveries and subcontractor coordination and scheduling.
- C. Participate in Progress Meetings

1.05 PROJECT SUPERINTENDENT RESPONSIBILITIES

- A. Coordinate the work of the Contractor and the Subcontractors for the work of all trades.
- B. Coordinate the schedules of the Contractor, the Subcontractors and materials and equipment suppliers.
- C. Verify timely deliveries of products for installation by the trades.
- D. Verify that labor and materials are adequate to maintain schedules.
- E. Conduct conferences and maintain communications with Subcontractors, suppliers, and other concerned parties as necessary to:
 - 1. Maintain coordination and schedules.
 - 2. Resolve matters in dispute.
- F. Participate in Project Meetings.
- G. Report progress of work. Submit daily report to Owner's Representative listing number and type of work force and work in progress.
- H. Recommend needed changes in Schedules.
- I. Assist in compiling and assembling Project Record Information.
- J. Observe required testing. Maintain a record of tests including:
 - 1. Testing agency and name of inspector.
 - 2. Subcontractor.
 - 3. Manufacturer's representative present.
 - 4. Date and time of testing.
 - 5. Type of product or equipment.
 - 6. Type of test, and results.
 - 7. Retesting required.

- K. Verify that Subcontractors maintain accurate record documents.
- L. Attend all punch list inspections.

1.06 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

- A. Prior to submittal, review for compliance with Contract Documents. Contractor shall stamp submittals approving them for materials, fit and coordination, prior to submission to Architect.
- B. Check field dimensions and clearance dimensions.
- C. Check relation to available space.
- D. Check anchor bolt settings.
- E. Review the effect of any changes on the work of other contracts or trades.
- F. Check compatibility with equipment and work of other trades.

END OF SECTION

SECTION 01045
CUTTING AND PATCHING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provision of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section.

1.02 DESCRIPTION

- A. Contractor shall be responsible for all cutting, fitting, and patching, including attendant excavation and backfill, required to complete the work and to:
 - 1. Make its several parts fit together properly.
 - 2. Uncover portions of the Work to provide for installation of ill-timed work.
 - 3. Remove and replace defective work.
 - 4. Remove and replace work not conforming to requirements of Contract Documents.
 - 5. Remove samples of installed work as specified for testing.
 - 6. Provide routine penetration of non-structural surfaces for installation of piping and electrical conduit.
- B. Related Requirements in other parts of the project manual:
 - 1. Basic responsibilities of other parties: General Conditions Section 00700.

1.03 RELATED WORK

- 1. Summary of Work: Section 01010.
- 2. Construction Aids: Section 01520
- 3. Barriers: Section 01530
- 4. Selective Demolition: Section 02070
- 5. Earthwork: Section 02200
- 6. Temporary Shoring: Section 02250

1.04 SUBMITTALS

- A. Submit a written existing building survey to Architect and the Owner's Representative prior to any work being started.
- B. Submit a written request to Architect and the Owner's Representative well in advance of executing any cutting or alteration which affects:
 - 1. The work of the Owner or any separate contractor.
 - 2. The structural value or integrity of any element of the Project.
 - 3. The integrity or effectiveness of weather-exposed or moisture resistant elements or systems.
 - 4. The efficient, operational life, maintenance or safety of operational elements.
 - 5. The visual qualities of the sight-exposed elements.
- C. Submit a written notice to Architect and the Owner's Representative designating the date and the time the work will be uncovered.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Comply with specifications and standards for each specific product involved.

PART 3 - EXECUTION

3.01 INSPECTION

- A. General Contractor shall conduct an existing building survey with the Owners representative prior to any construction operations. A written report shall be made of existing project conditions, including elements subject to damage or to movement during cutting of patching.
- B. After uncovering work inspect the conditions affecting installation of products, or performance of the work.
- C. Report unsatisfactory or questionable conditions to the Architect and the Owner's Representative in writing; do not proceed with the work until the Architect and the Owner's Representative have provided further instructions.
- D. Verify that areas to be demolished are unoccupied and discontinued in use.
- E. Verify that all utilities within the area to be demolished have been cut off and capped.

- F. Do not commence work until conditions are acceptable to Architect and Owner's Representative.

3.02 PREPARATION

- A. Provide adequate temporary support as necessary to assure the structural value or integrity of the affected portion of the work.
- B. Provide devices and methods as necessary to protect other portions of the Project from damage.
- C. Provide protection from the elements for that portion of the Project which may be exposed by cutting and patching work, and maintain excavations free from water.
- D. Remove items scheduled to be salvaged for Owner, and place in designated storage area.

3.03 PERFORMANCE

- A. Execute cutting and demolition by methods that will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.
- B. Execute excavating and backfilling by methods which will prevent settlement or damage to other work.
- C. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finishes.
- D. Restore work that has been cut or removed; install new products to provide completed work in accordance with requirements of Contract Documents.
- E. Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through walls, floors, roofs and other surfaces.
- F. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:
 - 1. For continuous surfaces, refinish to nearest intersection.
 - 2. For an assembly, refinish the entire unit.
- G. 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 during school hours.
- H. Do not use power-driven impact tools in or near occupied areas during school hours (see Section 01010, Summary of Work).

END OF SECTION

SECTION 01091

APPLICABLE STANDARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 through Division 16 Specification Sections, apply to this Section.

1.02 RELATED WORK

- A. Specific naming of codes or standards occurs in other sections of these specifications.

1.03 DESCRIPTION

- A. Throughout the Contract Documents, reference is made to codes and standards which establish qualities and types of workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics.
- B. Where materials or workmanship are specified in the Contract Documents to meet or exceed the specifically named code or standard, it is the Contractor's responsibility to provide materials and workmanship which meet or exceed the specifically named code or standard.
 - 1. It is the Contractor's responsibility, when so required by the Contract Documents or by written request from the Architect, to provide all required proof that the materials or workmanship, or both, meet or exceed the requirements of the specifically named code or standard. Such proof shall be in the form requested in writing by the Architect, and generally will be required to be copies of a certified report of tests conducted by a testing agency approved for that purpose by the Architect.
- C. The most current adopted edition of the individual standards or test procedures, published by the associations establishing applicable standards, and referenced throughout the Contract Documents, shall apply. Exception: The edition of the VUSBC governing the Contract Documents shall be that edition which was in force for purposes of permit review and issuance by Fairfax County Department of Public Works and Environmental Services (DPWES).

1.04 QUALITY ASSURANCE

- A. Familiarity with pertinent codes and standards: In procuring all items used in this Work, it is the Contractor's responsibility to verify the detailed requirements of the specifically named codes and standards and to verify that the items procured for use in this Work meet or exceed the specified requirements.

- B. Rejection of non-complying items: The Architect reserves the right to reject items incorporated into the Work which fail to meet the specified minimum requirements. The Architect further reserves the right, and without prejudice to other recourse the Architect may take, to accept non-complying items subject to an adjustment in the Contract Amount as approved by the Architect and the Owner.

1.05 APPLICABLE INDUSTRY AND CODE REFERENCE STANDARDS

- A. Applicable standards listed in the Specifications include, but are not necessarily limited to, standards promulgated by the following agencies and organizations:
1. AAMA - American Architectural Manufacturers Association, 1827 Walden Office Square, Suite 550, Schaumburg, IL 60173-4268. 1-847-303-5664.
 2. AASHTO - American Association of State Highway and Transportation Officials, 444 N. Capitol St., N.W., Suite 249, Washington, D.C. 20001. 1-202-624-5800.
 3. ACI - American Concrete Institute, 38800 Country Club Drive, Farmington Hills, MI 48333-9094. 1-248-848-3700.
 4. AGA - American Gas Association, 400 N. Capitol Street., N.W., Washington, D. C. 20001. 1-800-841-8430.
 5. AISC - American Institute of Steel Construction, Inc., One East Wacker Drive, Suite 3100, Chicago, IL 60601-2001. 1-312—670-2400.
 6. ICC/ANSI A117.1-2003 - American National Standards Institute, Inc. 25 West 43rd Street, Fourth Floor, New York, NY 10036. 1-212-642-4900.
 7. ASTM - American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. 1-610-832-9585.
 8. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., (ASHRAE), 1791 Tullie Cir., N.E., Atlanta, GA 30329. 1-800-5-ASHRAE.
 9. AWI - Architectural Woodwork Institute, 1952 Isaac Newton Square W., Reston, VA 20190. 1-703-733-0600.
 10. AWS - American Welding Society, Inc., 550 N.W., Lejuene Road, Miami, FL 33126. 1-800-433-9353.
 11. BIA - Brick Industry Association, 11490 Commerce Park Drive, #300, Reston, VA 22091-1525. 1-703-620-0010.

12. BHMA – Builder’s Hardware Manufacturers Association, 355 Lexington Ave., 17th Floor, New York, NY 10017. 1-212-297-2122.
13. CRI – Carpet and Rug Institute, 310 Holiday Ave., P.O. Box 2048, Dalton, GA 30722. 1-800-882-8846.
14. CRSI - Concrete Reinforcing Steel Institute, 933 North Plum Grove Road, Schaumburg, IL 60173-4758. 1-847-517-1200.
15. CS - Commercial Standard of NIST, U.S. Department of Commerce, Government Printing Office, Washington, D.C. 20402.
16. DHI – Door and Hardware Institute, 14150, Newbrook Dr., Suite 200, Chantilly, VA 20151-2223. 1-703-222-2410.
17. Glass Association of North America, 2945 S.W. Wanamaker Dr., Suite A, Topeka, KS 66614. 1-785-271-0208.
18. International Building Code, International Code Council, Inc., in cooperation with Building Officials and Code Administrators International, Inc., 4051 West Flossmoor Road, Country Club Hills, IL 60478-5795, 1-800-214-4321 (as incorporated into the Virginia USBC).
19. MFMA – Maple Flooring Manufacturers Association, 60 Revere Dr., Suite 500, Northbrook, IL 60062. 1-847-480-9138.
20. NAAMM - The National Association of Architectural Metal Manufacturers, 8 South Michigan Avenue, Suite 100, Chicago, IL 60603. 1-312-332-0405.
21. NCMA - National Concrete Masonry Association, 2302 Horse Pen Road, P.O. Box 781, Herndon, VA 20171-3499. 1-703-713-1900.
22. NEC - National Electrical Code (See NFPA).
23. NEMA - National Electrical Manufacturers Association, 660 White Plains Rd., Suite 600, Tarrytown, NY 10591. 1-914-524-8650.
24. NFPA - National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269. 1-800-344-3555.
25. NIST - National Institute of Standards and Technology, Office of Standards Service, 100 Bureau Dr., Gaithersburg, MD 20899. 1-301-975-2758.
26. NRCA - National Roofing Contractors Association, 10255 West Higgins Road, Suite 600, Rosemont, IL 60018-5607. 1-847-299-9070.

27. NSF - National Sanitation Foundation, 3475 Plymouth Road, Ann Arbor, MI 48105.
28. NTMA – National Terrazzo and Mosaic Association, 110 E. Market St., Suite 200A, Leesburg, VA 20176. 1-800-323-9736.
29. OSHA - Occupational Safety and Health Administration, US Dept. of Labor/OSHA, 200 Constitution Avenue, N.W., Washington, D.C. 20210. 1-202-693-1999.
30. PCA - Portland Cement Association, 5420 Old Orchard Road, Skokie, IL 60077-1083. 1-847-966-6200.
31. SMACNA - Sheet Metal and Air-Conditioning Contractors Association International, 4201 Lafayette Center Dr., Chantilly, VA 20151. 1-703-803-2980.
32. SDI - Steel Deck Institute, P.O. Box 25, Fox River Grove, IL 60021-0025. 1-847-458-4647.
33. SDI - Steel Door Institute, 30200 Detroit Road, Cleveland, OH 44145-1967. 1-440-899-0010.
34. SJI - Steel Joist Institute, 3127 10th Avenue, North, Myrtle Beach, South Carolina 29577-6760. 1-843-626-1995.
35. SSPC - Steel Structures Painting Council, 40 24th Street, 6th Floor, Pittsburgh, Pennsylvania 15222-4656. 1-412-281-2331.
36. TCA - Tile Council of America, Inc., 100 Clemson Research Boulevard, Anderson, SC 29625. 1-864-646-TILE.
37. UL - Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, Illinois 60062-2096. 1-877-854-3577.
38. VDOT - Virginia Department of Transportation, P.O. Box 256, 2400 Pine Forest Drive, Colonial Heights, Virginia 23834.
39. Federal Specs and Federal Standards - General Services Administration, Specification Section, Room 6654, 7th & D Streets S.W., Washington, D.C. 20407.
40. VUSBC - Virginia Uniform Statewide Building Code.
41. 2010 ADA Standards for Accessible Design. Department of Justice 800-514-0301

42. Fairfax County Special Inspections Program: Special Inspections: Implementation in Fairfax County – Current Edition (SIFC- Current Edition), as administered by the Fairfax County Critical Structures Section, Department of Public Works and Environmental Services.
43. Fairfax County “Public Facilities Manual” (PFM).
44. Commonwealth of Virginia, “Erosion and Sediment Control Handbook.”
45. VA CHPS-Virginia Collaborative for High Performance Schools, 2443 Fair Oaks Blvd. #259, Sacramento, CA 95825.

1.06 JOB SITE ACCESS

- A. The Contractor shall provide one (1) copy of all reference standards at the job site for review by the Architect and Owner's Representative.

END OF SECTION

SECTION 01092

APPLICABLE FCPS STANDARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and Division 1 through Division 16 Specification Sections, apply to this Section.

1.02 RELATED WORK (including, but not limited to, the following)

- A. Section 08710: Finish Hardware
- B. Section 10100: Markerboards, and Tack boards
- C. Section 10800: Toilet Accessories
- D. Section 12302: Wood Casework
- E. Section 12304: Plastic Laminate Faced Casework and Fixtures
- F. Section 12360: Library Casework
- G. Section 15450/15451: Plumbing Fixtures and Trim
- H. Section 15900: Automatic Temperature Controls
- I. Division 16 Specification Sections
- J. 2010 ADA Standards for Accessible Design Department of Justice
- K. ICC/ANSI A117.1 –2009

1.03 DESCRIPTION

- A. This section establishes the standard required mounting heights for the types of equipment and accessories normally associated with the scope of school construction. Contractor shall coordinate the standards listed herein with the Construction Drawings and other specifications sections of the construction documents to determine applicability of the standards to equipment and accessories specified for the work, and the suitability of mounting height dimensions to the building occupants, where more than one dimension is listed for a particular item or accessory.

1.04 QUALITY ASSURANCE

- A. The Contractor shall be responsible for ensuring that the trades associated with the installation of the equipment and accessories referenced herein are familiar with these standards as they relate to the work of each trade.

1.05 EQUIPMENT MOUNTING HEIGHTS

- A. Fairfax County Public Schools standard for equipment installation heights:

1. **LAVATORIES:** (Measured from floor to top of rim)
 - a. Grades PS (Preschool),
K,1,2,3,4,5,6 = 27"
Accessible = 30" (24" clear knee space)
 - b. Grades 7,8,9,10,11,12, and Adults = 31"
Accessible = 34" max (29" clear knee space at rim
by 8" deep, minimum, 27" clear
to bottom of bowl)

2. **URINALS:** (Measured from floor to top of rim)
 - a. Grades PS,K,1,2,3,4,5,6 and = 17" (centerline of flush valve
Accessible 11.5" from top of urinal)
 - b. Grades 7,8,9,10,11,12, and Adults = 24" (centerline of flush valve
Accessible = 17" max (rim height A.F.F.)

3. **WATER CLOSETS:** (Measured from floor to top of rim)
 - a. Grades PS,K,1,2,3,4,5,6 = 15" (centerline of flush valve 26"
Accessible = 15" A.F.F.)
 - b. Grades 7,8,9,10,11,12, and Adults = 15" (centerline of flush valve 29"
Accessible = 18" A.F.F.)

4. **DRINKING FOUNTAINS, EWC's:** (Measured from floor to spout)
 - a. Grades PS,K,1,2,3,4,5,6 = 28"
Accessible = 30" max for parallel approach
(24" clear knee space for forward
approach)
 - b. Grades 7,8,9,10,11,12, and Adults = 42"
Accessible = 36" (27" clear knee space)

5. **SHOWER HEADS:** (Measured from floor to head)
 - a. All Grades - Boys = 78"
 - b. All Grades - Girls = 72"
 - c. Adults = 78"

6. **COMPUTER COUNTERS:** (Measured from floor to top)

- a. Grades PS,K,1,2,3 = 24"
- b. Grades 4,5,6 = 27"
- c. Grades 7,8,9,10,11,12, and Adults = 30"
- d. Accessible = 34"

7. **COUNTERTOPS:** (measured from floor to top)

- a. Grades PS, K, 1, 2, 3 = 24"
- b. Grades 4, 5, 6 = 27"
- c. Grades 7,8,9,10,11,12, and Adults = 36"
- d. Accessible sink tops (Grades PS, K thru 6) 30" (24" min. clear knee space)
- e. Accessible sink tops (Grades 7 thru 12 and Adults) 34" max (27" min. clear knee space)

8. **ACCESSIBLE GRAB BARS:** (Measured from finish floor to top of bar)

- a. Grades PS,K,1,2,3,4,5,6 = 27" Horizontal Bars
30" Vertical Bars
- b. Grades 7,8,9,10,11,12, and Adults = 36" Horizontal Bars
41" Vertical Bars

9. **HANDRAILS:** (Measured from ramp or stair nosing to top of gripping surface)

- a. All grades and adults (including adult accessible) = 36"
- b. Grades PS,1,2,3,4,5,6 (child accessible) = 25"

10. **PAPER TOWEL DISPENSERS:** (Measured from floor to towel slot)

- a. Grades PS, K, 1, 2,3,4,5,6 = 40" max.
- b. Grades 7,8,9,10,11,12, and Adults = 44" max.

11. **PAPER TOWEL WASTE RECEPTACLE:** (Measured from floor to top of unit)

- a. All Grades and Adults = 27" max.

12. **TOILET PAPER HOLDERS:** (Measured from floor to centerline of roll)

- a. All Grades and Adults = 20"

- 13. **WARM AIR HAIR DRYERS:** (Measured from floor to centerline of push button switch)
 - a. All Grades and Adults = 40"
- 14. **SOAP DISPENSERS:** (Measured from floor to bottom of dispenser)
 - a. Grades PS,K,1,2,3,4,5,6 = 36"
 - b. Grades 7,8,9,10,11,12, and Adults = 40"
- 15. **FEMININE NAPKIN DISPOSAL:** (Measured from floor to top of unit)
 - a. Grades 4,5,6,7,8,9,10,11,12, and Adults = 27"
- 16. **MIRRORS:** (Measured from floor to bottom of reflective surface/mirror)
 - a. Grades 9,10,11,12, and Adults = 40"
 - b. Tall Mirror All Grades-Group Toilets = 24"
- 17. **FIRE EXTINGUISHERS:** (Measured from floor to top of cabinet <4" deep)
 - a. All Grades and Adults = 56"
- 18. **PENCIL SHARPENER BLOCKS:** (Measured from floor to top of 8" x 8" wood block)
 - a. Grades PS,K,1,2,3 = 32"
 - b. Grades 4,5,6 = 38"
 - c. Grades 7,8,9,10,11,12 = 42"
- 19. **CORRIDOR TACK STRIPS:**
 - a. (2) strips - 6'-8" A.F.F. and 4'-8" A.F.F.
 - b. Stop strips 36" from door/window frames
 - c. Maximum strip length 20'. Provide 5' break between strips.
- 20. **MARKERBOARDS & TACKBOARDS:** (Measured from floor to bottom of writing or tackable surface)
 - a. Grades PS,K,1,2,3 = 24"
 - b. Grades 4,5,6 and other instructional spaces = 28"
 - c. Grades 7,8,9,10,11,12, and Adults = 36"
- 21. **DOOR HARDWARE:** (Measured from floor to centerline of hardware)
 - a. Grades PS,K,1,2,3,4,5,6
 - 1) Push Plates = 42"
 - 2) Pull Handles = 42"
 - 3) Levers = 36"

- 4) Panic Exit = 36" centerline of push bar
- 5) Deadlocks = 48" maximum

- b. Grades 7,8,9,10,11,12, and Adults
 - 1) Push Plates = 50"
 - 2) Pull Handles = 42"
 - 3) Levers = 36"
 - 4) Panic Exit = 40" centerline of push bar
 - 5) Deadlocks = 48" maximum

- 22. **CCMS SENSORS:** (Measured from floor to centerline of box)
 - a. All Occupied Spaces = 5'-6" A.F.F.

- 23. **THERMOSTATS:** (Measured from floor to top of box)
 - a. All Occupied spaces = 4'-0 A.F.F.

- 24. **CONV. RECEPTACLES:** (Measured from floor to bottom of box)
 - a. General Areas = 1'-4" A.F.F.
 - b. Special Areas = As required/check with Owner

- 25. **CLOCK OUTLETS:**
 - a. General Areas = 6" from ceiling to top of box
 - b. Special Areas = As required/check with Owner

- 26. **LIGHT SWITCHES:** (Measured from floor to top of box)
 - a. All Areas = 4'-0" A.F.F.

- 27. **FIRE ALARM PULL SWITCHES:** (Measured from floor to top of box)
 - a. All Areas = 4'-0" A.F.F.

- 28. **FIRE ALARM BELLS/HORNS:** (Measured from floor to top of box)
 - a. All Areas = 6'-8" A.F.F.
(or 6" below ceiling, whichever is lower)

- 29. **INTERCOM SPEAKERS:**
 - a. General Areas = Flush with ceiling
 - b. Special Areas = As required/check with Owner

- 30. **T. V. OUTLETS:** (Measured from floor to bottom of box)
 - a. General Areas = 1'-4" A.F.F.
 - b. TV/VCR Fixed = 1'-0" Below ceiling
 - c. TV/VCR on Cart = 5'-0" A.F.F.
 - d. Special Areas = As required/check with Owner

- 31. **TELECOMMUNICATIONS:**
(Measured from floor to bottom of box) = 1'-4' A.F.F.

- 32. **SOUND SYSTEM CALL SWITCHES:**
(Measured from floor to top of box) = 4'-0" A.F.F.

- 33. **SMOKE/HEAT DETECTOR:**
 - a. General Areas = Ceiling
 - b. Special Areas = As required/check with Owner

- 34. **WIRELESS ACCESS POINT:**
 - a. Locate unit 1'-0" below ceiling. For ceiling heights 11'-0" A.F.F. or higher, mount unit at 10'-0" A.F.F.

- 35. **LIBRARY SHELVING:** (Measured from floor to top)
 - a. Grades PS,K,1,2,3,4,5,6
 - 1) check-out desk = 32" H
 - 2) easy books 13" deep = 42" H (min.), 48" H (max.)
 - 3) reference 13" deep = 48" H
 - 4) free standing 13" deep = 48" H, wall shelving 13" deep, 72" H
 - b. Grades 7,8,9,10,11,12 and Adults
 - 1) check-out desk = 39" H
 - 2) reference 13" deep = 48" H
 - 3) free standing 13" deep = 48" H
 - 4) wall shelving 13" deep = 84" H
 - c. 36" wide path minimum

- 36. **KITCHEN SERVING LINES:**
 - a. Elementary School Finish Floor to Tray Slide (27" clear to under side of tray slide) = 28" min.

- | | | | |
|----|---|---|-----|
| b. | Level Floor (Measured from floor to top of unit, middle and high schools) | = | 34" |
| c. | Minimum width | = | 36" |

END OF SECTION

SECTION 01152

APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and Division 1 Specification Sections, apply to the Work of this Section.

1.02 DESCRIPTION

- A. Submit Applications for Payment to Architect in accordance with the schedule established by Conditions of the Contract and Agreement Between Owner and Contractor.

1.03 RELATED WORK

- A. Lump Sum Price: Agreement Between Owner and Contractor.
- B. Progress Payments, Retainages, and Final Payment. General Conditions, Section 00700.
- C. Allowances: Section 01020.
- D. Construction Progress Schedules: Section 01310.
- E. Schedule of Values: Section 01370.
- F. Contract Close-out: Section 01700.

1.04 FORMS

- A. Application for each progress payment shall be prepared using the standard Fairfax County Public Schools Forms (copy enclosed), which include the following:
 - 1. Requisition Form
 - 2. Stored Material Log
 - 3. Change Order Log
 - 4. Certification Form

1.05 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

- A. Fill in required information, complete list of all component items of Work, fill in columns for all line items included in the Schedule of Values. Round all values off to the nearest dollar.
- B. Requisition Form: Describe each line item and list scheduled value, previous completed value, value of work for the current application, total value to date, and balance of uncompleted work. Calculate percentage of completion. Provide a total for all line items for each column.
- C. Stored Material Log: Describe all stored materials, listing previous value, received value for the application period, and installed value for the application period. List the total of these values (current value) for each item. Provide a total for all columns, less 10% retainage.
 - 1. The Contractor may bill for materials stored off the site with the following provisions:
 - a. Provide a copy of manufacturers invoice indicating nature of materials and amount of invoice.
 - b. Indicate location of materials stored.
 - c. Materials shall be marked to indicate that they are the property of Fairfax County Public Schools, and to indicate their destination.
 - d. Provide proof of sufficient insurance coverage to cover the value of the materials stored. The policy or certificate of insurance shall be in the name of Fairfax County Public Schools and must be submitted prior to the submission of the requisition. The Owner reserves the right to inspect the materials stored off the site prior to processing the requisition.
- D. Change Order Log: Identify and describe all Change Orders, Change Proposals and prepared Modification Requests. List total value, previous value, value for application period, total value to date, and balance of uncompleted work. Provide a total for all columns, less 5% retainage.
- E. Complete all items in item 1, "Analysis of Work Performed" on the certification form.
- F. Execute certification form with the signature of a duly authorized officer of the Contractor on all copies of the completed form.
- G. Submit 5 copies of the application for payment.

1.06 PROGRESS PAYMENTS

- A. The Owner will make a Progress Payment to the Contractor on the basis of a duly certified and approved estimate of the work performed during the preceding calendar month under this Contract, but to insure the proper performance of this contract, the Owner will retain five percent (5%) of the value of change orders and ten percent (10%) of the portion of the Contract Sum properly allocable to materials and equipment suitably stored at or off the site until final completion and acceptance of all work included in the Contract.
- B. As the Work progresses, the Owner may in its sole and absolute discretion decide to reduce the retainage on a Project where such is found to be in the best interests of the school division. **[Delete for Elementary and Middle schools]**

1.07 PREPARATION OF APPLICATION FOR FINAL PAYMENT

- A. Fill in Application Form as specified for progress payments.
- B. Use continuation sheet for presenting the final statement of accounting as specified in Section 01700: Contract Close-out.

1.08 SUBMITTAL PROCEDURE

- A. Submit Applications for Payment on a monthly basis or as stipulated in the Owner Contractor agreement.
- B. Submit for review and obtain certification signature of the School Board Inspector on all completed copies of the application. The Contractor shall provide supplementary information to facilitate review of application if requested.
- C. Upon review and certification by the School Board Inspector, submit all copies to the Architect. Upon review and certification by the architect, all copies shall be forwarded to the School Board representative.
- D. Upon review and certification by the School Board representative, the application shall be forwarded for payment.
- E. Upon rejection by any certifying party, the Contractor shall make corrections or adjustments required by the rejection, and shall be required to obtain certification of the corrected application by all parties.

END OF SECTION

CONTRACTOR LETTERHEAD

FAIRFAX COUNTY PUBLIC SCHOOLS REQUISITION

PROJECT:
DATE:
REQUISITION #

1. ANALYSIS OF WORK PERFORMED

Table with 4 columns: Item (A-H), Description, Percentage, and Value. Items include Total Cost of Work Performed to Date, Less Amount Retained, Net Amount Earned on Contract to Date, Materials Stored, Add or Deduct Change Orders, Total Amount Earned on Contract to Date, Less Previous Payments, and Balance Due This Payment.

2. CERTIFICATION OF CONTRACTOR

ACCORDING TO THE BEST OF MY KNOWLEDGE AND BELIEF, I CERTIFY THAT ALL ITEMS AND AMOUNTS SHOWN ON THE FACE OF THIS REQUISITION FOR PAYMENT ARE CORRECT; THAT ALL WORK HAS BEEN PERFORMED AND/OR MATERIAL SUPPLIED IN FULL ACCORDANCE WITH THE REQUIREMENTS OF THE REFERENCED CONTRACT, AND/OR DULY AUTHORIZED DEVIATIONS, SUBSTITUTIONS, ALTERATIONS, AND/OR ADDITIONS; THAT THE FOREGOING IS A TRUE AND CORRECT STATEMENT OF THE CONTRACT ACCOUNT UP TO AND INCLUDING THE LAST DAY OF THE PERIOD COVERED BY THIS REQUISITION; THAT NO PART OF THE "BALANCE DUE THIS PAYMENT" HAS BEEN RECEIVED AND THAT I WILL MAKE TIMELY PAYMENT FROM THESE PROCEEDS TO MY SUBCONTRACTORS AND/OR SUPPLIERS IN ACCORDANCE WITH MY CONTRACTUAL ARRANGEMENTS WITH THEM.

BY _____ CONTRACTOR _____ SIGNATURE OF AUTHORIZED REPRESENTATIVE
_____ 19 _____ TITLE _____

3. CERTIFICATION OF SCHOOL BOARD INSPECTOR

I CERTIFY THAT I HAVE CHECKED AND VERIFIED THE ABOVE AND FOREGOING REQUISITION FOR PAYMENT DURING MY REGULAR INSPECTION.

_____ SCHOOL BOARD INSPECTOR _____ DATE

4. CERTIFICATION OF ARCHITECT

I CERTIFY THAT I HAVE CHECKED AND VERIFIED THE ABOVE AND FOREGOING REQUISITION FOR PAYMENT; THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF IT IS A TRUE AND CORRECT STATEMENT OF WORK PERFORMED AND/OR MATERIAL SUPPLIED BY THE CONTRACTOR; THAT ALL WORK AND/OR MATERIAL INCLUDED IN THIS REQUISITION HAS BEEN INSPECTED BY ME AND/OR BY DULY AUTHORIZED REPRESENTATIVE OR ASSISTANTS AND THAT IT HAS BEEN PERFORMED AND/OR SUPPLIED IN FULL ACCORDANCE WITH REQUIREMENTS OF THE REFERENCED CONTRACT; AND THAT PAYMENT CLAIMED BY THE CONTRACTOR IS CORRECTLY COMPUTED ON THE BASIS OF WORK PERFORMED AND/OR MATERIAL SUPPLIED TO DATE.

SIGNED _____ ARCHITECT _____ DATE

5. PRE-PAYMENT CERTIFICATION BY FAIRFAX COUNTY SCHOOL BOARD

I CERTIFY THAT I HAVE CHECKED AND VERIFIED THIS REQUISITION AND THAT, TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT IS A TRUE AND CORRECT STATEMENT OF WORK PERFORMED AND/OR MATERIAL SUPPLIED BY THE CONTRACTOR; THAT ALL WORK INCLUDED IN THIS ESTIMATE HAS BEEN INSPECTED AND THAT IT HAS BEEN PERFORMED AND OR SUPPLIED IN FULL ACCORDANCE WITH REQUIREMENTS OF THE CONTRACT.

FAIRFAX COUNTY SCHOOL BOARD

SIGNED _____ DATE

SECTION 01153
CHANGE ORDER PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specifications Section, apply to this Section.

1.02 RELATED WORK

- A. General Conditions of the Contract: Section 00700.
- B. Section 01020: Contingency Allowance.
- C. Section 01152: Applications for Payment.
- D. Section 01370: Schedule of Values.
- E. Section 01630: Substitutions

1.03 WORK DESCRIPTION

- A. Promptly implement Change Order procedures:
 - 1. Provide full written data required to evaluate changes.
 - 2. Maintain detailed records for work done on a time-and-material/force account basis.
 - 3. Provide full documentation to Architect/Engineer on request.
- B. Contractor and Owner will designate in writing the person who is authorized to execute Change Orders.

1.04 DEFINITIONS

- A. Change Order: See Section 00700, General Conditions.
- B. Proposed Modification: See Section 00700, General Conditions.

1.05 PRELIMINARY PROCEDURES

- A. Owner or Architect/Engineer may initiate changes by submitting Proposed Modification to Contractor. Request will include:

1. Detailed description of the Change, Products, and location of the change in the Project.
 2. Supplementary or revised Drawings and Specifications.
 3. A specific period of time during which the requested price will be considered valid, which shall be 90 calendar days, unless otherwise stated.
 4. The specific action to be initiated by the Contractor.
 5. The amounts of the unit prices to be:
 - a. Those stated in the Agreement and the Proposal Form.
 - b. Those mutually agreed upon between Owner and Contractor.
- B. Contractor may initiate changes by submitting a written notice to Architect/Engineer, containing:
1. Description of the proposed changes.
 2. Statement of the reason for making the changes.
 3. Statement of the effect on the Contract Sum and the Contract Time.
 4. Statement of the effect on the work.
 5. Documentation supporting any change in Contract Sum or Contract Time, as appropriate.
 6. All claims by the Contractor arising out of or relating to the performance of the work or any termination hereunder shall be made in writing and shall be decided by the Director of the Office of Design and Construction or his designated representative. All claims must be filed with the Office of Design and Construction within five (5) calendar days after sustaining the injury underlying the claim. Failure to comply with this provision shall constitute an absolute waiver of such claim. The Director or the Office of Design and Construction or his designated representative shall issue his written decision within thirty (30) days of his receipt of the written claim which decision shall be final.

1.06 DOCUMENTATION OF PROPOSALS AND CLAIMS

- A. Support each quotation for a lump-sum proposal, and for each unit price which has not previously been established, with sufficient substantiating data to allow Owner and Architect/Engineer to evaluate the quotation.

1. Proposal costs attributable to labor shall be based upon labor rates for each category of personnel. A list of labor rates shall be submitted to the Owner for review and concurrence within 30 calendar days of the Notice to Proceed. See paragraph B2 below for allowable inclusions for establishment of labor rates.
- B. Provide data for lump sum proposals in accordance with the following criteria:
1. The Contractor's proposal shall be itemized and segregated by labor, equipment, and materials for the various components of the Change in the Work (no aggregate labor total will be acceptable) and shall be accompanied by signed proposals of any Subcontractors who shall perform any portion of the Change in the Work and of any entities who shall furnish materials or equipment for incorporation therein.
 2. The portion of the proposal relating to labor, whether by the Contractor's forces or the forces of any of its Subcontractors, shall include anticipated gross wages of Job Site labor, including foremen, who shall be directly involved in the Change in the Work (for such time as they will be so involved), plus payroll costs (including premium costs of overtime labor, if overtime is authorized, Social Security, Federal or State unemployment insurance taxes and fringe benefits required by collective bargaining agreements entered into by the Contractor or any such Subcontractor in connection with such labor).
 3. The portion of the proposal relating to materials may include the reasonable anticipated direct costs to the Contractor or to any of its Subcontractors of materials shall be purchased for incorporation in the Change in the Work, plus transportation and applicable sales or use taxes.
 4. The proposal may further include the Contractor's and any of his Subcontractor's reasonable anticipated equipment rental costs, except small hand tools, in connection with the Change in the Work. For rented equipment an hourly rental rate shall be used which shall be determined by using the monthly rental rates taken from the current edition of the Rental Rate Blue Book for construction Equipment and dividing it by 176. An allowance shall be made for operating costs for each and every hour the equipment is actually operating in accordance with the rates listed in the aforesaid Rental Book. The Contractor shall be allowed no more than 65% of the rental rate on Contractor owned equipment.
 5. Base Cost is defined as the total of labor, material, and equipment rentals as described in Subparagraphs 1.06B3 and 1.06B4. The actual net cost in money to the Owner for the Change in the Work shall be computed as follows:

- a. Contractor overhead and profit: If the Contractor performs the Change in the Work, his compensation shall be the Base Costs as described above, plus a mark-up of 20% on Base Costs less than or equal to \$10,000. If the Base Costs exceed \$10,000, his compensation shall be the Base Cost, plus a mark-up of 20% on Base Costs less than or equal to \$10,000, and a mark-up of 15% on Base Costs above \$10,000.
 - b. Subcontractor overhead and profit: If the work is performed by a Subcontractor, his compensation shall be the Base Costs as described above plus a mark-up as described in Paragraph 5.a. above for overhead and profit. The Contractor's compensation shall be a mark-up of ten percent (10%) of the Subcontractors Base Costs.
 - c. Sub-subcontractor overhead and profit: If the work is performed by a Sub-subcontractor, his compensation shall be the Base Costs as herein described plus a mark-up as described in paragraph 5.a. above for overhead and profit. The Subcontractors compensation shall be a mark-up of ten percent (10%) of the Sub-subcontractor's Base Costs for his overhead. The Contractor's compensation will be a mark-up of ten percent (10%) of the Sub-subcontractor Base Costs.
6. The mark-up on the cost of labor, materials, and equipment described in Paragraphs 5.a., 5.b., and 5.c. above shall compensate the Contractor, Subcontractor or Sub-subcontractor for all indirect costs associated with or relating to the Change in the Work including, but not limited to, labor and/or equipment inefficiency, acceleration, changes in sequence, delays, interference, impact on unchanged work, gross receipts tax, superintendent, small tools, reproduction, administration, insurance, unrelated safety requirements, temporary structures and offices, all other general and administrative, home office, and field office expenses.
- a. The mark-up on the cost of labor, materials, and equipment described in Paragraphs 5.b. and 5.c. above shall compensate the contractor or Subcontractor for all indirect costs associated with or relating to the change in the Work including but not limited to, gross receipt tax, superintendent, reproduction, administration, and insurance.
- C. Support each claim for additional costs, and for work done on a time-and-material basis, with documentation as required for a lump-sum proposal, plus additional information:
1. Name of the Owner's authorized agent who ordered the work, and date of the order. Include copies of written authorization when applicable.

2. Dates and times that work was performed, and by whom, verified and signed by Owner's Field Representative.
 3. Time record, summary of hours worked, and hourly rates paid.
 4. Receipts and invoices for:
 - a. Equipment used, listing dates and times of use.
 - b. Products used, including listing of quantities.
 - c. Subcontracts.
- D. Document requests for substitutions of Products as specified in Section 01600.

1.07 PREPARATION OF CHANGE ORDERS

- A. Architect/Owner will prepare each Change Order. Three copies shall be prepared, each with original signature.
- B. Form: Change Order - AIA Document G701.
- C. Change Order will describe changes in the work, both additions, deletions and any voided proposed modifications.
- D. Change Order will provide an accounting of the adjustment in the Contract Sum and in the Contract Time.
- E. Upon completion of work under a Change Order, enter the pertinent changes in Record Documents.

1.08 CHANGE ORDER CONTENTS

- A. Contents of Change Orders will be based on, either:
 1. Architect/Engineer's proposed Modification and Contractor's responsive Proposal as mutually agreed between Owner and Contractor.
 2. Contractor's Proposal for a change as recommended by Architect/Engineer and as mutually agreed between Owner and Contractor.
- B. Owner and Architect/Engineer will sign and date the Change Order as authorization for the Contractor to proceed with the changes.
- C. Contractor will sign and date the Change Order to indicate agreement with the terms therein.

END OF SECTION

SECTION 01200
PROJECT MEETINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section.

1.02 RELATED WORK

- A. Pre-Bid Conferences: Instructions to Bidders.
- B. Summary of Work: Section 01010.
- C. Construction Progress Schedules: Section 01310.
- D. Shop Drawings, Product Data and Samples: Section 01340.
- E. Project Record Information: Section 01720.
- F. Operating and Maintenance Data: Section 01730.

1.03 DESCRIPTION OF WORK

- A. Architect/Owner will schedule and administer pre-construction meetings, periodic progress meetings and specially called meetings throughout the progress of the Work. Architect/Owner will:
 - 1. Preside at meetings.
 - 2. Record the minutes, including all significant proceedings and decisions.
 - 3. Reproduce and distribute copies of minutes after each meeting and furnish six (6) copies of minutes to Contractor.
- B. Representatives of Contractor, Subcontractors and suppliers attending the meeting shall be qualified and authorized to act on behalf of the entity each represents.
- C. Architect will attend meetings to ascertain that Work is being expedited consistent with Contract Documents and the construction schedules. Consulting Engineers will attend meetings when so directed by the Architect.

1.04 PRE-CONSTRUCTION MEETING

- A. Schedule immediately after date of Notice to Proceed.
- B. Location: A central site, convenient for all parties, as designated by the Owner.
- C. Attendance:
 - 1. Owner's Representative.
 - 2. Architect/Engineers.
 - 3. Contractor's Superintendent.
 - 4. Major Subcontractors.
 - 5. Major Suppliers.
 - 6. Others as appropriate as determined by the Architect and Contractor.
- D. Suggested Agenda (including, but not limited to the following):
 - 1. Distribution and discussion of:
 - a. List of major subcontractors and suppliers.
 - b. Projected Construction Schedules.
 - 2. Critical work sequencing:
 - a. Major equipment deliveries and priorities.
 - 3. Project Coordination.
 - a. Designation of responsible personnel.
 - 4. Procedures and processing of:
 - a. Field decisions.
 - b. Submittals.
 - c. Change Orders.
 - d. Applications for Payment.
 - 5. Adequacy of distribution of Contract Documents.
 - 6. Procedures for maintaining Record Information.

7. Use of premises:
 - a. Office, work, and storage areas.
 - b. Owner's requirements.
8. Construction facilities, controls and construction aids.
9. Temporary utilities.
10. Safety and first aid procedures.
11. Security procedures.

1.05 PROGRESS MEETINGS

- A. Schedule progress meetings every second week unless it is determined by Architect and Owner that additional meetings are necessary.
- B. Hold specially called meetings as required by progress of the work.
- C. Location of the meetings: The Project field office of the Contractor.
- D. Attendance:
 1. Architect and his professional consultants as needed.
 2. Subcontractors as appropriate. (Major and Active)
 3. Suppliers as appropriate. (Major and Active)
 4. Owner's Representatives
- E. Agenda of each progress meeting.
 1. Review and approval of minutes of previous meeting
 2. Safety Concerns
 3. School Coordination Issues
 4. Submittals
 5. Delivery Schedules
 6. Utility Coordination

7. Field observations, problems, conflicts
8. Outstanding RFI's, PM's, CO's
9. Outstanding Punch Lists
10. Uncorrected Deficiencies
11. Status of DPWES, Fire Marshal, Health Inspections
12. Third Party Inspections and Certifications
13. Abatement Issues
14. Any other problems which might impact the schedule
15. Corrective measures and procedures to regain projected schedule
16. Two-week look-ahead
17. Maintenance of quality standards and controls
18. Site Cleanliness
19. Security Issues
20. Project Closeout related items
21. Other pertinent business

END OF SECTION

SECTION 01310

CONSTRUCTION PROGRESS SCHEDULES

- 1.1 GENERAL. This section specifies requirements and procedures in preparing computerized schedules and reports for planning, coordinating, executing, and monitoring the progress of the Work. Work shall be scheduled using the Critical Path Method (CPM) type of network analysis. Scheduling software shall be Primavera Project Planner (P3, or most recent version for Microsoft Windows) or Microsoft Project Pro 2003 (such software to be referred to herein as the "Specified Software").

The Contractor shall employ a trained and experienced construction scheduling person knowledgeable in construction work sequencing, productivity, scheduling, and application of the Specified Software system. This person shall work together with the Contractor's management team and with the Architect and the Owner to deliver acceptable products outlined in this section.

- 1.2 SCHEDULING RESPONSIBILITIES.

1.2.1. Critical Path Method. The Construction Schedule shall be developed by means of a critical path method of scheduling and shall be used to monitor job progress. The Contractor shall be responsible for providing all information concerning the sequencing, logic and duration of all activities as well as providing the initial critical path method ("CPM") logic network diagram (in electronic and paper form) and tabular report data. Once the initial logic network diagram is accepted by the Architect and the Owner, the Contractor shall be responsible for providing monthly update information on logic, percentage completion, actual start and finish dates, and duration changes as requested by the Owner.

1.2.2. Large-Scale Plots; Posting of Schedule and Schedule Updates. The Contractor shall provide a large scale plot of the initial schedule and of any subsequent updated schedules. The schedules shall be posted in the progress meeting trailer and in the FCPS Representative's trailer at the Project Site.

1.2.3. Schedule Accuracy. The initial Construction Schedule and all update information shall be provided by the Contractor. This information shall constitute a representation of the best efforts of the Contractor and his subcontractors with regard to the manner in which they intend to accomplish the Work within the Contract Period. Similarly, all progress information to be provided by and through the Contractor shall constitute an accurate representation of his or his subcontractor's or supplier's actual performance. The Construction Schedule shall at all times remain an accurate reflection of the Contractor's actual or projected sequencing of Work. Once accepted by the Owner, adherence to the established Construction Schedule shall be obligatory upon the Contractor and his subcontractors for performance of the Work. The Owner shall have the right to require the Contractor to revise the Construction Schedule if in his judgment the schedule does not accurately reflect the actual prosecution of the Work, or the Contractor is in violation of any provisions of this section. The Contractor shall revise the Construction Schedule to meet the above criteria as often as is

necessary during the performance of the Work without additional cost to the Owner.

1.3 SUBMITTALS.

- 1.3.1. Qualifications. The Contractor shall submit a statement of qualifications to perform computerized CPM scheduling. The submittal shall verify that either the Contractor has in-house capability qualified to use CPM technique and the Specified Software or that the Contractor has arranged for the services of a CPM consultant so qualified. In either event the statement shall identify the individual(s) who will perform the CPM scheduling. Capability shall be verified by description of construction projects on which the individual has successfully utilized computerized CPM scheduling and shall include at least two projects of similar nature, scope, and value, neither of which shall be less than one-half the Contract Sum for the Project. The statement shall also identify the contact persons for the referenced projects with current telephone and address information. Unless otherwise agreed in writing by the Owner, the Contractor shall assign the individual who will perform the scheduling to a full-time, onsite position.
- 1.3.2. 90-Day CPM Network Diagram. Within 14 days after issuance of the Notice to Proceed, the Contractor shall submit to the Architect six (6) prints of his proposed CPM network diagram (also in electronic form) and tabular reports for the first 90 days of the Work. This initial logic diagram shall be drawn as described herein and submitted on sheets 36 inches by 48 inches and shall include both procurement and construction activities. The schedule will be the subject of a schedule review meeting with the Contractor, the Architect, and the Owner within 14 days after its submission. The Contractor shall revise and resubmit the 90-day schedule until it is acceptable to the Owner.
- 1.3.3. Complete CPM Network Diagram. Within 60 days after issuance of the Notice to Proceed, the Contractor shall submit to the Architect six (6) sets of his proposed CPM logic diagram (also in electronic form) and tabular reports for the entire Contract duration and shall include both procurement and construction activities. The tabular reports shall include the following:
- a. Report of activities sorted by activity number. Activity numbers, where practical, shall correlate to the area numbers designated on the drawings.
 - b. Report of activities sorted by early start date and late start date.
 - c. Report of activities sorted by total float, as such term is defined below.
 - d. Report of activities sorted by responsibility code. Responsibility codes shall be established for the Contractor, Architect, Owner, Subcontractors, Suppliers, etc. These codes shall be identified in the network diagram.

- e. A successor-predecessor report which shall identify the successor and predecessor activities for each activity and ties between schedule activities.
- f. Report of resource loading.
- g. Report of cost loading.
- h. Cash flow curves, cumulative and per month sorted by early start dates.
- i. Activity codes, values, and coding dictionary.

The logic diagram shall be drawn as described herein and will be the subject of a schedule review meeting with the Contractor, the Architect, and the Owner within two weeks after its submission. If a review of the submitted CPM schedule indicates a work plan which will not result in completion of the Work within the Contract Period, it shall be the Contractor's responsibility to revise the CPM schedule as required by the Owner and resubmit it until it is acceptable.

The Contractor's failure to submit an acceptable CPM schedule may, without limitation and in the Owner's sole discretion, constitute cause for the withholding of any partial payment otherwise due under the Contract Documents. The accepted schedule will be designated the "original Construction Schedule".

Acceptance of the Contractor's proposed CPM schedule by the Owner will in no event constitute its representation that the Work can be completed as indicated on such schedule.

- 1.3.4. Submittal Schedule. In addition to the above scheduling requirements, the Contractor shall submit a complete separate and independent schedule and detailed listing of anticipated submittals during the Contract Period. The submittal schedule shall be submitted within 30 days after Notice to Proceed. The submittal schedule shall then be accepted or revised as required by the Owner within 10 working days after receipt, and the Contractor shall incorporate the dates and review durations into his complete CPM schedule.

The Contractor shall coordinate his submittals with those of his Subcontractors and suppliers. The anticipated submission due date for each submittal shall be indicated along with the date on which its return is required. For planning purposes, the Architect will return shop drawings within 10 working days after receipt. Whenever the review of a particular submittal is on the critical path, such submittal shall be clearly marked in red with the words "Critical Path" by the Contractor at the time of submission.

The Submittal Schedule, including a detailed listing of submittals, shall be revised and resubmitted each month for use as a tracking log.

- 1.3.5. Look Ahead Reports. The Contractor shall also submit two-week look ahead reports.

1.4 NETWORK REQUIREMENTS.

- 1.4.1. Network Diagrams. The network diagram shall show the order and interdependence of activities and the sequence in which the Work is to be accomplished as planned by the Contractor. The purpose of the network analysis diagram is to show how the start of a given activity is dependent on the completion of preceding activities and how its completion restricts the start of succeeding activities. A time scaled precedence format shall be followed. The detailed network diagram shall be time scaled showing a continuous flow from left to right.

- 1.4.2. Schedule Activities Groupings. The schedule activities shall be organized into two major groups: procurement and construction.

Procurement activities shall include, but not be limited to, the following:

- a. Major submittal items.
- b. Review and acceptance of major submittal items.
- c. Fabrication and delivery of major submittal items.

Fabrication and delivery of the major submittal items shall be tied logically to the correct construction activity in the overall Construction Schedule.

Construction activities shall be physical work activities that describe how the job will be constructed.

- 1.4.3. Breakdown of Activities and Coding Structure. The Contractor shall breakdown the Work into activities with durations of no greater than 15 working days each, except for nonconstruction activities such as procurement of materials, delivery of equipment, and other activities which may require longer durations. To the extent feasible, activities related to a specific physical area of the Project shall be grouped on the network for ease of understanding and simplification. The selection and number of activities and coding of activities shall be subject to the review and acceptance by the Architect and Owner.

The coding shall follow the designation conventions of the facilities outlined on the drawings and in the specifications and shall include identification of Subcontractors, suppliers/vendors and fabricators, and other parties reporting to the Contractor.

Each activity on the network shall have indicated for it the following:

- a. A single duration, no longer than 15 working days which represents the single best estimate of the expected elapsed time considering the scope of work involved in the activity. Durations shall be expressed in days. Normal holidays and weather delays shall be included. One critical path shall be shown for the schedule.
- b. A unique activity identification (I.D.) number shall be assigned to each activity. The I.D. number may contain up to 10 alpha-numeric characters.
- c. A brief description of the activity shall be included. If this description is not definitive, a separate listing of each activity and a descriptive narrative may be required.
- d. Each activity (except for procurement activities) shall be cost loaded as specified herein to indicate the total estimated costs of the activity. No activity shall exceed \$50,000 except for an equipment item or other item approved by the Owner. Material costs shall be assigned to delivery activities.
- e. Each activity shall be manhour loaded with the estimated manhours to be expended on each activity.

1.4.4. Incomplete Schedules. Notwithstanding the network review by the Architect and/or the Owner, the failure to include on a network any element of the Work required for the performance of this Contract shall not excuse the Contractor from completing all Work required within the Contract Period.

1.4.5. Early Finish Schedules. A CPM schedule which shows a completion of any milestone or completion dates prior to the contractual completion date for that milestone or completion date may be accepted, but in no event shall be acceptable as a basis for a claim for delay against the Owner and Architect and any of their authorized representatives if the early completion date is not met by the Contractor.

1.5 COST LOADING.

1.5.1. Schedule of Values. Each activity on the Construction Schedule shall be allocated a dollar value in accordance with the provisions of this section. Each activity's assigned cost shall consist of labor, equipment, and materials costs, and a *pro rata* contribution to overhead and profit. The aggregate amount of all activity costs shall equal the Contract Sum. In submitting cost data, the Contractor certifies that it is not unbalanced and that the value assigned to each activity represents the Contractor's estimate of the actual costs of performing that activity.

The accepted schedule of values shall be deemed to represent a fair, reasonable, and equitable dollar cost allocation for each activity on the Contractor's construction schedule.

- 1.5.2. Documentation. If, in the opinion of the Architect and the Owner, the cost data do not meet the requirements for a balanced bid breakdown, the Contractor shall present documentation to the Architect substantiating any cost allocation on the cost data. Cost allocations shall be considered unbalanced if any activity on the construction schedule has been assigned, in the opinion of the Owner, a disproportionate allocation of direct costs, overhead, or profit.

1.6 PROGRESS OF THE WORK

- 1.6.1. Start of Work. The Work shall be started in accordance with Article 11 of the General Conditions and the Notice to Proceed. The Work shall be executed with such progress as may be required to prevent delay to separate contractors or to the completion of the Project as a whole. The Work shall be executed at such times and in or on such parts of the site and with such forces, material, and equipment, as to assure completion of the Work within the Contract Period.
- 1.6.2. Delays to Critical Path. Whenever it becomes apparent that delays to the critical path have occurred (other than an unreasonable delay caused by the Owner) and that, as a result, the Work will not be completed within the Contract Period, the Contractor, at the direction of the Owner, shall take one or more of the following actions at no additional cost to the Owner:
- a. Increase construction and other manpower in such quantities and crafts as will substantially eliminate the backlog of Work.
 - b. Increase the number of working hours per shift, shifts per day, or working days per week; the amount of construction equipment; the forms for concrete work; etc., or any combination of the foregoing to substantially eliminate the backlog of Work.
 - c. Reschedule activities to achieve maximum practical concurrence of accomplishment of activities, and comply with the revised schedule.
 - d. The Contractor shall submit to the Owner for review a written statement of the steps he intends to take to remove or arrest the delay to the schedule. The Contractor shall promptly provide such level of effort to bring the Work back on schedule. Should schedule delays persist, the Contractor's Surety may be asked to attend schedule update meetings.
 - e. Failure of the Contractor to comply with the requirements herein shall subject him, without limitation and at the Owner's sole discretion, to withholding, in whole or in part, of payments otherwise due the Contractor for Work performed under the Contract. Any withholding of monies is not a penalty for noncompliance, but is an assurance for the Owner that funds will be available to implement these requirements should the Contractor fail to do so, since failure of the Contractor to comply with these requirements shall mean that the Contractor failed to prosecute the

Work with such diligence as to ensure its completion within the Contract Period.

1.7 SCHEDULE DATES.

1.7.1. Changed Work. If the Contractor claims acceleration charges in a cost proposal, the Contractor shall document a sub-network in the schedule depicting the changed Work and its effect on other activities. This sub-network shall be tied to the main network with appropriate logic so that a true analysis of the critical path can be made in order to prove acceleration costs.

1.7.2. Extensions of Time. The Contract Period will be adjusted only for causes specified in the Contract Documents. In the event that the Contractor requests an extension of any Contract Period, he shall furnish such justification and supporting evidence as the Owner or Architect may deem necessary, and as provided for in the General Conditions for a determination as to whether the Contractor is entitled to an extension of time under the provisions of this Contract. The Owner will, after receipt of such justification and supporting evidence, make a determination in the manner specified in the General Conditions and will advise the Contractor in writing thereof. If the Owner finds that the Contractor is entitled to an extension of the Contract Period under the provisions of the Contract Documents, then the Owner's determination as to the total number of days of extension shall be based upon the current accepted and updated Construction Schedule and on all data relevant to the extension. Such data shall be included in an update of the Construction Schedule. The Contractor acknowledges and agrees that actual delays in activities which, according to the Construction Schedule do not affect any contract completion date shown by the critical path in the network, do not have any effect on the Contract completion dates, and therefore, will not entitle the Contractor to an extension of time or to any change in the Contract Period.

All information known to the Contractor at the time concerning the nature and extent of the delay shall be submitted in writing in accordance with the General Conditions. Within the time frame stated in the General Conditions but before the date of final payment under this Contract, all information as required above concerning the delay must be submitted to the Architect and to the Owner. No time extension will be granted for requests which are not submitted with the specified time limits.

1.7.3. Schedule Adjustment by Owner. From time to time it may be necessary for the Contract Schedule and completion time to be adjusted by the Owner to reflect the effects of job conditions, acts or omissions of other contractors not directly associated with the Contract, weather, technical difficulties, strikes, unavoidable delays on the part of the Owner or his representatives, and other unforeseeable conditions which may require schedule adjustments and/or extensions of the Contract Period. Under such conditions the Contractor shall reschedule the Work to reflect the changed conditions, and the Contractor shall revise his schedule accordingly. Time extensions affecting the Contract Period shall be

granted by the Owner in writing. No additional compensation shall be made to the Contractor for such schedule changes. The Owner has the right to accelerate performance of the Work. The Contractor will be entitled additional compensation in the event that the Owner requires completion of the Project prior to the expiration of the Contract Period; provided that such acceleration is not required as a result of the fault or neglect of the Contractor.

- 1.7.4. Schedule Meetings. The Contractor shall participate in such periodic scheduling meetings, and shall furnish such periodic schedule updates, as may be required by the Owner in order to meet the needs of the Project, as such are determined by the Owner.

1.8 FLOAT.

- 1.8.1. Definition of Float. As employed in the Contract Documents, the terms “float” and “float time” shall be used interchangeably to mean the period of time between the early start date and the late start date, or the early finish date and the late finish date of any activities set forth on the Construction Schedule.
- 1.8.2. Ownership of Float. The Owner shall have and retain exclusive ownership of the float.
- 1.8.3. Float Time. The Contractor shall not be entitled to any adjustment to the Contract Period, the Construction Schedule, or the Contract Sum, or to any additional payment of any sort by reason of the loss of use of any float time. The Owner may initiate changes to the Work that absorb float time without obligation to adjust or extend the overall completion date or any intermediate completion dates set forth in the CPM network. Owner-initiated changes that affect the critical path on the CPM network shall be the sole grounds for extending (or shortening) the Contract Period. Contractor-initiated changes that encroach on the float time identified in the CPM network may be accomplished with the Owner’s prior approval. Such changes, however, shall give way to Owner-initiated changes competing for the same float time. Delays in the critical path that are not associated with proper requests for time extensions in accordance with Part 11 of the General Conditions shall be deemed to be the responsibility of the Contractor.

END OF SECTION

SECTION 01340

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General Conditions and other Division 1 through Division 16 Specifications apply to this Section, with special attention to the following:
 - 1. Construction Progress Schedules: Section 01310.
 - 2. Respective Sections of the Specifications requiring submittals: Consult Division 15 and 16 for any additional requirements.
 - 3. The Fairfax County Special Inspections Manual/"Special Inspections: Implementation in Fairfax County" (Edition in force at time of project permit). Review and approval of fabrication and erection submittals as required by the Special Inspections Program.
 - 4. Fairfax County Public Schools Agreement between Owner and Architect, Paragraph 1(D).5.j: The Architect shall make available to the Contractor compact disks containing the floor plan backgrounds, reflected ceiling plans and building sections. These electronic files shall be used for preparing submittals which require equipment locations and systems layouts.

1.02 DESCRIPTION OF WORK

- A. Submit shop drawings, product data and samples required by Contract Documents.

1.03 SHOP SUBMITTALS

- A. Identify details by reference to sheet and detail numbers shown on Contract Drawings.
- B. Sheet size minimum: 8 1/2" x 11"; maximum: 30" x 42". All sheets in one submittal shall be of uniform size.
- C. Drawings: Submit a minimum of four (4) sets of prints; one (1) set of prints shall be returned to the Contractor for reproduction and distribution. Electronic PDF submissions are acceptable for review. Two (2) paper sets of approved prints shall be retained by the Owner. For submittals requiring special inspection review, provide additional sets as required by the special inspection manual.
- D. For submittals other than drawings, such as written specifications, maintenance instructions, calculations and catalog data which are capable of xerographic

duplicating, provide a minimum of five (5) copies. One (1) copy shall be returned to the Contractor for duplication and distribution. Two (2) copies shall be retained by the Owner.

1.04 PRODUCT DATA:

- A. Manufacturer's standard schematic drawings.
 - 1. Delete information not applicable to project.
 - 2. Provide additional information applicable to project.
- B. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data:
 - 1. Mark each copy to identify pertinent materials, products or models.
 - 2. Indicate dimensions and clearances required.
 - 3. Indicate performance characteristics and capacities.
 - 4. Indicate wiring diagrams and controls.

1.05 SAMPLES

- A. Office samples shall be of sufficient size and quantity to clearly illustrate:
 - 1. Functional characteristics of product or material with integrally related parts and attachments devices.
 - 2. Full range of color samples.
- B. Field samples and mock-ups.
 - 1. Erect at project site at location acceptable to Architect.
 - 2. Construct each sample or mock-up complete.
- C. Provide a minimum of three (3) samples unless specified otherwise. Two (2) samples shall be retained by the Owner.

1.06 SUBMITTALS REQUIRING JURISDICTIONAL APPROVAL

- A. Certain categories of submittals are required to be reviewed and approved by appropriate jurisdictional authority prior to incorporating into the Work. Make such submittals first to the Architect for review, then submit to the approving authority.

- B. Structural Submittals; to each drawing affix the seal and signature of a Professional Engineer licensed in the State of Virginia, including, without limitation:
 - 1. Foundation piles and caissons, reinforced concrete framing systems, structural steel components and framing, steel roof trusses and girders, open-web steel joists, steel deck systems, steel stair railing and guardrail systems, steel ladders, cold-formed metal framing.

1.07 SUBMITTALS FOR CHPS APPROVAL

- 1. Provide documentation from the manufacturer that the products meet or exceed the requirements of CHPS.

1.08 CONTRACTOR RESPONSIBILITIES

- A. Review shop drawings, product data and samples prior to submission for conformance to contract requirements. Return non-conforming submittals to originator.
 - 1. Contractor shall stamp each submittal with a stamp bearing the following information:

Approved for Construction
 Approved as Noted
 Submittal Deviates from Contract Requirements

Contractor
 Date: _____
 Review by: _____
 Return by: _____
 Spec. Section: _____
 Submittal No.: _____

Indicate action taken of each submittal by checking appropriate box. If information on stamp is incomplete, submittal will be returned with no action taken.

- B. Verify:
 - 1. Floor Plan layouts provided by Architect on electronic media.
 - 2. Field measurements
 - 3. Field construction criteria
 - 4. Catalog numbers and similar data.

- C. Coordinate each submittal with requirements of work and of Contract Documents.
- D. Contractor's responsibility for errors and omissions in submittals is not relieved by Architect's review of submittals.
- E. Contractor's responsibility for deviations in submittals from requirements of Contract Documents is not relieved by Architect's review of submittals, unless Architect gives written acceptance of specific deviations.
- F. At time of submission, note deviations in submittals from requirements of Contract Documents.
- G. Begin no work which requires submittals unless such submittals have been returned with Architect's stamp and initials or signatures indicating review.
- H. Distribute copies of submittals to parties concerned.

1.09 SUBMISSION REQUIREMENTS

- A. Schedule submissions for receipt by the architect from the date of Notice to Proceed (NTP) as follows:
 - 1. Finish materials and packaged or prefabricated equipment: Maximum of 45 calendar days from NTP.
 - 2. Designed systems (such as, but not limited to, casework, control systems, fire protection special systems window and curtain wall systems): Maximum of 90 calendar days from NTP.
 - 3. Liquidated damages: Liquidated damages shall be assessed for each consecutive calendar day beyond the maximum time periods indicated above. Refer to Section 01010, summary of work.
- B. Shop Drawings: Submit the required number of prints of each Drawing, including fabrication, erection, layout, and setting drawings until final acceptance is obtained.
- C. Product Data: Submit copies of manufacturer's descriptive data for materials, equipment and fixtures, including catalog sheets, showing dimensions, performance characteristics and capacities; wiring diagrams and controls; schedules; and other pertinent information as required. Indicate compliance with applicable referenced quality standards.
- D. Samples: Submit samples specified in product specification sections.
 - 1. Provide full range for color, texture or pattern selection.

2. Samples shall be marked, tagged, or otherwise identified with name of Contractor, name of project, purpose for which samples are submitted, and date, and be accompanied by letter of transmittal containing similar information, together with specification paragraph number for identification of each item.
- E. Submittals shall include:
1. Date and revision dates.
 2. Project title and number _____.
 3. The names of:
 - a. Architect
 - b. Contractor
 - c. Subcontractor
 - d. Supplier
 - e. Manufacturer
 - f. Separate detailer when pertinent.
 4. Identification of product or material.
 5. Relation to adjacent materials.
 6. Field dimensions, clearly identified as such.
 7. Specification section number.
 8. Applicable standards, such as ASTM number or Federal Specification.
 9. Space for Architect's stamp. (3" x 5" min.)
 10. Identification of deviations from Contract Documents.

1.10 RESUBMISSION REQUIREMENTS

- A. Shop Drawings
1. Revise drawings in accordance with review comments and resubmit as specified for initial submittal.
 2. Indicate changes that have been made. Indicate resubmittal status by adding "R" after the original submittal number.
- B. Project Data and Samples: Submit new data and samples as specified for initial submittal.

1.11 ARCHITECT'S DUTIES

- A. Review for:
 - 1. Design concept of project.
 - 2. Information given in Contract Documents.
 - 3. Review consultants' shop drawings for coordination with Contract Documents.
- B. Review of separate item does not constitute review of an assembly in which item functions.
- C. Affix stamp and initials or signature certifying to review of submittal.
- D. Return submittals to Contractor for reproduction and distribution.

END OF SECTION

SECTION 01370
SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section, with special attention to the following:
 - 1. Allowances: Section 01020
 - 2. Application for Payment: Section 01152

1.02 DESCRIPTION OF WORK

- A. Submit to the Architect a Schedule of Values allocated to the various portions for the Work within ten days after award of Contract.
- B. Upon request of the Architect, support the values with data substantiating their correctness.
- C. The Schedule of Values, unless objected to by the Architect, shall be used only as the basis for the Contractor's Applications for Payment.

1.03 FORM AND CONTENT OF SCHEDULE OF VALUES

- A. The form for the Schedule of Values shall be the Fairfax County School Board's "Schedule of Amounts for Contract Payments" and will be obtained from the School Board's Office of Design and Construction. The form shall be completed in detail including quantities and unit costs.
- B. Identify Schedule with:
 - 1. Complete title of Project and location.
 - 2. Name of Architect and Architect's Commission Number.
 - 3. Name and address of Contractor.
 - 4. Date of Submission.
- C. Organize the Content of Schedule into columns with headings as follows:
 - 1. Item No. (Column No. 1).
 - 2. Description of Item (Column No. 2).

3. Quantity (Column No. 3).
 4. Unit of Measure (Column No. 4).
 5. Cost per unit (Column No. 5).
 6. Total cost of Item (Column No. 6).
- D. Column numbers above are identical to Requisition for Payment column numbers.
- E. Information in Schedule of Values shall be incorporated into proper and identical lines and columns of all Requisitions for Payment, and shall serve as a basis for computing Progress Payments during construction.
- F. All line items shall be separated into all sub-values of major products and all information for all sub-values shall be as outlined above.
- G. Each item shall include a directly proportional amount of the Contractor's overhead and profit.
- H. The sum of all values listed in the Schedule shall equal the total Contract Sum.
- 1.04 SUBMITTALS
- A. Submit six (6) copies for review by the Architect and Owner immediately after the Notice to Proceed. The Architect and Owner shall review and approve, or require modifications of the submittal. If modifications are required, make corrections and resubmit.

END OF SECTION

SECTION 01400
QUALITY CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section.

1.02 RELATED WORK

- A. Additional Requirements of all parties to the Contract: General Conditions, Section 00700.
- B. Summary of Work: Section 01010.
- C. Supervision and Coordination: Section 01040.
- D. Construction Progress Schedules: Section 01310.
- E. Shop Drawings, Product Data and Samples: Section 01340.
- F. Testing Laboratory Services: Section 01410.
- G. Materials and Equipment: Section 01600.

1.03 REFERENCE STANDARD

- A. ASTM E329-77 (1983) Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as used in construction.

1.04 QUALITY CONTROL

- A. The Owner, with the cooperation of the Contractor, shall maintain an adequate inspection system and perform such inspections and tests as will assure that the work performed under the Contract conforms to the Contract Documents and shall maintain and make available to the Architect adequate records of such inspections and tests.

1.05 DEFINITIONS

- A. Factory Tests: Tests made on various products and component parts prior to shipment to the job site, including but not limited to such items as transformer, boilers, air conditioning equipment, electrical equipment, and precast concrete.

- B. Field Tests: Tests or analysis made at, or in the vicinity of the job site in connection with the actual construction.
- C. Product: A type or category of manufactured goods, constructions and installations, or their associated services.
- D. Testing Laboratory: An individual or firm whose function includes testing, analyzing or inspecting "products."
- E. Certified Test Reports: Reports are reports of tests signed by a qualified professional attesting that tests were performed in accordance with the test method specified, that the test results reported are accurate, and that items tested either meet or fail to meet the stated minimum requirements. These test reports include those performed by Factory Mutual, Underwriters Laboratories, Inc., and others.
- F. Certified Inspection Reports: Those signed by approved inspectors attesting at the items inspected meet the specification requirements other than any exception included in the report.
- G. Manufacturer's Certificate of Conformance or Compliance: A certificate signed by an authorized manufacturer's official attesting that the material or equipment delivered meets the specifications requirements.

1.06 SUBMITTALS

- A. Submittals shall be prepared in accordance with the General Requirements and submitted to the Owner for approval. Each submittal shall be accompanied with a cover letter signed by the Lab. Each item proposed to be incorporated into the Contract shall be clearly marked and identified in the submittals, and shall be cross-referenced to the Contract Drawings and Specifications so as to identify clearly the use for which it is intended.
- B. Submit the number required by the Contractor plus four (4) copies for the Architect.
- C. Certified Test Reports: Before delivery of materials and equipment, certified copies of the reports of all tests listed in the technical sections shall be submitted and approved. The testing shall have been performed in a laboratory meeting the requirements specified herein. Unless otherwise specified the tests shall have been performed within three years of submittal of the reports for approval. Test reports shall be accompanied by the certificate from the manufacturer certifying that the material and equipment proposed to be supplied is of the same type, quality, manufacturer, and make as that tested.
- D. Manufacturer's Certificates of Conformance or Compliance: Manufacturer's certification furnished by the Contractor on items of materials and equipment incorporated into the work will be accepted only when this method will assure full

compliance with the provisions of the Contract, as determined by the Architect. Pre-printed certifications will not be acceptable. All certifications shall be in the original. The original of all manufacturer's certifications shall name the appropriate item of equipment or material, specification, standard, or other document specified as controlling the quality of that item and shall have attached thereto certified copies of test data upon which the certifications are based. All certificates shall be signed by the manufacturer's official authorized to sign certificates of conformance or compliance.

- E. Laboratory Reports: Reports shall cite the contract requirements, the test or analysis procedures used, the actual test results, and include a statement that the item tested or analyzed conforms or fails to conform to the specification requirements. All test reports shall be signed by a representative of the testing laboratory authorized to sign certified test reports.

1.07 QUALITY CONTROL REQUIREMENTS

- A. The Testing Laboratory shall inspect and test all work under the contract and maintain records of the inspections and tests. Approvals, except those required for field installations, field applications, and field tests, shall be obtained before delivery of materials and equipment to the project site.
- B. Factory Tests: Unless otherwise specified, the Contractor will arrange for factory tests when they are required under the Contract.
- C. Factory Inspection: Unless otherwise specified, the Contractor will arrange for factory inspection when required under the Contract.
- D. Field Inspections and Tests by the Owner: The Owner will provide and pay for all equipment, instruments, qualified personnel, and facilities necessary to inspect all work and perform all tests required by the Contract.
- E. Approval of Testing Laboratories: All laboratory work under this Contract shall be performed by a laboratory approved by the Owner. The basis of approval includes the following:
 - 1. Testing laboratories performing work not in connection with concrete, steel or bituminous materials shall comply with Sections 3 and 4 of ASTM E329.
- F. Repeated Tests and Inspections: The Owner will repeat tests and inspections after each correction made to non-conforming materials and workmanship until tests and inspections indicate that the materials, equipment, and workmanship conform to the Contract requirements. The retesting and reinspection shall be performed by the testing lab. The Contractor shall pay for any retesting and reinspection.

END OF SECTION

SECTION 01410

TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section.

1.02 RELATED WORK

- A. Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities: Conditions of the Contract
- B. Certification of Products: The respective sections of Specifications.
- C. Testing, adjusting and balancing of equipment: The respective sections of Specifications.
- D. Laboratory tests required and standards for testing: Each Specification Section listed.

1.03 DESCRIPTION OF WORK

- A. Owner will employ and pay for the services of an Independent Testing Laboratory to perform specified services and testing.
- B. Employment of the laboratory shall in no way relieve the Contractor's obligations to perform the Work of the Contract.

1.04 SUBMITTALS

- A. Submit a copy of report of inspection of facilities made by Materials Reference Laboratory of National Institute of Standards and Technology (NIST) during the most recent tour of inspection, with memorandum of remedies of any deficiencies reported by the inspection.

1.05 QUALIFICATION OF LABORATORY

- A. Authorized to operate in the Commonwealth of Virginia.

1.06 TESTING EQUIPMENT

- A. Calibrated at reasonable intervals by devices of accuracy traceable to either:
 - 1. National Institute of Standards and Technology (NIST).
 - 2. Accepted values of natural physical constants.

1.07 LABORATORY DUTIES

- A. Cooperate with Architect and Contractor; provide qualified personnel after due notice.
- B. Perform specified inspections, sampling and testing of materials and methods of construction.
- C. Comply with specified standards.
- D. Ascertain compliance of materials with requirements of Contract Documents.
- E. Promptly notify Architect/Owner and Contractor of observed irregularities or deficiencies of work products.
- F. Promptly submit written report of each test and inspection; one copy each to Architect, Owner, Contractor and one copy to Record Documents File. Each report shall include:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Testing laboratory name, address and telephone number.
 - 4. Name and signature of laboratory inspector.
 - 5. Date and time of sampling or inspection.
 - 6. Record of temperature and weather conditions.
 - 7. Date of test.
 - 8. Identification of product and specification section.
 - 9. Location of sample or test in the Project.
 - 10. Type of inspection or test.
 - 11. Results of tests and compliance with Contract Documents.
 - 12. Interpretation of test results, when requested by Architect/Engineer.
 - 13. Employment of personnel making test samples.
 - 14. Perform additional tests as required by Architect/Engineer or the Owner.

1.08 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

- A. Laboratory is not authorized to:
 - 1. Release, revoke, alter or expand requirements of the Contract Documents.
 - 2. Approve or accept any portion of the Work.
 - 3. Perform any duties of the Contractor.

1.09 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with laboratory personnel, provide access to Work, to Manufacturer's operations.
- B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.
- C. Furnish copies of Products test reports as required.
- D. Furnish incidental labor and facilities.
- E. To provide access to Work to be tested.
- F. To obtain and handle samples at the Project site or at the source of the product to be tested.
- G. To facilitate inspections and tests.
- H. For storage and curing of test samples, provide a suitable storage box at the site.
- I. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.
- J. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to Contractor's negligence.
- K. Make arrangements with laboratory and pay for additional samples and tests required for Contractor's convenience, including concrete design mixes.
- L. Pay for the services of the Independent Testing Laboratory to perform additional inspections, sampling and testing required when initial tests indicate that work does not comply with Contract Documents.

END OF SECTION

SECTION 01505

CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General Conditions and Division One Specification Sections, apply to the Work of this Section with special attention to the following:
 - 1. Section 01010, Summary of Work
 - 2. Section 01200, Project Meetings
 - 3. Section 01400, Quality Control
 - 4. Section 01560, Temporary Controls
 - 5. Section 01700, Contract Close Out

1.02 RELATED WORK

- A. Section 02070, Selective Demolition – Recycling of Materials Resulting from selective demolition in Existing Building.

1.03 REFERENCES

- A. Environmental Protection Agency, “Waste Wise” Program (www.epa.gov/wastewise/)
- B. Institute of Scrap Recycling Industries, Inc., Washington, D.C. (www.isri.org)
- C. Triangle J Council of Governments, Research Triangle Park, NC, “Waste Spec” (www.tjcog.dst.nc.us)
 - 1. Appendix A: Preparing Estimates on Recycling
 - 2. Appendix D: Sample Waste Management Plan

1.04 SUMMARY OF WORK

- A. The Contractor shall minimize the amount of non-hazardous construction waste disposal into landfills, and shall salvage as much non-hazardous construction waste as possible for shipment to recycling collection centers.
 - 1. Revenues or cost savings resulting from recovery of recycled construction waste materials shall accrue to the Contractor.
- B. Provide labor for material handling, provide storage enclosures and containers, signage, transportation and other resources required in order to implement the construction waste management operations described in this section. The Contractor shall maintain a clearly designated on-site collection area for the

temporary stock piling of construction waste designated to be recycled, separated from other non-recyclable materials that shall be disposed of legally.

1. Provide clearly identified enclosures, bins or labeled containers for each type of recyclable waste material to be temporarily stockpiled in the collection area. Include signage listing acceptable or unacceptable materials for each enclosure, bin or container.
2. Locate collection area convenient to work areas, but not in a location that will impede free flow of construction traffic, inhibit performance of construction activities or adversely affect school daily operations. Locate collection area to minimize interference with roads, streets, walkways, and other facilities adjacent to the project site.
3. Provide adequate vehicle access and working clearance for pick up of waste materials for delivery to recycling processing centers.

1.05 QUALITY ASSURANCE

- A. The Contractor shall designate a full time, on-site representative to oversee compliance of subcontractors, and other personnel associated with the project, with the construction waste requirements of this Section.
- B. Within 30 days of the date of the Notice to Proceed, review construction waste management procedures with Owner's Representative. Include the following:
 1. A proposed list of construction waste materials to be recycled to meet a diversion percentage goal of a minimum of 50% of construction and demolition materials to be recycled.
 2. A proposed on site location for waste material collection area.
 3. A list of local or regional recycling processing centers and the type of materials that each center will accept. The list shall include name, address and telephone number of each center.
 4. A description of methods that shall be used for separating and storing construction waste materials, including types of containers and container labeling.

PART 2 - PRODUCTS

2.01 RECYCLABLE MATERIALS

- A. Construction waste materials designated for recycling include, but are not limited to, the following:
 1. General waste:

- a. Paper and beverage containers used by on-site construction staff and workers
2. Uncontaminated packaging and shipping materials:
 - a. Corrugated cardboard
 - b. Metal banding/strapping
 - c. Wood pallets
 - d. Packing shims
 - e. Paper wrappings
 - f. Wood crates
 - g. Polystyrene packing material
3. Construction metals:
 - a. Light gauge framing members (cutoffs)
 - b. Metal floor and roof decking (deck cutouts, etc.)
 - c. Plumbing/Mechanical piping
 - 1) Schedule 40 black steel
 - 2) Copper
 - 3) Ductile iron
 - 4) Cast iron
 - d. Electrical conduit
 - e. Concrete reinforcing steel
 - f. Sheet metal (ductwork, metal flashings)
 - g. Suspension wire
 - h. Miscellaneous structural framing steel (angles, channels, etc.)
4. Clean unfinished wood:
 - a. Dimensional lumber
 - b. Wood trim
 - c. Wood athletic and stage flooring
 - d. Wood sheet materials such as plywood
5. Clean, unfinished gypsum board
6. Other construction waste materials identified by Contractor that are capable of being recycled

PART 3 - EXECUTION

3.01 IMPLEMENTATION AND PERFORMANCE

- A. The Contractor shall conduct a preconstruction meeting to familiarize subcontractors, fabricators, suppliers, and other personnel associated with the project, with the approved job site waste management procedures and

requirements for recyclable materials. The contractor shall provide each meeting participant with a written copy of the procedures. Include discussion of the following:

1. Waste management procedures for each individual trade.
 2. Procedures for separation, handling and stockpiling of construction waste materials.
 3. Procedures for periodic waste collection and transport to recycling processing centers.
- B. The Contractor shall provide updates of ongoing waste management practices as a recurring agenda item during regular job progress meetings. Discussion shall include the following:
1. Types of construction waste materials currently being stockpiled on site.
 2. Verification that correct procedures for separation, handling, stockpiling and transporting are being followed.
 3. Verification that periodic and frequent collection and transport of materials to recycling collection centers is being maintained.

3.02 COLLECTION AREA

- A. On site collection area shall be established on site plan prior to bidding. Alternate sites may be established until the location has been approved by the Owner's Representative.

3.03 CONSTRUCTION WASTE MATERIAL HANDLING

- A. Place, grade and shape material stockpiles to shed surface water. Cover stockpiles where needed to avoid wind blown debris and dust. For stockpiled materials subject to deterioration from weather exposure, store above ground and provide cover.
- B. Waste management documentation:
- a. Compile weight tickets for all wastes removed from the site including recycled and salvaged materials to document diversion percentages achieved.
 - b. Recycling summary: Recycle and waste data will be collected into a summary document for construction documentation.

- C. Periodically inspect enclosures, bins and containers for contamination and misplaced waste materials. Clean enclosures, bins and containers, and remove contaminated or inappropriate materials.
- D. Control the amount of temporarily stockpiled, recyclable waste materials by arranging frequent, periodic removal of materials to off-site collection centers, in order to avoid over-accumulation in the collection area. Remove and transport materials in a manner that will prevent spillage.
- E. Organize and store recycled waste materials in tight, dense bundles. Comply with special requirements of collection centers.
- F. Wood materials: Sort and stock dimensional materials according to size, type and length.
 - 1. Where possible, arrange for return of wood pallets to material or equipment suppliers and manufacturers. Otherwise, break down pallets into component pieces and sort by size and length.
 - 2. Crates: Break down into component pieces and sort by size and length.
- G. Structural Steel: Sort and stack structural steel members according to size, type of member, and length.
- H. Gypsum Board: Stack large, uncontaminated pieces on wood pallets and store under cover.
- I. Piping and conduit: Reduce tubular items to straight lengths and stockpile by type and size.
- J. Sheet metal and metal strapping: Flatten and fold to fit into containers.
- K. Cardboard packaging and boxes: Break down into flat sheets. Bundle and store above ground and under cover.
- L. Polystyrene packing material: Separate and bag.

3.04 FINAL CLEAN UP

- A. At project closeout, ensure that all recyclable construction waste materials have been removed and delivered to collection centers. Remove all enclosures and containers from the Project Site.
- B. Re-grade and re-establish all areas disturbed by recycling activities in accordance with the requirements of Division 2, Site Work, and the County approved Civil Drawings.

END OF SECTION

SECTION 01510
TEMPORARY UTILITIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section, with special attention to the following:
 - 1. Summary of Work: Section 01010.
 - 2. Field Offices and Sheds: Section 01590.

1.02 DESCRIPTION OF WORK

- A. Furnish, install and maintain temporary utilities required for construction. Remove temporary utilities upon completion of work.

1.03 REQUIREMENTS OF REGULATORY AGENCIES

- A. Comply with National Electric Code.
- B. Comply with Federal, State and Local Codes and Regulations and with utility company requirements.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials may be new or used, but shall be adequate in capacity for the required usage, shall not create unsafe conditions, and shall not violate requirements of applicable codes and standards.

2.02 TEMPORARY ELECTRICITY AND LIGHTING

- A. Make connections to existing service facilities in compliance with governing code, laws, and regulations.
- B. Owner will be responsible for paying power charges.
- C. Install circuit and branch wiring, with area distribution boxes located so that power and lighting is available throughout the construction by the use of construction type power cords.

- D. Provide adequate artificial lighting for all areas of work when natural light is not adequate for work, and for areas accessible to the public.
- E. Provide adequate power and artificial light to field offices for Contractor and owner's Representative.

2.03 TEMPORARY HEAT AND VENTILATION

- A. Provide temporary heat and ventilation as needed to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation of materials and to protect materials and finishes from damage due to temperature or humidity.
- B. Provide adequate forced ventilation of enclosed areas where curing of installed materials occurs, in order to disperse humidity and noxious odors and to prevent hazardous accumulations of dust, fumes, vapors or gases.
- C. Portable heaters shall be standard UL approved units complete with controls.
- D. Provide adequate heat and cooling to field offices of Contractor and Owner's Representative.
- E. Pay all costs of installation, maintenance, operation and removal and for fuel consumed.
- F. No extension of time shall be allowed due to Contractor's failure to provide temporary heat.

2.04 TEMPORARY TELEPHONE SERVICE

- A. Arrange with local telephone service company, provide direct line telephone service at the construction site for the use of personnel and employees. Service required shall be as follows:
 - 1. One direct line instrument in Field Office, and one dedicated line for fax machine.
 - 2. One direct line instrument for the Owner's Representative, and one dedicated line for fax machine.
 - 3. Other instruments at the option of the Contractor, or as required by regulations.
 - 4. Pay all costs for installation, maintenance and removal, and service charges for local calls. Toll charges shall be paid by the party who placed the call.

2.05 TEMPORARY WATER

- A. Make connections to existing facilities, provide water for construction purposes.
- B. Owner will pay costs of water used.

2.06 TEMPORARY SANITARY FACILITIES

- A. Provide sanitary facilities in compliance with laws and regulations. See section 01010, Contractor Use of Premises.
- B. Service, clean and maintain facilities and enclosures.
- C. Provide one separate sanitary facility for the sole use of the Owners Representative, throughout the construction period.
- D. Use of school facilities by contractor's personnel is prohibited.

PART 3 - EXECUTION

3.01 GENERAL

- A. Comply with applicable requirements in Division 15 - Mechanical, and in Division 16 - Electrical.
- B. Maintain and operate systems to assure continuous service.
- C. Modify and extend systems as work progress requires.

3.02 REMOVAL

- A. Completely remove temporary materials and equipment when their use is no longer required.
- B. Clean and repair damage caused by temporary installations or use of temporary facilities.
- C. Restore existing facilities used for temporary service to specified or original condition, fully operational.

END OF SECTION

SECTION 01520
CONSTRUCTION AIDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section, with special attention to the following:
 - 1. Section 01010 "Summary of Work" (Safety precautions)
 - 2. Section 01530 "Barriers".

1.02 DESCRIPTION OF WORK

- A. Furnish, install and maintain required construction aids; remove upon completion of work.

1.03 REQUIREMENTS OF REGULATORY AGENCIES

- A. Comply with Federal, State and local codes and regulations.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials may be new or used, suitable for the intended purpose, but shall not violate requirements of applicable codes and standards.

2.02 CONSTRUCTION AIDS

- A. Provide construction aids and equipment as required by personnel and to facilitate the execution of the work; including scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes and other such facilities and equipment.
- B. Refer to respective sections for particular requirements for each trade.
- C. Maintain all facilities and equipment in a first-class condition.

2.03 TEMPORARY ENCLOSURES

- A. Provide temporary enclosures to separate work areas from the areas of existing building occupied by Owner; to prevent penetration of dust, fumes, or moisture into occupied areas, to prevent damage to existing equipment, to protect Owner's occupants and operations from construction work, and to prevent entry of

unauthorized persons. Doors in the construction barrier between the additions / renovated areas shall be self-closing.

- B. Provide temporary exterior and interior doors and frames with self-closing hardware and padlocks. Springs utilized as closers shall not be permitted. Doors shall be solid core wood or hollow metal, and weather stripped. Provide temporary walk-off mats at each passable entrance between occupied and construction areas in order to minimize dust migration. Mats shall be carpet with non-skid backing. Mats shall be rotated and professionally cleaned on a regular basis, in a manner sufficient to maintain visual cleanliness and mitigate airborne dust in occupied spaces. Mats should be dissimilar to the school's own floor mats, in order to minimize confusion for custodial staff.
- C. Where work is phased, enclosures shall be removable as necessary for work being done in each phase. Other enclosures shall be removable as necessary for performance of work and handling of material.
- D. Enclosures shall be 3 5/8", 20 gauge minimum metal stud frames with 5/8" gypsum wallboard to meet two-hour rated construction. Frames shall extend from floor to underside of metal deck and shall completely seal off all necessary areas. On exterior enclosures, substitute 1/2" CDX plywood. Tape or otherwise seal panel joints in gypsum board and plywood. Where exterior enclosures form temporary means of egress, provide 1/2" gypsum sheathing. Insulate exterior enclosures with batt type insulation complying with the requirement of Section 07210, 2.01A.
 - 1. For temporary enclosures or exitways adjacent to work that is occurring overhead, provide structural roof construction that is adequate to protect building occupants using the enclosures or exitways.
 - 2. Secure sole plates of temporary enclosures to existing floors with construction adhesive.
- E. Exterior enclosures: Provide 6 feet high temporary chain link construction fencing to enclose construction work areas, material storage areas, and access ways. Fences shall be added or modified to enclose active work and storage areas as the project progresses. All chain link mesh panels shall be secured with clamps, wire ties shall not be permitted. Mesh shall be knuckled at the top and bottom, securely fastened to panel frames and shall be monitored for protruding wires. Barbed wire shall not be permitted.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Consult with Architect, review site conditions and factors which affect construction procedures and construction aids, including adjacent properties and public facilities which may be affected by the execution of the Work.

3.02 GENERAL

- A. Relocate construction aids as required by progress of construction, by storage or work requirements, and to accommodate legitimate requirements of Owner and other contractors employed at the site.

3.03 REMOVAL

- A. Completely remove temporary materials, equipment and services:
 - 1. When construction needs can be met by use of permanent construction.
 - 2. At completion of the Project.
- B. Clean, and repair damage caused by installation or by use of temporary facilities.
- C. Grade areas of the site affected by temporary installations to required elevations and slopes, and clean the area.
- D. Restore existing and permanent facilities used for temporary purposes to specified or to original condition.

END OF SECTION

SECTION 01530

BARRIERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section with special attention to the following:
 - 1. Summary of Work: Section 01010.
 - 2. Construction Aids, Enclosures: Section 01520.

1.02 DESCRIPTION OF WORK

- A. Furnish, install and maintain suitable barriers to prevent public entry, and to protect the Work, existing facilities, trees and plants from construction operations; remove when no longer needed or at completion of Work.
- B. Maintenance of Means of Egress
 - 1. The Contractor shall keep open and maintain all existing and temporary fire exits in the existing school during the course of construction.
 - 2. Provide alternate fire exits if necessary including barriers and signs as may be required by local fire official.
 - 3. Contractor shall coordinate and arrange with local fire officials to implement a plan for temporary exiting of existing school building should alternate fire exits be required.

1.03 REQUIREMENTS OF REGULATORY AGENCIES

- A. Comply with Federal, State, and local codes and regulations.

PART 2 - PRODUCTS

2.01 BARRIERS

- A. Materials shall be determined at Contractor's option, of type, size and quantity as appropriate to serve the required purpose.

PART 3 - EXECUTION**3.01 TREE AND SHRUB PROTECTION**

- A. The Contractor shall preserve and protect all existing trees and shrubs on or adjacent to the site which have not been designated for removal or relocation. The Contractor shall be responsible for all unauthorized cutting or damaging of trees and shrubs, including damage due to careless operation of equipment materials stockpiles shall not be permitted within branch spread. All trees susceptible to possible damage by equipment shall be boxed with boards and wire to protect the trunk. Barricades shall be erected to prevent operation of heavy equipment within the drip lines of trees to remain.
- B. Interfering branches shall be removed without injury to the trunks. Care shall be taken by the Contractor in felling trees authorized for removal to avoid any unnecessary damage to trees and shrubs that are to remain in place. Any branches of trees broken during such operations shall be trimmed in accordance with recommended practice. The Contractor shall replace or restore at his own expense all trees and shrubs not protected as required herein that may be destroyed or damaged by construction operations.

3.02 REMOVAL

- A. Completely remove barricades, including foundations, when construction has progressed to the point that they are no longer needed and when approved by the Architect.
- B. Clean and repair damage caused by installation. Fill and grade the areas of the site to required elevations and slopes and clean the area.

END OF SECTION

SECTION 01560
TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section, with special attention to the following:
 - 1. Construction Aids: Section 01520.
 - 2. Barriers: Section 01530.
 - 3. Cleaning: Section 01710.

1.02 RELATED WORK

- A. Related requirements specified in Division 2: Site Work.

1.03 DESCRIPTION OF WORK

- A. Contractor shall provide and pay for all controls required by Fairfax County Regulations for noise, dust, water, pest and rodent, debris, pollution, traffic and erosion whether indicated in the Contract Documents or not.
- B. All site controls and features shall be constructed and maintained in accordance with the latest edition of the Fairfax County Public Facilities Manual.

1.04 OTHER REGULATIONS

- A. All regulations of the Fairfax County Department of Public Works and Environmental Services.

1.05 OPEN BURNING

- A. Not Permitted

1.06 EROSION CONTROL

- A. The Contractor shall perform the work in such a manner as to prevent the washing of any soil, silt, or debris onto adjacent properties, and shall be held responsible for any damage incurred for a period of one year after date of acceptance of the completed work. This includes construction of berms, siltation pond, collars on structures, etc., or any other device that might aid as a deterrent to erosion.

- B. The Contractor shall construct a siltation trap in natural ground at the base of all perimeter fill slopes. The siltation trap shall be 2 feet deep, 2 feet wide at the bottom with 2:1 side slopes. All excavated material shall be placed on the downhill side of the construction to act as a berm. Minimum one-foot top berms shall be maintained at all times during the construction of perimeter fills.
- C. The Contractor agrees to hold the School Board or any of its agents harmless from any and all liability or damage that may arise out of a violation of the Siltation Ordinance and agrees to indemnify them against any loss.
- D. If at any time during the construction of this property silt goes offsite and if, when this occurs, the site plan and specifications for siltation and erosion control as approved by Fairfax County are not being complied with, then the Contractor shall pay to the Owner the sum of \$5,000 as liquidated damages.
- E. This provision for liquidated damages shall be a continuing one and for each and every occurrence there shall be paid to the Owner the sum of \$5,000 as liquidated damages.

1.07 INSPECTION AND APPROVAL

- A. The County School Board of Fairfax County, Virginia, shall provide an inspector to represent it in the inspections of the work. The presence of this inspector shall in no way be construed by the Contractor as approval of methods or materials that do not conform to the requirements of this Contract.

1.08 TRAFFIC CONTROL

- A. The Contractor shall maintain, at his expense, all boundary, adjacent and/or access roads, regardless of status, classification, or ownership, which he or his subcontractor uses, under permit or otherwise during the course of construction of this project. Maintenance shall be performed as needed to keep the road passable at all times, so as to guarantee that other users of the road can travel thereon with a minimum of inconvenience and interruption of normal routine.
- B. Contractor shall, at his expense, provide and maintain all traffic control devices, signals, barriers, flares, lights, flagmen, etc. required by law when his operations conflict with the movement of traffic, both vehicular and pedestrian, on dedicated streets and highways.

1.09 PERMITS AND FEES

- A. Contractor shall obtain and pay for all permits and fees required for the performance of this Work.

END OF SECTION

SECTION 01580
CONSTRUCTION SIGNS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section, with special attention to the following:
 - 1. Summary of Work: Section 01010.

1.02 DESCRIPTION

- A. Provide temporary on-site information signs.
 - 1. As required and regulated by codes, laws and regulatory agencies.
 - 2. To identify key elements of the construction facilities.
 - 3. To direct traffic.
- B. The Architect and Contractor will be allowed to install their own identification signs.
- C. Remove signs on completion of construction.
- D. Allow no other signs to be displayed.

1.03 INFORMATION SIGNS

- A. Painted signs with painted lettering or standard products.
- B. Size of signs and lettering: As required by regulatory agencies or as appropriate to the usage.
- C. Colors: As required by regulatory agencies, otherwise of uniform colors throughout the Project.
- D. Erect at appropriate locations to provide the required information.

1.04 QUALITY ASSURANCE

- A. Sign Painter: Professional Experience in the type of work required.
- B. Finishes, Painting: Adequate to resist weathering and fading for the scheduled construction period.

PART 2 - PRODUCTS

2.01 SIGN MATERIALS

- A. Structure and Framing: May be new or used, wood or metal in sound condition structurally adequate to the work and suitable for specified finish.
- B. Sign Surfaces: Exterior softwood plywood with medium density overlay, standard large sizes to minimize joints.
- C. Thickness: As required by standards to span across framing members, to provide even, smooth surface without waves or buckles.
- D. Rough Hardware: Galvanized.
- E. Paint: Exterior quality, as specified in Section 09900.
- F. Use Bulletin colors for graphics.

PART 3 - EXECUTION

3.01 INFORMATION SIGNS

- A. Paint All Exposed Surfaces: One coat of primer and one coat of exterior paint.
- B. Paint graphics in the styles, sizes, and colors as required.
- C. Install at a height for optimum visibility, on ground-mounted poles or attached to temporary structural surfaces.

3.02 MAINTENANCE

- A. Maintain signs and supports in a neat, clean, condition; repair damages to structure, framing, or sign.

3.03 REMOVAL

- A. Remove signs, framing, supports, and foundations at completion project.

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section, with special attention to the following:
 - 1. Section 01340: Shop Drawings, Product Data and Samples: Submittal of manufacturers' certificates.
 - 2. Section 01700: Contract Closeout.

1.02 WORKMANSHIP

- A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- B. Perform work by persons qualified to produce workmanship of specified quality.
- C. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.03 MANUFACTURER'S INSTRUCTIONS

- A. When work is specified to comply with manufacturers' instructions, submit copies as specified in Section 01340, distribute copies to persons involved, and maintain one set in field office.
- B. Perform work in accordance with details of instructions and specified requirements. Should a conflict exist between Specifications and instructions, consult with Architect.

1.04 DELIVERY AND HANDLING

- A. Transport Products by methods to avoid Product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry.
- B. Provide equipment and personnel to handle Products by methods to prevent soiling or damage.
- C. Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.

1.05 STORAGE AND PROTECTION

- A. Store Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive Products with weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.
- B. For exterior storage of fabricated Products, place on sloped supports above ground. Cover Products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.
- C. Store loose, granular materials on solid surfaces in a well-drained area; prevent mixing or contact with foreign matter.
- D. Arrange storage to provide access for inspection. Periodically inspect to assure that Products are undamaged, and are maintained under required conditions.
- E. After installation, provide coverings to protect Products from damage from traffic and construction operations, remove when no longer needed.

PART 2 - PRODUCTS

- 2.01 Products include materials, equipment, and systems.
- 2.02 Comply with Specifications and referenced standards as minimum requirements.
- 2.03 Components required to be supplied in quantity within a Specification section shall be the same, and interchangeable.
- 2.04 No asbestos materials are permitted to be used in the construction of this project.

PART 3 - EXECUTION

(Not used)

END OF SECTION

SECTION 01630

SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section.

1.02 CONTRACTOR'S OPTIONS

- A. For products specified only by referenced performance standards, select a product and manufacturer meeting all the required standards. After award of contract, evidence of conformance shall be submitted in accordance with Section 01340, Shop Drawings, Product Data and Samples.
- B. For products specified by naming a list of several products and manufacturers, select any product and manufacturer named on the list. Contractor may propose a directly comparable substitution to the specified items in accordance with the requirements of this section.
- C. Products specified by naming one product and manufacturer shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Contractor may propose a directly comparable substitution to the specified item in accordance with the requirements of this Section.
- D. For products specified by naming one product and manufacturer followed by the phrase "No Substitution", there shall be no option. The contractor shall not be allowed to propose a substitution to the specified item.

1.03 SUBSTITUTIONS

- A. Ten (10) days prior to receipt of bids, Architect will consider formal requests from Contractor for substitution of products; requests received less than 10 days prior to bid due date shall not be considered.
- B. Submit 4 copies of request for substitution. Include:
 - 1. Complete data substantiating compliance of proposed substitution with Contract Documents.
 - 2. For Products:
 - a. Product identification, manufacturer's name and address.

- b. Manufacturer's literature indicating product description, performance and test data, reference standards and range of manufacturers colors if item requires color selection.
 - c. Samples.
 - d. Name and address of similar projects on which product was used, dates of installation, responsible contacts, and telephone numbers.
 3. Detailed description of proposed construction methods with drawing illustrating methods.
 4. Itemized comparison of proposed substitution with product(s) or method(s) specified.
 5. Data relating to changes in construction schedule.
 6. Relation to separate contracts (if applicable).
- C. Request for substitution represents that:
 1. Contractor has personally investigated proposed product or method, and determined that it is equal or superior in all respects to that specified.
 2. Contractor will provide the same guarantee for substitution as for product or method specified.
 3. Contractor will coordinate installation of accepted substitution into work, making such changes as may be required for work to be complete.
 4. Contractor waives all claims for additional costs related to substitution that may arise subsequent to approval.
- D. Substitutions shall not be considered if:
 1. Subsequent to award of contract, such items are indicated or implied on shop drawings or project data submittals, without formal substitution request submitted as specified in this Section.
 2. Acceptance will require substantial revision of Contract Documents.
 3. Acceptance will require additional contract time and will adversely affect construction schedule.
- E. Substitutions will be considered after the deadline only under the following conditions:

1. The specified product is no longer manufactured.
2. The specified product is not available due to a strike or catastrophic occurrence.

PART 2 - PRODUCTS

2.01 NOT APPLICABLE

PART 3 - EXECUTION

3.01 NOT APPLICABLE

END OF SECTION

SECTION 01700
CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section, with special attention to the following:
 - 1. Section 01010 - Summary of Work.
 - 2. Section 01720 - Project Record Information
 - 3. Section 01730 - Operating and Maintenance Data

1.02 CLOSEOUT PROCEDURES

- A. Comply with procedures stated in General Conditions of the Contract for issuance of Certificate of Substantial Completion.
- B. Owner will occupy designated portion of Project for the purpose of installation of equipment, conduct of business, under provision stated in Certificate of Substantial Completion.
- C. When Contractor considers Work has reached final completion, submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect's inspection.
- D. In addition to submittals required by conditions of Contract, provide submittals required by governing authorities, and submit final statement of accounting giving total adjusted Contract Sum, previous payments, and sum remaining due.
- E. Owner's Representative will issue final change order reflecting approved adjustments to Contract Sum not previously made by Change Order.
- F. Ceiling Concealment Inspection.
 - 1. General: Prior to installation of ceiling panels, an inspection shall be conducted to ascertain the quality and degree of completion of all work above the finished ceiling and to record any discrepancies in the Contract Documents. The inspection shall be conducted by the Owner's Representative and the Contractor and recorded on forms provided by the Owner's Representative.
 - 2. Ceiling Suspension System: Grilles, registers, diffusers, light fixtures, and cut panels around fixtures may be installed prior to the inspection,

however, ceiling panels shall not be laid in place until after the inspection and all discrepancies have been corrected.

- G. Wall Close-in Inspection: Prior to wall close-in, an inspection shall be conducted to ascertain the quality and degree of completion of all work concealed within walls and record any discrepancies in the Contract Documents. The inspection shall be conducted by the Owner's Representative, Architect, and the Contractor and recorded by the Contractor on forms provided by the Owner's Representative.
- H. Copies of the Inspection Reports: Reports shall be prepared by the Contractor with copies to the Owner's Representative, Architect, and the Consulting Engineers. The inspection report shall be annotated as each discrepancy is corrected and any discrepancy remaining at the time of the Final Inspection shall be included on the punch list.
- I. Substantial Completion: See Section 00700, General Conditions, paragraph 12.04.
- J. Final Inspection: See Section 00700, General Conditions, paragraph 12.05.

1.03 SYSTEMS DEMONSTRATION

- A. Prior to final inspection, demonstrate operation of each system to Owner's Representative.
- B. Instruct Owner's designated operating and maintenance personnel in operation, adjustment, and maintenance of materials, products, equipment and systems, using the operation and maintenance data as the basis of instruction.

END OF SECTION

SECTION 01710

CLEANING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section, with special attention to the following:

- 1. Summary of Work: Section 01010.

1.02 RELATED WORK

- A. Each Specification Section: Cleaning for specific equipment, products, or elements of the work.

1.03 WORK DESCRIPTION

- A. Execute cleaning, during the course of the Work, and at completion of the Work, as required by General Conditions, and as described in Part 3 of this Section.
- B. Nothing in this Section or elsewhere in the Contract Documents shall be construed as relieving the Subcontractors of their individual responsibility to perform periodic clean up of their portion of the Work. Subcontractors shall cooperate with the Contractor to assist in both periodic and final clean up. The Contractor shall enforce this requirement and shall notify each subcontractor of his responsibility for any damage caused by his operations during such cleanups.
- C. If the Contractor fails to clean up, the Owner may do so and the cost thereof shall be deducted from the Contract Sum.

1.04 DISPOSAL REQUIREMENTS

- A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Use only those cleaning materials that will not create hazards to health or property and which will not damage surfaces.
- B. Use only those cleaning materials and methods recommended by manufacturer of the surface.

- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 CLEANING DURING CONSTRUCTION

- A. Execute daily cleaning to keep the Work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.
- B. Provide on-site containers for the collection of waste materials, debris and rubbish. Remove containers from the site at project completion.
- C. Remove waste materials, debris and rubbish from the site as necessary and dispose of at legal disposal areas away from the site.
- D. Where work is performed adjacent to occupied areas, contractor shall utilize HEPA vacuums to minimize and control dust levels. Use of other types of vacuums shall not be acceptable.
- E. During the course of construction the building and premises shall present a neat, orderly and workmanlike appearance.

3.02 DUST CONTROL

- A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-need basis until painting is finished.
- B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly coated surfaces.

3.03 FINAL CLEANING

- A. Employ skilled workmen for final cleaning.
- B. Besides the general broom cleaning and refuse removal, the Contractor shall do the following special cleaning for all trades before the final completion and acceptance of the work.
 - 1. Remove putty stains, soil and paint from all glass and wash and polish same.
 - 2. Clean and polish all finishing hardware.
 - 3. Remove all spots, soil and paint from all ceramic tile work, glazing and mirrors.

4. Clean all plumbing fixtures, accessories and equipment, including all mechanical equipment.
 5. Clean all tile, terrazzo, wood, and other finished floors.
 6. Clean and vacuum all carpet.
 7. Clean premises of all debris and dirt.
 8. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels and other foreign materials from sight-exposed interior and exterior surfaces.
 9. Polish glossy surfaces to a clear shine.
 10. Clean window frames, entrance frames, hollow metal work and all ornamental iron work.
- C. Ventilating Systems:
1. Clean permanent filters and replace disposable filters if units were operated during construction.
 2. Clean ducts, blower, and coils if units were operated without filters during construction.
- D. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.
- E. Prior to final completion, or Owner occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces, and all work areas, to verify that the entire Work is clean.

END OF SECTION

SECTION 01720

PROJECT RECORD INFORMATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section, with special attention to the following:
 - 1. Section 01730, Operating and Maintenance Data, for pertinent data which shall be included in the Record and Information Booklet.

1.02 DESCRIPTION OF WORK

- A. During the course of construction, and as various portions of the work are performed, the Contractor shall record and maintain an accurate accounting of changes or deviations from the Contract Documents, and any other information which elaborates upon, or supplements, the description of work contained in the Contract Documents.

1.03 SUBMITTALS

- A. Upon completion of work, Contractor shall forward one (1) complete set of all project record information (as built drawings) including the civil, architectural, structural, mechanical, plumbing and electrical portions of the work, as applicable, to the Architect. Based upon this data, the Architect shall prepare reproducible Project Record Documents.

1.04 QUALITY ASSURANCE

- A. Accuracy of Record
 - 1. Make legible entries on each pertinent sheet of drawings, specifications, or other documents as necessary, in order to properly document the entry.
- B. Accuracy shall be such that the Architect may reasonably rely upon the information for preparation of Record Documents, and that the information may be reasonably relied upon for future reference and research by the Owner.
- C. Entries shall be recorded in a timely fashion upon performance or notification of a change or deviation.

1.05 HANDLING OF RECORD INFORMATION

- A. Maintain record information in a secure manner, protected from deterioration, loss or damage until work is completed and the data is ready to be forwarded to the Architect.

PART 2 - PRODUCTS**2.01 PROJECT RECORDS**

- A. The Contractor shall designate one (1) set of Contract Documents for compiling and maintaining project record data. Each individual part of the Contract Documents shall be designated and clearly labeled as "PROJECT RECORD INFORMATION - JOB SET".

PART 3 - EXECUTION**3.01 MAINTENANCE OF JOB SET**

- A. Make entries using colored pencil. Add description notes to clarify entry, such as item description, location and reason for the change. "Cloud" or otherwise highlight entries. Use different colors where different entries overlap.
- B. All entries shall be dated.
- C. Provide record data for in-place arrangements of circuitry, conduit, piping, ductwork, and other systems that are indicated by schematic layouts or diagrams in the Contract Documents. The Owner or Architect may, at his discretion, allow the Contractor to omit record data for items where the elaboration of the layout or diagrams conveys no additional useful information.

3.02 SUBMITTAL TO THE ARCHITECT

- A. Upon completion of the work, forward the Project Record Information set to the Architect. The Architect may require the Contractor to perform corrections, provide additional information, or make other revisions necessary for completeness of data. Make all required corrections or revisions and promptly return the set to the Architect.

END OF SECTION

SECTION 01730

OPERATING AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section, with special attention to the following:
 - 1. Shop Drawings, Product Data and Samples: Section 01340.
 - 2. Testing, Adjusting and Balancing of Systems: Section 01660
 - 3. Contract Close-out: Section 01700.
 - 4. Project Record Information: Section 01720
 - 5. Warranties and Bonds: Section 01740.
 - 6. Applicable Divisions 2 through 16 Specifications

1.02 DESCRIPTION OF WORK

- A. Compile product data and related information appropriate for Owner's record, maintenance and operation of products, equipment, materials and systems furnished under the Contract.
- B. Prepare record, operating and maintenance data as specified in this Section and as referenced in other pertinent sections of Specifications.
- C. All information shall be organized into a Record and Information Booklet.

1.03 SUBMITTAL PROCEDURES

- A. Prepare three (3) complete copies of the Record and Information Booklet and deliver to the Architect. Provide one (1) additional copy each of the following (including warranties): Special Systems, Communication Systems, House and Stage Lighting Controls and Stage Lighting Systems, Automatic Temperature Controls, and Food Service Equipment.
- B. The Architect shall review the booklets for compliance to the requirements specified in this section. If found to be non-complying, the booklets shall be returned to the Contractor for corrections.

- C. The Architect shall indicate approval of the booklets by review stamp on each copy and shall forward the booklets to the Owner. The Owner shall not accept the booklets unless they have been reviewed and stamped as approved.

PART 2 - PRODUCTS

2.01 FORM OF SUBMITTALS

- A. Prepare data in the form of an instructional manual for use by Owner's personnel.
- B. Format:
 - 1. Size: 8 1/2" x 11".
 - 2. Paper: 20 pound, minimum, white, for typed pages.
 - 3. Text: Manufacturer's printed data, or neatly typewritten. All catalog, data, maintenance and cleaning instructions shall be on manufacturer's letterhead, or have other identification indicating the manufacturer as source of information.
- C. Drawings:
 - 1. Provide reinforced, punched, binder tab, bind in with text.
 - 2. Fold larger Drawings to the size of the text pages.
- D. Provide flyleaf for each separate product, or each piece of operating equipment.
 - 1. Provide typed description of product and major component parts of equipment.
 - 2. Provide indexed tabs.
- E. Cover: Identify each volume with typed or printed title "RECORD AND INFORMATION BOOKLET", and the name of the project.
- F. Identify on each volume a list of general subject matter covered in the manual.
- G. No partial submittals shall be accepted. Contractor shall not deliver Record and Information Booklets to the Architect until all the required documents have been obtained by the Contractor and organized in accordance with the requirements of this Section. Incomplete submissions shall be returned to the Contractor, and all expenses required for resubmission shall be the responsibility of the Contractor.

2.02 BINDERS

- A. Commercial quality three-ring binders with durable and cleanable plastic covers.
- B. Maximum ring size: 3 inches
- C. When multiple binders are used, correlate the data into related, consistent groupings. Mark binders in sequence.

2.03 CONTENT OF BOOKLET

- A. Neatly typewritten table of contents for each volume, arranged in a systematic order by specifications divisions.
- B. Indicate contractor, name of responsible principal, address, and telephone number.
- C. List each product material, piece of equipment, and system required to be included, indexed to the content of the volume. Include serial and/or model numbers of equipment where appropriate, in order to specifically identify such items.
- D. List with each product material, piece of equipment and system as appropriate, the name, address and telephone number of the following with the area of responsibility clearly identified for each:
 - 1. Manufacturer.
 - 2. Representative.
 - 3. Subcontractor or installer.
 - 4. Maintenance Contractor as appropriate.
- E. Indicate local source of supply for parts and replacement.
- F. Identify each product by product name and other identifying symbols as set forth in Contract Documents.
- G. Include operating, cleaning and maintenance information.
- H. Include copies of each warranty, bond, and service contract issued.
- I. Information Sheet: Provide information sheet on manufacturer's letterhead indicating the following:
 - 1. Proper procedures in the event of equipment or systems failure.
 - 2. Conditions that may affect the validity of warranties or bonds.

2.04 PRODUCT DATA

- A. Include only those sheets, which are pertinent to the specific product.
- B. Annotate each sheet to:
 - 1. Clearly identify the specific product or part installed.
 - 2. Clearly identify the data applicable to the installation.
 - 3. Delete references to inapplicable information.

2.05 DRAWINGS

- A. Supplement product data with Drawings as necessary to clearly illustrate:
 - 1. Relations of component parts of equipment and systems.
 - 2. Control and flow diagrams.
- B. Coordinate drawings with information in "as-built" drawings, shop submittals or other project record information to assure correct illustration of completed installation.
- C. Do not use project record information as operating and maintenance drawings.
- D. Organize in a consistent format under separate headings for different procedures.
- E. Provide a logical sequence of instructions for each procedure.
- F. Items included in each Booklet: The Booklet shall contain a complete description of all products materials, equipment and systems as outlined in Part 3.

PART 3 - EXECUTION**3.01 PRODUCT, MATERIALS, EQUIPMENT AND SYSTEMS DESCRIPTIONS**

- A. Division 1 - General Requirements
 - 1. Warranties and Bonds: Provide a copy of each warranty, bond and service contract issued. Execute warranties and bonds in accordance with provisions of Section 01740.
- B. Division 4 - Masonry

1. Concrete Masonry Units: Identify each type of unit used; include fire resistance ratings where applicable.

C. Division 8 - Doors and Windows

1. Metal and Wood Doors: Identify each type of door including labeled doors; indicate core, veneer and face sheet construction.
2. Side Folding Gates: Provide manufacturer's catalog data and parts list. Include operating and maintenance instructions, along with lubrication requirements.
3. Overhead Coiling Grilles, Folding Gates and Rolling Service Doors: Provide manufacturer's catalog data and parts list. Include operating and maintenance instructions, along with lubrication requirements.
4. Storefronts: Identify type of curtain wall framing used.
5. Windows: Identify each type and include product data and parts list for operating hardware.
6. Hardware: Furnish as-built schedule with closeout documents, including keying control schedule, manufacturers' installation, adjustment and maintenance information. Include supplier's final inspection report. Provide product descriptions of major door hardware equipment, including but not limited to, hinges, closers, exit devices, locksets, and latch sets.
7. Glass: Identify each type, design or pattern.

D. Division 9 - Finishes

1. Finish Schedule: Schedule shall identify each room or space by name and number, with a list of each type of finish to include: floors, base, wainscot, wall coatings, ceilings and all other applicable finishes. Where more than one color pattern or design is used for each type of finish, identify on the schedule.
2. Ceramic Tile:
 - a. Identify each type; include manufacturers catalog number, name of each color and design or pattern.
 - b. Provide manufacturers recommended maintenance and cleaning instructions.
3. Acoustical Tile Ceilings: Identify type of grid and each type of panel.
4. Resilient Tile and Base:

- a. Identify each type, provide manufacturer's catalog number and name of each color or pattern.
 - b. Provide manufacturer's recommended maintenance and cleaning instructions.
 5. Room Carpet:
 - a. Identify type; include product data and name of each color used.
 - b. Provide manufacturer's recommended maintenance and cleaning instructions.
 6. Wood Flooring-Athletic: Provide manufacturer's product data and written recommended maintenance instructions.
 7. Paint and Coatings: Identify each type of paint and coating by schedule.
- E. Division 10 - Specialties
1. Operable Partitions (Folding and Accordion)
 - a. Identify each type, include manufacturer's catalog data.
 - b. Provide a service manual and parts list.
- F. Division 12 - Furnishings
1. Casework, tops and accessories: Provide manufacturer's recommended maintenance procedures for care and cleaning of finished surfaces.
- G. Division 15 - Mechanical
1. Plumbing Systems: Include the following:
 - a. Manufacturer's catalog data and parts list for each item of equipment, along with preventative maintenance instructions.
 - b. Maintenance and lubrication instructions for each item of equipment furnished.
 2. Heating and air conditioning systems: Include the following:
 - a. Manufacturer's catalog data, parts list and wiring diagram for each item of equipment, along with preventative maintenance instructions.
 - b. Manufacturer's catalog data, "equipment cuts", parts list and diagrams for each type of temperature controls. Include "as built"

diagrams incorporating all control system components. Include system description manuals as specified in Section 15900.

- c. Maintenance and lubrication instructions for each item of equipment.
3. Ventilating and Exhaust Fans:
 - a. Identify each type, model number, size and capacity.
 - b. Provide service manual, parts list, and catalog data for each type of fan.
- O. Division 16 - Electrical
1. Power, Lighting and Special Systems: Include the following:
 - a. Manufacturer's catalog data and parts list for each item of service entrance equipment and each item of electrical sub-distribution equipment, along with preventative maintenance instructions.
 - b. Manufacturer's catalog data, "equipment cuts" and parts list for all lighting fixtures; indicate installed locations.
 - c. Manufacturer's catalog data, "equipment cuts", parts list, and "as built" wiring diagrams for all components of all special systems: fire alarm system, sound and intercommunication system, master clock and program system, cable TV and broadband system, and security system.
 - d. Training manuals, where described in the individual sections, are separate from the requirements listed above.

END OF SECTION

SECTION 01740

WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section, with special attention to the following:
 - 1. Bid Proposal Bonds: Instructions to Bidders.
 - 2. Performance Bond and Labor and Material Payment Bond: Sections 00302 and 00303.
 - 3. General Warranty of Construction: General Conditions, Section 00700 (16.02).
 - 4. Contract Close-out: Section 01700.
 - 5. Operating and Maintenance Data: Section 01730.

1.02 DESCRIPTION OF WORK

- A. Compile specified Warranties and Bonds.
- B. Co-execute submittals when so specified.
- C. Review submittals to verify compliance with Contract Documents.
- D. Assemble and format, include in Record and Information Booklets and submit to Architect for review and transmittal to Owner.

1.03 SUBMITTAL REQUIREMENTS

- A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers and subcontractors.
- B. Number of original signed copies required: See Section 01730, submittal procedures.
- C. Product or work item: List each firm or manufacturer, with name of Principal or representative, address and telephone number.
 - 1. Product Identification: Provide serial and/or model numbers for specific identification of equipment.

- D. Indicate date of beginning of warranty, bond or service and maintenance contract.
- E. Specify duration of warranty, bond, or service maintenance contract.
- F. Provide information for Owner's personnel:
 - 1. Proper procedure in case of failure.
 - 2. Instances which might affect the validity of warranty or bond.
- G. Contractor, name of responsible principal, address, and telephone number.

1.04 FORM OF SUBMITTALS

- A. Format:
 - 1. Size 8 1/2" x 11", punch sheets for 3 ring binder.
 - 2. Fold larger sheets to fit into binders.
 - 3. Incorporate into Record and Information Booklets in accordance with format described in Section 01730.

1.05 EFFECTIVE DATE AND DURATION OF WARRANTIES AND BONDS

- A. The Contractor shall provide and maintain warranties on all completed work performed under this Contract for a period of one (1) year, unless noted otherwise in the individual specification section. The start of the Warranty Period for all completed work shall commence on the date of legal occupancy by the Owner for each separate phase.
- B. All materials, products, equipment, etc. provided under this contract shall carry the manufacturer's standard warranties. Where standard equipment through the manufacturer exceed the periods listed in these specifications, the manufacturer's warranty shall take precedence. **No additional cost extended warranties or service agreements are required under this contract.**

1.06 SUBMITTALS REQUIRED

- A. Submit warranties, bonds, and service and maintenance contracts as specified in the respective sections of Specifications, and as specified by this Section.

END OF SECTION

SECTION 02070
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and Division 1 Specifications Sections, apply to the Work of this Section, with special attention to the following:
 - 1. Summary of Work: Section 01010
 - 2. Temporary Utilities: Section 01510
 - 3. Construction Aids: Section 01520 (Temporary Enclosures)
 - 4. Barriers: Section 01530

1.02 RELATED WORK

- A. Site Preparation: Section 02100
- B. Earthwork: Section 02200

1.03 REFERENCE STANDARDS

- A. Occupational Safety and Health Standards for the Construction Industry (29 CFR Part 1926) as promulgated by OSHA.
 - 1. Subpart D – Occupational Health and Environmental Controls, 1926.62-Lead.
 - 2. Subpart T – Demolition.
- B. Fairfax County Public Facility Manual

1.04 WORK EXCLUDED

- A. Information related to asbestos abatement/removal and materials and finishes containing asbestos is indicated in the school's Asbestos Containing Materials (ACM) Management Plan, available through FCPS. Removal of asbestos containing materials shall be performed by a licensed asbestos abatement/removal contractor retained by the Owner, except as noted in 1.06 below

- B. It shall be the responsibility of the Contractor to notify the Owner prior to initiating selective demolition in existing building areas where the presence of asbestos has been identified. Selective demolition shall not commence until asbestos-containing material has been removed.
- C. The Contractor shall include a time allowance for notification and abatement/removal operations for identified ACM in his work schedule.
 - 1. A minimum 20-day notification to the EPA and the Virginia State Department of Labor and Industry is required where removal and disturbance of more than 10 LF per 10 SF of ACM is required.

1.05 CONTRACTOR QUALIFICATIONS

- A. The Contractor shall have personnel on site during performance of selective demolition who are trained to identify ACM and other hazardous material, and who are familiar with removal procedures for non asbestos containing hazardous materials (See 1.06 below). The Contractor shall provide evidence of certification for these personnel.
- B. For removal of existing elevator, the contractor shall use subcontractors licensed for such work. The subcontractor shall obtain a permit for the work and have the work inspected after demolition is complete.

1.06 DESCRIPTION OF WORK

- A. General:
 - 1. The contractor shall remove and legally dispose of all equipment and materials indicated on the drawings, including those items that contain regulated hazardous materials, including asbestos containing materials (ACM) as noted below. Regulated hazardous materials shall require specialized disposal in accordance with applicable regulations. The Contractor will coordinate the scheduling of the removal of all hazardous materials with the Owner and provide the Owner with documentation that the hazardous waste is disposed at an authorized waste disposal facility.
 - a. Regulated hazardous materials include the following:
 - 1) Fluorescent lamps and PCB containing ballasts.
 - 2) Lead paint, glazed surfaces, putty and sealants in windows/frames.
 - a) Remove primer from existing steel prior to making modifications required by the structural drawings. Where modifications run along the structural steel completely, remove primer from area or work. Where modifications intersects at 90 degrees+/-,

remove primer 1 foot each side of the connection for a minimum of 2 feet total.

- 3) Metal primer on structural steel and steel windows.
 - 4) CFC type refrigerants such as R-12 ("Freon").
 - 5) ACM putty and caulk at steel windows. The Contractor must coordinate removal activities to allow the Owner to schedule the presence of a project monitor. Provide the Owner with documentation that the ACM waste generated is disposed at an authorized waste disposal facility.
 - 6) Wood utility poles treated with creosote.
2. Lead-containing painted and glazed surfaces that contain detectable concentrations of lead, including concentrations less than the definition of LBP, must be handled in accordance with the OSHA Lead in Construction Standard. Contractors performing work that could impact paint films or glazing that have detectable concentrations of lead should be informed of the testing results, and should take appropriate actions to comply with the OSHA Lead in Construction Standard. Appropriate actions would include but not limited to performing air monitoring to measure worker exposure; assuring that the workers are provided with adequate respiratory protection; and assuring that workers are provided with appropriate training.
 3. Workers performing demolition of LCSC (lead-containing surface coatings) must have, at a minimum, two-hour lead awareness training in accordance with OSHA Standard 29 CFR Part 1926.62. If LCSC are required to be stripped or removed from the building component substrate, then additional training would be required based upon the measured lead concentration of the surface coating and the airborne lead concentrations measured or anticipated to be generated during the each work activity.
 4. The disposal of waste generated during any restoration, renovation, or demolition operations, including items coated with lead paint, is regulated by EPA Standard 40 CFR Part 261, Subpart C.
- B. Performance of Work
1. Construction of the proposed work will be performed while school is in use. The Contractor shall give full cooperation to the school administration and staff in scheduling and performing the work.
 2. The Contractor shall provide, install and maintain safety and dust barriers as required by applicable health and safety regulations and as specified in Section 01520.

3. The Contractor shall schedule his work and deliveries so as not to interfere with the normal operation of the school, including morning arrivals and afternoon departures.
 4. The Contractor shall give seventy-two hours advance written notice to Owner when work is to be performed that might endanger and inconvenience occupants.
 5. The Contractor shall provide all erosion and sediment control devices as required by site inspector, owner, owner's agent, architect or engineer.
 6. The Contractor shall keep open, protect and maintain all existing fire exits and fire lanes during the entire course of construction.
- C. Protection
1. Erect barriers, fences, guard rails, enclosures, chutes, and shoring to protect personnel, structures, and utilities remaining intact.
- D. Maintaining Traffic
1. Minimize interference with normal use of roads, streets, driveways, sidewalks, and adjacent facilities.
 2. Do not close or obstruct streets, sidewalks, alleys, or passageways without written permission from authorities having jurisdiction.
 3. If required by governing authorities, provide alternate routes around closed or obstructed traffic ways.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that areas to be demolished are unoccupied and discontinued in use.
- B. Verify that all utilities within the area to be demolished have been cut off and capped.
- C. Do not commence work until conditions are acceptable to Architect and Owner.

3.02 PREPARATION

- A. Remove items scheduled to be salvaged for Owner, and place in designated storage area. (See 3.05, Salvage).

3.03 DEMOLITION

- A. Demolition shall be carried out with care so that portions of building that are to remain will be undamaged. Work on exterior of building shall be done with extreme care to prevent risk or harm to persons or property. Install temporary floors consisting of sisal kraft paper over existing floors that are to remain in areas of work. Do not allow debris to accumulate.
- B. Coordinate demolition with work of other trades. Supervise and assist in removal and replacement of existing materials for installation of new mechanical and electrical items. Remove and replace or re-route mechanical, electrical installation as indicated on the drawings and specified or required for installation of new work or remodeling.
- C. Walls
 - 1. At areas where windows are removed, protect adjacent work which shall remain.
 - 2. Where openings are cut in walls, such openings shall be cut with care to avoid damage to work that shall remain.
 - 3. Infill masonry shall be toothed, with the exception of face brick which shall be flush vertically with adjoining existing work.
 - 4. New work shall be carefully installed with materials that match existing, and shall conform to existing planes unless indicated otherwise.
- D. Finishes
 - 1. Existing ceiling, wall and floor finish or trim that is disturbed or destroyed by these operations shall be replaced to abut adjoining walls, floors, ceiling and new construction with material to match existing.
 - 2. At locations where existing tile floors are disturbed by new construction, existing tile shall be removed to nearest tile joint that parallels new construction and shall be replaced.
- E. Connecting work and new work in extension of existing work shall correspond in all respects with that to which it connects, or similar existing work, unless otherwise indicated or specified. Existing work shall be cut, drilled, altered or temporarily removed and replaced as necessary for performance of Contract.
- F. No structural member shall be cut or altered without written authorization of Architect.

- G. Work remaining in place that is damaged or defaced by work under this contract shall be restored to the original condition at the time of award of contract.
- H. If removal of existing work exposes discolored, unfinished surfaces or work out of alignment, such surfaces shall be refinished or material replaced as necessary to make contiguous work uniform and harmonious.

3.04 DISPOSAL

- A. Remove demolition debris daily.
- B. Do not store or burn materials on site.
- C. Transport demolition debris to off-site legal disposal facilities.
 - 1. Hazardous materials such as fluorescent lamps and PCB-containing ballasts shall be disposed of at special collection centers offering specialized recycling and treatment procedures.

3.05 SALVAGE

- A. Owner assumes no responsibility for loss or damage to materials or structures on site, salvage value of which Contractor may have reflected in his bid.
- B. Right of first refusal: All existing items of construction, building materials and furnishings (doors, frames, hardware, windows, chalkboards, tackboards, kitchen, heating ventilation, air conditioning, plumbing and electrical equipment, etc.) located in renovated or altered areas of the project shall be carefully removed without damage and remain the property of the Owner unless indicated for re-use in the new work. Any equipment not desired to be retained by the Owner shall be removed from the site and legally disposed of by the Contractor.

END OF SECTION

SECTION 05500
METAL FABRICATIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section.

1.02 REFERENCE DOCUMENTS

- A. ASTM A36 - Structural Steel.
- B. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless.
- C. ASTM A283 - Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars.
- D. ASTM A501 - Hot Formed Welded and Seamless Carbon Steel Structural Tubing.
- E. ASTM A512 - Cold-Drawn Buttweld Carbon Steel Mechanical Tubing.
- F. AWS - American Welding Society Structural Welding Code.
- G. "Metal Finishes Manual" Published by National Association of Architectural Metal Manufacturer's (NAAMM).

1.03 RELATED WORK

- A. Section 04200 - Unit Masonry; installation of loose lintels and attachment of fabrications to masonry.
- B. Section 09900 - Painting; finish painting in the field.

1.04 DESCRIPTION OF WORK

- A. Miscellaneous metal work shall include items fabricated from iron and steel plates, bars, strips, tubes, pipes and castings that are not a part of structural steel or other metal systems.
- B. Miscellaneous metal work shall include loose lintels or other supports that are not part of building structural system.

1.05 SUBMITTALS

- A. Submit Shop Drawings for fabrication and erection of miscellaneous metal assemblies. Includes plans and elevations at not less than 1/4 inch to 1 ft.-0 in. scale, and include details of sections and connections at not less than 3 in. to 1 ft.-0 in. scale. Indicate all anchorage and accessory items.

PART 2 - PRODUCTS

2.01 METALS

- A. Steel:
1. Structural shapes, bars, plates: ASTM A36.
 2. Steel plates to be bent or cold-formed: ASTM A283, grade C.
 3. Structural tubing: ASTM A501.
 4. Cold-drawn tubing: ASTM A512.
 5. Pipe: ASTM A53, Type E, Grade E, galvanized where exposed to weather.
 6. Flat Rolled Steel Sheets: ASTM A611, class I (cold rolled), or ASTM A570 (hot rolled). Galvanized steel sheets: ASTM A525 and ASTM A526; G90 coating.
 7. Steel Bars: hot rolled, ASTM A575; other bars or bar shapes, ASTM A663 or ASTM A36.
- B. Expansion shields: Type and size to support load imposed.
- C. Aluminum Tube Railing: Extruded type. (Brushed Satin finish / Anodized)
- D. Stainless Steel:
1. Bar Shapes and Forgings: ASTM A276, type best suited for purpose.
 2. Plates, Sheets and Strips: STM A167 or A176, type best suited for purpose.
- E. Fasteners
1. General: Furnish all bolts, nuts, screws, clips, washers, and any other fastenings necessary for proper erection of items specified herein.

- a. For ferrous metal use stainless steel on exterior. On interior match adjacent material, or if not applicable, provide zinc coated fasteners.
- b. For stainless steel, AISI 300 Series Stainless Steel. Unless noted otherwise, exposed screws shall be Phillips flat head, countersunk.

2. Products:

- a. Toggle Bolts: FS FF-W-84.
- b. Bolts & Nuts: ASTM A 307, grade A, hex head.
- c. Lag Bolts: FS FF-B-561, square head.
- d. Machine Screws: Cadmium-plated steel, FS FF-S-92.
- e. Wood Screws: Carbon Steel, FS FF-S-111, flat head.
- f. Washers: Carbon Steel, FS FF-W-92, round.
- g. Expansion Shields: FS FF-S-325.
- h. Lock Washers: Carbon Steel, FS FF-W-84, helical spring type.
- i. Powder Driven Fasteners: FS FF-P-395; comply with ANSI A10.3.

- F. Welding Electrodes: As permitted by AWS Code D1.1.

2.02 ACCESS DOORS

- A. Access doors shall be furnished and installed in accordance with requirements of Mechanical and Electrical Sections and the Drawings. Doors shall be the product of Inryco/Milcor, Karp or pre-bid approved equal. Install in accordance with the manufacturer's printed instructions as modified herein.
- B. Where walls or ceilings consist of fire-resistive assemblies, doors shall be UL rated the same as the wall or ceiling in which they are installed. Doors shall be as inconspicuous as possible and shall receive the same finish as the material in which they are installed. Utilize doors specifically designed for installation in the type of wall or ceiling material involved.

2.03 LADDERS

- A. Provide galvanized steel ladders at all locations indicated on the drawings. Use welded construction with all welds ground smooth and no visible grind markings. Unless detailed otherwise, construction shall be as follows:
1. Stringers: 2 1/2" x 3/8" flat bar, spaced. Space 24" apart.
 2. Rungs: 3/4" round bars, spaced 12" on center, let into stringers.
 3. Anchor Brackets: 4" x 6" x 3/8" angle, 4" long. Minimum of two per string, maximum spacing 4'-0".
- B. Furnish galvanized bolts with expansion shields to install ladders against concrete and masonry walls.
- C. Provide handholds mounted on walls in conjunction with ladders where shown in the drawings. Handholds shall be fabricated of 1-inch nominal diameter steel pipe, fitted with flanges, and mounted securely on the wall.

2.04 STEEL AND ALUMINUM RAILINGS

A. Performance Requirements

1. Structural Performance: Design, engineer, fabricate, and install the following metal fabrications to withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each respective component of each metal fabrication.
 - a. Top Rail of Guardrail Systems: Capable of withstanding the following minimum loads applied as indicated:
 - 1) Concentrated load of 200 pounds applied at any point in any direction and non-concurrently with uniform load.
 - 2) Uniform load of 100 pounds per linear foot applied non-concurrently with concentrated load, acting vertically downward.
 - b. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:
 - 1) Concentrated load of 200 pounds applied at any point and in any direction, non-concurrently with uniform load.
 - 2) Uniform load of 50 pounds per linear foot applied in any direction, acting non-concurrently with concentrated load.

- c. Infill Area of Guardrail Systems: Capable of withstanding a horizontal concentrated load of 200 pounds applied to one square foot at any point in the system including panels, intermediate rails balusters, or other elements composing the infill area.
 - d. Treads of Steel Stairs: Capable of withstanding a uniform load of 100 pounds per square foot or a concentrated load of 300 pounds on an area of 4 square inches located in the center of the tread, whichever produces the greater stress.
 - e. Platforms of Steel Stairs: Capable of withstanding a uniform load of 100 pounds per square foot.
- B. Railing shall be smooth with welded connections. Welded connections shall be ground smooth with no visible grind markings. Joints shall be flush, with concealed fittings.
 - C. Railing shall be constructed of steel or aluminum members of sizes and shapes indicated.
 - D. Rails shall run continuously to each post.
 - E. Posts at concrete shall be set plumb in pipe sleeves with non-shrink grout.
 - F. Handrail brackets: Malleable iron or steel, standard units, complete with mounting plates and anchoring accessories. Handrails shall be secured to masonry and concrete surfaces by wall brackets with expansion bolts.
 - G. Fabricate handrails to provide end returns to wall.

2.05 PIPE SLEEVES

Sleeves through masonry or concrete shall be standard weight, wrought iron or galvanized steel, size to allow 1/4 inch between sleeve and pipe.

2.06 LOOSE LINTELS AND SUPPORTS

- A. Provide loose structural steel angles, bearing plates, channels, tees, plates, and other steel items as detailed for masonry opening lintels, roof and floor openings, and other locations shown on drawings. Provide galvanized steel for loose items exposed to weather.
- B. Length of lintels shall be as required to provide minimum bearing of 4 inches at each end. Where minimum bearing cannot be obtained due to proximity of structural framing member, anchor lintel with clip angle expansion bolted to concrete framing member or welded to steel framing member.

- C. Furnish loose lintels and other-support accessories as part of the work of this Section. Installation of loose lintels shall be under UNIT MASONRY SECTION 04200.

2.07 PAINT

- A. Metal primer paint: Rust inhibitive primer, Fed. Spec. TT-P-86, Type II or TT-P-645 (zinc chromate type).
- B. Galvanizing: Provide zinc coating for all items exposed to weather or otherwise specified for galvanizing,
 - 1. ASTM A153 for iron and steel hardware
 - 2. ASTM A123 for rolled, pressed, and forged steel shapes, plates, and bars.
 - 3. ASTM A386 for assembled steel items

2.08 BRICK VENTS

- A. See Section 10200, Louvers and Vents.

2.09 SAFETY TREADS AND NOSINGS - EXTERIOR CONCRETE STAIRS

- A. Provide and install cast aluminum safety treads and nosings with abrasive grit surface on all treads of exterior stairs. Dimensions: treads and nosings shall be 4" wide x 6" less than the width of the concrete stair treads.
- B.. Approved Manufacturers:
 - 1. Wooster Products, Inc. , Wooster, OH, Type 101, shall be the basis of specification (www.wooster-products.com). Comparable products of the following manufacturers shall be acceptable.
 - 2. Safe-T-Metal Co., Inc., Syracuse, NY, Style AX (1-800-886-7238)
 - 3. American Safety Tread, Helena, AL, Style 801, (www.americansafetytread.com).
- C. Features:
 - 1. "Alumogrit" abrasive cast aluminum #43 prime and secondary ingot, low copper content; corrosion resistant.
 - 2. Abrasive #20 virgin grain aluminum oxide abrasive, integrally cast into the walking surface. Minimum depth: 1/32" (.79 mm).

3. Cross-hatching: 1/16" (1.59 mm) deep minimum.
4. Fasteners: 1/4" (6.35 mm) plated screws and nuts with steel wing anchors. Holes for fasteners shall be machine made in the factory.

2.10 VERTICAL CHASES

- A. Fabricate vertical mechanical pipe chases of minimum 16 gauge sheet steel, shop primed for finish field painting. Refer to drawings for locations and profiles. All chases shall fit tightly to adjacent construction and surfaces. Provide bent metal framing and vertical reinforcement as required by drawings.
 1. Extend chases a minimum of 4 inches above finished ceiling.
- B. Fabrication and installation of horizontal pipe chases for mechanical equipment is covered under Division 15.

2.11 STEEL STAIRS

- A. General: Construct stairs to conform to sizes and arrangements indicated on drawings. Join pieces together by welding, unless otherwise indicated. Provide complete stair assemblies, including metal framing, hangers, columns, railings, newels, balusters, struts, clips, brackets, bearing plates, and other components necessary for the support of stairs and platforms, and as required to anchor and contain the stairs on the supporting structure.
 1. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM "Metal Stair Manual" for commercial class except where more stringent requirements are indicated.
 2. Fabricate treads and platforms of exterior stairs to accommodate slopes to drain in finished traffic surfaces.
- B. Stair Framing: Fabricate stringers of structural steel channels, or plates, or a combination thereof, as indicated. Provide closures for exposed ends of stringers. Construct platforms of structural steel channel headers and miscellaneous framing members as indicated. Bolt or weld headers to strings, newels, and framing members to strings and headers; fabricate and join so that bolts, if used, do not appear on finish surfaces.
- C. Metal Pan Risers, Subtreads and Subplatforms: Shape metal pans for risers and subtreads to conform to configuration shown. Provide thickness of structural steel sheet for metal pans indicated, but not less than that required, to support total design loading.

1. Form metal pans of uncoated cold-rolled steel sheet, unless otherwise indicated.
 2. Attach risers and subtreads to stringers by means of brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting or bolting.
- D. Provide Subplatforms of configuration and construction indicated; if not indicated, of same metal as risers and subtreads, in thickness required to support design loading. Attach subplatform to platform framing members with welds.
- E. Stair Railings and Handrails: Comply with applicable requirements specified elsewhere in this section for steel pipe railings and handrails, and as follows:
1. Make bends of consistent radius, preserving the contour of the pipe, or use prefabricated fittings.
 2. Connect railing posts to stair framing by direct welding or as otherwise indicated.
 3. Interior handrails to be aluminum as shown in Part 2: Products; Metals 2.01C.

2.12 FABRICATION

- A. Use materials of size and thickness indicated, or if not indicated, of the required size and thickness to produce adequate strength and durability in the finished product for intended use. Work to dimensions indicated on drawings using industry proven details of fabrication and support.
- B. Form exposed work with accurate angles and surfaces and straight sharp edges. Ease exposed edges to radius of approximately 1/32 in. unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or impairing work.
- C. Weld corners and seams continuously and in accordance with recommendations of AWS. Grind exposed welds smooth and flush, to match and blend with adjoining surfaces.
- D. Form exposed connections with hairline joints flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of the type indicated, or if not indicated, use Phillips flathead, countersunk screws or bolts.
- E. Provide for anchorage of type required, coordinated with supporting structure and the progress schedule. Fabricate and space anchoring devices as required to provide adequate support for intended use.
- F. Cut, reinforce, drill, and tap miscellaneous metal work to receive other items.

- G. Shop Painting:
1. Shop paint miscellaneous metal work, except members or portions of members embedded in concrete or masonry, surfaces and edges to be field-welded, and galvanized surfaces.
 2. Remove scale, rust and other deleterious materials before shop paint is applied. Clean surfaces in accordance with Steel Structures Painting Council, SP-3.
 3. Apply one shop coat of metal primer paint to fabricated metal items.
- H. Fabricate miscellaneous units to the sizes, shapes and profiles indicated or, if not indicated, of the required dimensions to receive adjacent grating, plates, doors or other work to be retained by framing. Except as otherwise shown, fabricate from structural steel shapes and plates and steel bars of welded construction using mitered corners, welded brackets and splice plates and minimum number of joints for field connections. Equip units with integrally welded anchor strips for casting into poured concrete. Furnish inserts if units must be installed after concrete is poured; except as otherwise indicated, space anchors 2 feet 0 inch o. c.
- I. Custom fabricate pipe railings to dimensions and details indicated, with smooth bends and welded joints ground smooth and flush.
- J. Fabricate ladders for locations indicated, with dimensions, spacing details and anchorage as required. Comply with the requirements of ANSI A14.3. For rungs other than round bars, such as ships ladders with flat plate or tubular rungs, provide non-slip surface on the top of each rung, either by coating the rung with aluminum oxide granules set in epoxy resin adhesive, or by using a manufactured rung filled with aluminum oxide grout; or provide heavily serrated profiles.
- K. For fabrication of work exposed to view, use only materials which are smooth and free of surface blemishes such as pittings, seam marks, roller marks, trade names and roughness. Remove blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes including zinc coatings.
- L. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly of units at project site.

PART 3 - EXECUTION

3.01 FIELD CONDITIONS

- A. Verify measurements in field for work fabricated to fit job conditions.

- B. Before starting work, examine adjoining work on which miscellaneous metal work is supported, or to which it is fitted or joined.
- C. Provide anchorage devices and fasteners where necessary for securing miscellaneous metal items to in-place construction including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connections as required.
- D. Perform cutting, drilling and fitting required for installation of miscellaneous metal items. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels.
- E. Fit exposed connections accurately together to form tight hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind joints smooth and touch-up shop paint coat. Do not weld, cut or abrade the surfaces for exterior units that have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.

3.02 FIELD WELDING

- A. Comply with AWS Code for procedures for manual shielded metal-arc welding, the appearance and quality of welds made and the methods used in correcting welding work.

3.03 TOUCH-UP PAINTING

- A. Immediately after erection, clean field welds, bolted connections and abraded areas of the shop paint, and paint exposed areas with same materials used for shop painting.

END OF SECTION

SECTION 06100
ROUGH CARPENTRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of contract, including General Conditions and Division One, Specification Sections, apply to the work of this Section.

1.02 REFERENCE STANDARDS

- A. FS TT-W-571 - Wood Preservation: Treating Practices.
- B. APA - American Plywood Association.
- C. ASTM A 153 – Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
- D. International Code Council (ICC); International Building Code.

1.03 RELATED WORK

- A. Temporary, rough framed exterior weather enclosure for doors, windows and other openings are covered under Section 01520, Construction Aids.
- B. Bolts and other fasteners: see Section 05500, Metal Fabrication.
- C. Architectural Woodwork: Section 06400.

1.04 GRADING RULES

- A. Grading of lumber of various species in accordance with American Softwood Lumber Standard PS 20-15, U.S. Department of Commerce (National Grading Rule).
- B. Each piece of yard, structural lumber shall bear official grade mark of appropriate inspection bureau or association.

PART 2 - PRODUCTS

2.01 WOOD

- A. Exterior blocking: No. 2 dimension Southern Yellow Pine, preservative treated.
- B. Interior grounds, nailers, furring and blocking: No. 2 dimension Southern Yellow Pine, fire-retardant treated.

- C. Interior Plywood: 3/4" thick APA INT BC fire retardant treated for Main Communications Room, Telephone, CATV and Electric Closets, and other utility spaces shown on the Drawings. Panels shall be 8'-0" tall.
- D. Exterior Plywood plywood sheathing: 1/2" thick exposure CD fire treated unless noted otherwise.

2.02 LUMBER SIZE AND MOISTURE CONTENT

- A. Lumber: Surfaced 4 sides (S4S).
- B. Board, dimension lumber: Either air or kiln dried with moisture content in accordance with National Grading Rule, but not exceeding 19 percent for dimension lumber and board lumber 8 inch or less in width.

2.03 PRESERVATIVE TREATMENT

- A. Lumber in contact with masonry, concrete, earth or roof cants: Preservative treated.
- B. Preservative treat by pressure method; Alkaline Copper Quaternary (ACQ). Preservative treatments containing arsenic or chromium shall not be acceptable. "Naturewood" by Osmose, Inc. or other products meeting the requirements of the ICC shall be acceptable.
 - 1. Certain metal products may corrode when in direct contact with ACQ. Use only hot dipped galvanized or other fasteners recommended by the hardware manufacturers for direct contact with ACQ. Hot dipped galvanized fasteners shall comply with ASTM A153.
- C. Season treat lumber after preservative treatment to moisture content specified for nontreated lumber.
- D. Label treated lumber except furring and grounds with name of treater and type of preservative used.
- E. Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment. Inspect each piece of lumber after drying and discard damaged or defective pieces.

2.04 FIRE-RETARDANT TREATMENT

- A. Fire-retardant treated lumber or plywood: AWPA standards for pressure impregnation with fire-retardant chemicals to achieve flame spread rating of not more than 25; UL Test 723, ASTM E84 or NFPA Test 355.
- B. Provide UL label on each piece of fire-retardant treated item.

- C. Season treat items after fire retardant treatment to moisture content specified for non-treated items.

2.05 MISCELLANEOUS MATERIALS

- A. Provide fasteners and anchorages of size and type as indicated and recommended by applicable standards, complying with federal specifications for nails, screws, staples, bolts, nuts, washers and anchoring devices.

PART 3 - EXECUTION

3.01 INSTALLATION GENERAL

- A. Frame, fit closely, set framing accurately to required lines levels. Secure rigidly in place. Size blocking to provide a true surface for finishing. Provide special blocking for construction not indicated or specified but required to complete work.
- B. Provide wood grounds nailers, blocking, as indicated for screeding or attachment of other work. Form to shapes indicated and cut as required to maintain tolerances specified for work to be attached. Coordinate location with adjoining work. Secure to substrate as required to support applied loading. Counter-sink bolts and nuts flush with surface.

3.02 PLYWOOD

- A. Install fire retardant treated plywood panels on walls for special system terminal cabinets and telephone and electric equipment as required by utility companies in Main Communications Room and other utility closets identified on the Drawings. Provide 8'-0" tall panels in widths as indicated below.
- B. Main Communications Room (Surface all walls with plywood)
 - 1. Elementary Schools:
 - a. Fire Alarm and Telecommunications: 6'-0" wide
 - b. Security, Sound, CATV and Emergency Panels: 3'-0" wide.
 - 2. Middle Schools and High Schools:
 - a. Fire Alarm and Telecommunications: 10'-0" wide.
 - b. Security: 5'-0" wide.
 - c. Sound: 8'-0" wide.
 - d. CATV: 4'-0" wide.

e. Emergency Panels: 3'-0" wide.

C. Telephone and CATV Service Demarcation Closets: 6'-0" wide

END OF SECTION

SECTION 06400

ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and Division-1 Specification Sections, apply to the Work of this Section.

1.02 WORK INCLUDED

- A. Subject to scope of work indicated on the drawings, the following items are part of this section:
 - 1. Wood shelving
 - 2. Mounting blocks
 - 3. Other miscellaneous millwork indicated on drawings

1.03 RELATED WORK

- A. Samples: Section 01340
- B. Rough Carpentry: Section 06100
- C. Wood Doors: Section 08211
- D. Woodwork Finish: See Section 09900, Painting
- E. Wood Casework: Section 12302
- F. Plastic Laminate Faced Casework and Fixtures: Section 12304
- G. Library Casework: Section 12360

1.04 QUALITY ASSURANCE

- A. The "Quality Standards" of the Architectural Woodwork Institute, apply to work specified in this Section. Reference to Premium, Custom or Economy in this Section shall be as defined in AWI "Quality Standards."
 - 1. Any item not given a specific quality grade shall be Custom Grade.

1.05 SUBMITTALS

- A. Submit detailed shop drawings covering all items of architectural woodwork.
- B. Submit manufacturer's descriptive literature of specialty items not manufactured by the architectural woodworker.
- C. Samples:
 - 1. Submit samples of wood veneers, and species as appropriate.
 - 2. Submit finished samples of each shop applied finish.

1.06 PRODUCT HANDLING

- A. Do not deliver woodwork to site until building and storage areas are sufficiently dry to prevent damage to woodwork caused by excessive changes in moisture content. Store materials in a secure area, safe from damage by work of other trades or unauthorized access.

PART 2 - PRODUCTS

2.01 CLOSET AND STORAGE SHELVING

- A. AWI quality grade: Custom grade for transparent finish.

2.02 MOUNTING BLOCKS

- A. General
 - 1. Type: Plain sawn red oak, AWI Custom grade for transparent finish. All edges shall be chamfered and sanded prior to finishing.
 - 2. Provide and install mounting blocks in locations and in quantities shown on the drawings.
 - 3. As part of the work of this Section, contractor shall be responsible for the following:
 - a. The attachment of Owner-provided pencil sharpeners to each of the sharpener blocks shown on the Drawings.
- B. Pencil sharpener blocks: 8" x 8" x 1".
- C. Fire extinguishers blocks: For fire extinguishers not in cabinets; size for mounting bracket supplied with extinguisher.

2.03 OAK TRIM

- A. Provide 1x oak trim at locations indicated on the drawings.
- B. Type: Plain sawn red oak, AWI Custom grade for transparent finish. All edges shall be chamfered and sanded prior to finishing.

2.04 SPECIALTY ITEMS

- A. Refer to Drawings for other special fabrications not listed in this Section.

PART 3 - EXECUTION**3.01 JOB CONDITIONS**

- A. Examine the drawings carefully to assure that large shop fabricated items can physically pass through openings. Where necessary, manufacture the units in parts for final field assembly.
- B. Prior to fabrication, examine the work areas and verify that field conditions will allow the work to be performed in accordance with the Contract Documents. Notify the Architect and Owner's Representative of any observed deficiencies or discrepancies that would interfere with the proper installation of the work. Do not proceed until these conditions have been corrected.
- C. Coordinate installation of the work of this section with the work of other trades, and verify that adjoining work is complete to the point where this installation may properly commence.

3.02 INSTALLATION

- A. General:
 - 1. Architectural woodwork shall produce joints true, tight and well nailed with members assembled in accordance with quality grade specified or as indicated.
 - 2. Discard units of material with defects that might impair the quality of work and units too small to fabricate the work with minimum joints or the optimum joint arrangement.
- B. Jointing:
 - 1. Make joints to conceal shrinkage; miter exterior corner; cope interior corners, miter or scarf end-to-end joints.
 - 2. Install trim in pieces as long as possible, jointing only where solid support is obtained.

C. Fastening:

1. Install items straight, true, level, plumb, and firmly anchored in place where blocking or backing is required. Coordinate as necessary with other trades to ensure placement of all required backing and blocking in timely manner.
2. Nail trim with finish nails or proper dimension to hold the member firmly in place without splitting the wood.
3. On exposed finish work, set nails for putty.
4. Screw, do not drive, wood screws except that screws may be started by driving and then screwed home.

3.03 FIELD TOUCH-UP

- A. Fill and touch-up exposed nail or screw holes, refinish raw surfaces resulting from job fitting, repair scratches, mars and clean finish surfaces.

3.04 CLEANING UP

- A. Keep the premises in a neat, safe and orderly condition at all times during execution of this portion of the work, free from accumulation of sawdust, cut-ends and debris. Perform final clean up once the work of this Section is completed.

END OF SECTION

SECTION 07900

SEALANTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section.

1.02 RELATED WORK

- A. Section 07910 – Through Penetration Protection Systems: Sealants used in conjunction with fire stopping systems in rated construction.
- B. Section 08800 - Glazing: Sealants used in conjunction with glazing.

1.03 REFERENCE STANDARDS

- A. FS TT-S-230C - Sealing Compounds, Synthetic-Rubber, Single Component, Chemically Curing.
- B. FS TT-S-00227E – Sealing Compound, Elastomeric Type, Multi-Component
- C. FS TT-S-.001657 Sealing Compound, Single Component, Butyl Rubber Based Solvent Release Type.
- D. ASTM C834 - Latex Sealing Compounds.
- E. ASTM C920 – Elastomeric Joint Sealant Compounds
- F. ASTM E90 – Airborne Sound Transmission Loss

1.04 SUBMITTALS

- A. Comply with applicable provisions of Section 01340, Shop Drawings, Product Data and Samples.
- B. Submit sealant manufacturer's catalog and technical data, including surface preparation and installation instructions. Include data for compressions seals, backer rods, bond breakers, and other accessories for joint conditions as detailed or required by Drawings, and per manufacturer's recommendations.
- C. Submit samples of sealant colors.

1.05 WARRANTY

- A. Provide a two (2) year written warranty covering materials and installation.

PART 2 - PRODUCTS

2.01 SEALANT MANUFACTURERS

- A. The materials specified in 2.02 are products manufactured by Pecora Corporation (www.pecora.com); (Basis of Specification)
- B. Other manufacturers, pre-bid approved in accordance with Section 01630, and complying with the requirements and the intent of this Section shall be acceptable.

2.02 SEALANT MATERIALS

- A. Type 1: "AC-20+Silicone"; one part, non-sag, acrylic latex caulk, complying with ASTM C834.
- B. Type 2: "890NST"; single-component, Non-sag, Nonstaining, Ultra-Low Modulus, Neutral Moisture-curing, Silicone Sealant, 100% extension/50% compression; complying with TT-S-001543, TT-C-00230C, CDPH-CA01350 and ASTM C920, Type S, Grade NS Class 100/50, Use NT, M, G, A, O.
- C. Type 3: "Urexpan NR-201"; one part urethane, self-leveling (Type I), 25% maximum movement capability for extension/compression; complying with FS TT-S-230C, ASTM C920.
- D. Type 4: "AC-20FTR"; one part, modified acrylic latex acoustical sealant, complying with ASTM E90-16 and ASTM C834.
- E. Type 5: "BC-158" Butyl Sealant, Federal Specification FS TT-S-001657 (Type I), Shore A hardness of 25 or greater.

2.03 PRECOMPRESSED SEALANT TAPE

- A. "Will-Seal" as manufactured by Illburck, U.S.A.
 - 1. Tape Type 150; tape number W-820.
- B. Install in compliance with manufacturer's recommendations.
 - 1. Verify conditions of installation (and actual field dimensions) with manufacturer's supplier as for correctness of installation.
- C. See Drawings for locations and details

2.04 NEOPRENE COMPRESSION SEAL

- A. Preformed vulcanized elastomeric compound as manufactured by Watson Bowman Acme Corp.
 - 1. Heavy Duty Seal, WA Series, Number WA 162.
 - 2. Install utilizing manufacturer's recommended lubricant type adhesive.
- B. Prepare and shape material adjoining seal in compliance with manufacturer's recommendations.
- C. Install in compliance with manufacturer's recommendations.

2.05 ACCESSORIES

- A. Primer: Non-staining type, as recommended by sealant manufacturer for type of sealant, joint substrate, and size of joint.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Backer Rod: Round, closed cell polyethylene or "Denver Foam" polyurethane foam rod as required by manufacturer for type of sealant; oversize 30 to 50 percent.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.
- E. Masking Tape: To prevent application of sealant on surfaces not scheduled to receive it. Tape shall be removable without damage to substrate.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that joint dimensions, physical and environmental conditions are acceptable to receive work of this Section.
- B. Beginning of installation shall indicate acceptance of condition of substrates and of adjacent installed work.

3.02 PREPARATION

- A. Clean, prepare, and size joints in accordance with manufacturer's written instructions. Remove any dirt, grease, loose materials and other foreign matter that might impair adhesion and proper performance of sealant.
- B. Verify that joint shaping materials and release tapes are compatible with sealant.
- C. Examine joint dimensions and size materials to achieve width/depth ratios as required by manufacturer.
- D. Use backer rod to achieve required joint depths, and to allow sealants to perform in accordance with manufacturers technical specifications.
- E. Use bond breaker tape where recommended by the sealant manufacturer and where indicated on the Drawings.

3.03 INSTALLATION

- A. Seal exterior joints subject to moisture penetration and interior joints exposed to view with sealant specified in schedule below.
- B. Perform work in accordance with latest ASTM requirements for type of sealant and type of application.
- C. Install sealant in accordance with manufacturer's written instructions.
- D. Apply sealant within manufacturer's recommended temperature ranges. Consult manufacturer prior to installation when sealant cannot be applied within recommended temperature ranges.
- E. Tool joints to a concave profile.
- F. Joints shall be free of air pockets, foreign embedded matter or other foreign substances. Joints shall be uniform, free of ridges, and sags.

3.04 SCHEDULE

- A. Type 1: Interior non-moving joint applications.
- B. Type 2: Exterior vertical surface applications, and interior moving joint applications.
- C. Type 3: Exterior horizontal surface applications.
- D. Type 4: Interior acoustical applications.
- E. Type 5: Radon mitigation joints where slabs abut foundation walls.

3.05 CLEAN-UP

- A. Clean adjacent surfaces of excess sealant and sealant droppings as the work progresses, using solvents or cleaning agents recommended by manufacturer for surfaces to be cleaned.
- B. Upon completion of sealant installation, remove all associated debris, empty containers, and surplus sealant from the job site. Do not leave excess sealants and accessories on the premises as "attic stock".

END OF SECTION

SECTION 07910

THROUGH PENETRATION PROTECTION SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section.

1.02 RELATED WORK

- A. Section 04200 - Unit Masonry
- B. Section 07210 - Building Insulation
- C. Section 07900 - Sealants
- D. Division 15 - Mechanical Duct and Piping Penetrations
- E. Division 16 - Electrical Cable and Conduit Penetrations

1.03 REFERENCE STANDARDS

- A. ASTM International E 814, "Standard Test Method for Fire Tests of Through-Penetration Fire Stops".
- B. UL 1479, "Standard for Fire Tests of Through-Penetration Firestops"

1.04 SYSTEM PERFORMANCE REQUIREMENTS

- A. F-Rated (flame penetration to the unexposed side of the construction assembly) Through-Penetration Firestop systems: Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E 814, but not less than the fire-resistance rating of the construction assemblies penetrated.
- B. T-Rated (temperature rise on the non-fire side of the construction assembly) Through-Penetration Firestop Systems: Provide through-penetration firestop systems with T ratings, as determined per ASTM E 814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas. T-rated assemblies are required where firestop systems protect penetrating items larger than a 4-inch-diameter nominal pipe or 16 square inches in overall cross-sectional area.
- C. Fire-Resistive Joint Sealants: Provide joint sealants with fire-resistance ratings indicated, as determined per ASTM E 119, but not less than the fire-resistance rating of the construction in which the joint occurs.

- D. For firestopping exposed to: moisture, and potential physical damage, only provide products that do not deteriorate when exposed to these conditions.
- E. For piping penetrations for plumbing and wet-pipe sprinkler systems, only provide moisture-resistant through-penetration firestop systems.
- F. For penetrations involving insulated piping, only provide through-penetration firestop systems not requiring removal of insulation.

1.05 SUBMITTALS

- A. Provide shop drawings and manufacturer's literature illustrating details, materials, surface preparation, installation methods, and relationships to adjoining construction for each through-penetration firestop system, each kind of construction condition penetrated and each kind of penetrating item. Include firestop design designation from qualified testing and inspecting agency demonstrating compliance with requirements for each condition indicated.
 - 1. Submit documentation, including illustrations, from U.L. or other qualified testing and inspecting agency, applicable to each through-penetration firestop configuration required, for each construction type and all items penetrating such construction.
- B. Submit certification from firestopping manufacturer indicating that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs), and that those products are nontoxic to building occupants.
- C. Submit product certificates, signed by manufacturers of firestopping products, certifying that their products comply with specified requirements.
- D. It shall be the Contractor's sole responsibility to submit and obtain approval from Fairfax County DPWES for through-penetration firestop system materials and systems approved by U.L. or other qualified testing and inspection agency, for the required through-penetration configurations.

1.06 WARRANTY

- A. Submit copies of written warranty agreeing to repair or replace joint sealers which fail in joint adhesion, extrusion resistance, migration resistance, or general durability or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data. The warranty period shall be one year. See Section 01740 for effective date of warranty commencement.

1.07 QUALITY ASSURANCE

- A. Installer's qualifications: A specialty firestop contractor experienced in installation or application of systems similar to those required for this project, plus the following:
 - 1. Acceptable to or licensed by manufacturer, State or local authority where applicable.
 - 2. At least 2 years experience with required systems.

3. Successfully completed at least 5 comparable scale projects using these systems.
 4. Member in good standing of Firestop Contractors International Association (FCIA).
- B. Local and State regulatory requirements: Submit forms of acceptance for proposed assemblies, if not conforming to specific UL Firestop System numbers, or UL classified devices.
- C. Materials shall have been tested to provide fire rating at least equal to that of the type of construction being penetrated.

PART 2 - PRODUCTS

2.01 FIRESTOPPING, GENERAL

- A. Through-Penetration Firestopping of Fire-Rated Construction:
1. Systems or devices listed in the U.L. Fire Resistance Directory under categories XHCR and XHEZ shall be used, and they shall conform to the construction type, penetrant type, annular space requirements and fire rating required for each condition. Systems shall be symmetrical for wall applications. Systems or devices shall be asbestos-free. Mortar systems shall be approved by Warnock Hersey International.
 2. Additional requirements: Systems shall withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product included as a part of the U.L. system or device, and designed to perform this function.
 3. Acceptable manufacturers and products.
 - a. Those listed in the U.L. Fire Resistance Directory for the U.L. System involved. Mortar systems: approved by Warnock Hersey International.
 4. All firestopping products shall be supplied by a single manufacturer.
- B. Compatibility: Provide firestopping systems using components that are compatible with each other, the substrates forming the openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer, and based on testing and field experience.
- C. Accessories: Provide components for each firestopping system that are needed to install fill materials. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Accessories include but are not limited to the following items:

1. Permanent forming, damming and backing materials including the following:
 - a. Semi-refractory fiber (mineral wool) insulation.
 - b. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Joint fillers for joint sealants.
 2. Temporary forming material.
 - a. Substrate primer.
 - b. Collars
 - c. Steel sleeves.
- D. Application: Provide firestopping systems composed of materials specified in this Section that comply with system performance and other requirements.
- 2.02 FILL MATERIALS FOR THROUGH-PENETRATION FIRESTOP SYSTEMS (AS REQUIRED BY SYSTEM)
- A. Intumescent, Latex Sealant: Single-component, intumescent, latex formulation.
 - B. Intumescent Putty: Non-hardening, dielectric, water-resistant putty containing no solvents, inorganic fibers, or silicone compounds.
 - C. Intumescent Wrap Strips: Single-component, elastomeric sheet with aluminum foil on one side.
 - D. Silicone Foam: Two-component, silicone-based liquid elastomer that, when mixed, expands and cures in place to produce a flexible, non-shrinking foam.
 - E. Silicone Sealant: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealant of grade indicated below:
 1. Grade: Non-sag formulation for openings in vertical and other surfaces requiring a non-slumping, gunnable sealant.
 - F. Products for Through Penetration Firestop Systems: Design standards and U.L. design assemblies listed on the Drawings are based on 3M Fire Protection products. These and other products listed below shall be acceptable, subject to compliance with the requirements of this Section and the Drawings:
 1. Intumescent Latex Sealant:
 - a. Metacaulk 950, The RectorSeal Corporation.

- b. Fire Barrier CP 25WB Caulk, 3M Fire Protection Products.
2. Intumescent Putty:
- a. Pensil 500 Intumescent Putty, General Electrical Co.
 - b. Flame-Safe FSP1000 Putty, International Protective Coating Corp.
 - c. Fire Barrier Moldable Putty, 3M fire Protection Products.
3. Intumescent Wrap Strips:
- a. Dow Corning Fire Stop Intumescent Wrap Strip 2002, Dow Corning Corp.
 - b. CS2420 Intumescent Wrap, Hilti Construction chemicals, Inc.
 - c. Fire Barrier Moldable Putty, 3M Fire Protection Products.
4. Silicone Sealants:
- a. Dow Corning Firestop Sealant 2000, Dow Corning Corp.
 - b. Down Corning Firestop Sealant SL 2003, Dow corning Corp.
 - c. Pensil 100 Firestop Sealant, General Electric Co.
 - d. CS240 Firestop Sealant, Hilti Construction Chemicals, Inc.
 - e. Metacaulk 835, The RectorSeal Corporation.
 - f. Metacaulk 880, the RectorSeal Corporation.
 - g. Fyre-Sil, Tremco Inc.
 - h. Fyre-Sil S/L, Tremco Inc.
5. Cable Management through-Penetration Systems
- a. "Flame Stopper" Thru-Wall Fitting, The Wiremold Company, or comparable. System shall be compatible with cable trays.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Prior to beginning work, Contractor shall verify that joint dimensions, physical and environmental conditions are acceptable to receive work of this Section. Contact Architect or Owner's Representative immediately if conditions are not acceptable. Do not begin work until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping, in accordance with written recommendations of firestopping manufacturer and the following requirements:
1. Remove all foreign materials from surfaces of openings and joint substrates, and from penetrating items that could interfere with adhesion of firestopping.
 2. Clean openings, joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form release agents from concrete.
 4. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to area of bond; do not allow spillage and migration onto exposed surfaces.
 5. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of Work, or would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape in accordance with manufacturer's instructions in order to avoid disturbing firestopping seal and adhesion to substrates.

3.03 INSTALLING THROUGH-PENETRATION FIRESTOPS

- A. General: Comply with the "System Performance Requirements" article in PART 1, the through-penetration firestop manufacturer's installation instructions and Drawing requirements.
- B. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for Through Penetration firestop systems in accordance with manufacturer's written instructions.
- D. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
- E. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
- F. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 INSTALLING FIRE-RESISTIVE JOINT SEALANTS

- A. General: Comply with the "System Performance Requirements" article in PART 1, with ASTM C 1193, with the sealant manufacturer's installation instructions and Drawing requirements.
- B. Install joint fillers to provide support of sealants during application and at position required to provide the cross-sectional shapes and depths of installed sealants relative to joint widths. Install fillers to allow optimum sealant movement capability and development of fire-resistance rating required.
- C. Install sealants in accordance with manufacturer's written instructions to result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and to provide uniform, cross-sectional shapes and depths relative to joint width that allow optimum sealant movement capability. Install sealants at the same time joint fillers are installed.
- D. Tool non-sag sealants immediately after sealant application and prior to the time skinning or curing begins. Form smooth, uniform beads in configuration indicated or required to produce fire-resistance rating, as well as to eliminate air pockets. Ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces. Use only tooling agents approved by sealant manufacturer.

3.05 QUALITY CONTROL

- A. Do not enclose firestopping with other construction until reports of examinations are issued.
- B. Where deficiencies are found, repair or replace firestopping.

3.06 CLEANING

- A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses, using methods and cleaning materials approved by manufacturers of firestopping products and which are suitable for substrates in which opening and joints occur.
- B. Protect firestopping during and after curing period from contact with contaminating substances, and from damage resulting from construction operations or other causes until time of Substantial Completion and Owner acceptance.
 - 1. If damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.
- C. Remove all excess materials, packaging, tools and other items associated with the work of this Section, and dispose of legally offsite.

END OF SECTION

SECTION 08100
METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and Division 1 Specification Sections, apply to the Work of this Section, with special attention to the following:
 - 1. Section 01092 - Mounting Heights

1.02 RELATED WORK

- A. Section 08211 - Wood Doors (Particle Core)
- B. Section 08326 – Cross Corridor Packaged Door Pair Assemblies
- C. Section 08710 - Finish Hardware
- D. Section 08800 - Glazing (vision panels).
- E. Section 09900 - Painting
- F. Section 16620 - Security Intrusion

1.03 DESCRIPTION OF WORK

- A. This Section includes provision and installation of exterior hollow metal doors, exterior and interior hollow metal door frames, and interior hollow metal window frames where indicated on the drawings.

1.04 QUALITY ASSURANCE

- A. Hollow metal work: Manufactured in accordance with requirements of ANSI/SDI-100-91 "Recommended Specifications for Standard Steel Doors and Frames".
- B. Hollow metal door and frame supplier: Direct factory supplier who employs a certified door consultant (CDC) or other individual who can demonstrate equivalent knowledge and experience.
- C. Field Installation: Comply with SDI-105, "Recommended Erection Instructions for Steel Frames."
- D. Labeled Fire Doors and Frames: Tested in accordance with UL-10B, ASTM E152, and NFPA 252.

- E. Installation of doors and hardware shall be in accordance with ANSI/DHI A115.1G-199, "Installation Guide for Doors and Hardware".

1.05 SHOP DRAWINGS AND PRODUCT DATA

- A. Submit shop drawings covering each type of frame, each type of door, frame anchorage details, and a door and frame schedule. Indicate coordination with hardware requirements. Show cutouts and hardware reinforcement where required.
- B. Submit manufacturers product data technical specifications and installation instructions for each type of door.
- C. Include certifications required to show compliance with this Section.

1.06 REQUIREMENTS OF REGULATORY AGENCIES

- A. Where fire-rated doors and frames are indicated, provide units tested and labeled as a rated assembly and labeled by Underwriter's Laboratories, Inc., Intertek Testing Services - Warnock Hersey or other authorized labeling agency.
- B. Non-sprinklered buildings: All labeled doors in rated enclosed stairways shall comply with the VUSBC for maximum temperature rise of 450°F after 30 minutes of standard fire test exposure. Such compliance shall be clearly stated on the door label.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle hollow metal work in manner to prevent damage and deterioration.
 - 1. Provide packaging such as cardboard or other containers, separators, banding, spreaders, and paper wrappings to protect hollow metal items.
- B. Storage of Doors: Doors shall be stored in an upright position under cover. Place the units on at least 4" (101.6 mm) wood sills on floors in a manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters, which create humidity and promote rusting. If the corrugated wrapper on the door becomes wet, or moisture appears, remove the wrapper immediately. Provide at least a ¼" (6.35 mm) space between the doors to promote air circulation.
- C. Storage of Frames: Frames shall be stored under cover on 4" (101.6 mm) wood sills on floors in a manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters, which create humidity and promote rusting. Assembled frames shall be stored in a vertical position, with no more than five units in a single stack. Provide at least a ¼" (6.35 mm) space between frames to promote air circulation.
- D. Follow other special storage and handling requirements of manufacturer.

- E. Protect exposed finish surfaces of pre-finished items with masking tape.
- F. Inspect delivered doors and frames for damage. Minor damage may be repaired provided that the repairs are acceptable to the Owner's Representative and Architect. Hollow metal doors and frames damaged in transit, during storage and handling, or during the construction process shall be replaced at no cost to the Owner when such items cannot be restored by field repairs.

1.08 WARRANTY

- A. Provide a one (1) year warranty against defects in materials and workmanship.

PART 2 - PRODUCTS

2.01 METAL DOORS

- A. Fabricate steel door units to be rigid, neat in appearance and free from defects, warp or buckle. To the fullest extent practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory - assembled before shipment, to assure proper assembly at project site. Comply with SDI-100 requirements as follows:
 - 1. Exterior Doors: ANSI/SDI-100-16, Level IV, extra heavy-duty, Model 2 (MSG No. 14); fabricate from galvanized sheet steel.
- B. Fabricate exposed faces and hardware reinforcements of doors from cold-rolled steel conforming to ASTM A924, A60 zinc coating (hot dipped).
- C. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled steel conforming to ASTM A366.
- D. Close top and bottom edges of exterior doors as integral part of door construction or by addition of minimum 14-gage steel channels; conforming to ASTM A924, with A60 zinc coating (hot dipped). Top channels shall be flush, bottom channels shall be inverted or flush.
- E. Core Materials
 - 1. Non-rated doors: Non-toxic honeycomb or vertical steel stiffened internal reinforcing manufactured of hot rolled, pickled and oiled steel per ASTM A569.
 - 2. Fire labeled doors: Temperature rise rating mineral fiber core.
- F. Exposed Fasteners: Unless otherwise indicated, provide countersunk, flat or Phillips heads for exposed screws and bolts.
- G. Shop Painting:

1. Clean, treat, and paint exposed surfaces of steel doors, including galvanized surfaces (see 2.03, Finish).
2. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.
3. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint.

H. Louver and Vision Panels

1. Provide factory pre-cut openings for installation of vision panels and metal louvers as indicated by door types shown on drawing.
 2. Vision Panel Frames: Door manufacturer's standard steel glass molding, 18-gauge minimum.
 3. Vision Panel Frames, Labeled Doors: Metal vision frames shall be Air Louvers, Inc. beveled vision lite with glass retainer, model #VLFEZ or VSIG, coordinate with glazing thickness, and be listed by Underwriter's Laboratories, Inc. and carry U. L. Label. All corners are to be mitered and flush welded. Counter-sunk flush mounting holes shall be pre-punched and plated thru-bolt fasteners provided by the factory. Vision frames shall be 18 gauge cold rolled steel, and shall be degreased and given a phosphate preparation prior to a baked silicon polyester powder coat finish.
- I. Undercut non-rated doors as indicated on drawings to allow for adequate air transfer.

2.02 DOOR FRAMES

- A. Fabricate frames with mitered corners, welded construction for interior and exterior applications. Knocked-down frames for field assembly shall be allowed only at retro-fitted applications as indicated on the drawings.
- B. Minimum gauges: 16 gauge cold rolled steel for interior frames; 14 gauge galvanized steel with A60 zinc coating for exterior frames.
- C. Break-form steel sheets:
1. Provide profiles and shapes free of warp, buckles, fractures or other defects.
 2. Form stops integral with frames unless otherwise shown.
- D. Corners and connection shall be mitered and welded with exposed welds ground flush and smooth.
- E. Frame Reinforcement: Reinforce per SDI 107.

1. Hinge reinforcement: Minimum 7 gauge.
2. Strike reinforcement: Minimum 16 gauge.
3. Closer reinforcement: Minimum 14 gauge.
4. Provide welded-in-place guards for all hardware cutouts.

F. Anchors:

1. Provide one anchor at each jamb for each 2 feet 6 inches of door height or fraction thereof.
2. Vary anchor types where required by conditions to provide positive fastening to, and compatible with adjacent construction:
 - a. Attachment to Masonry Construction:
 - (1) Galvanized
 - (2) Adjustable, flat, corrugated or perforated "T" shaped with leg not less than 2 inches wide by 10 inches long.
 - b. Attachment to Drywall Construction:
 - (1) Manufacturers standard compression type for Drywall type frame.
 - (2) Steel or Wood Stud type to accommodate frame jamb depth and face dimension.
 - c. Existing Masonry or Concrete
 - (1) 3/8 inch countersunk flat head bolt and expansion shields.
 - (2) Locate 6 inches from top and bottom and maximum 24 inches on center.
 - (3) Weld pipe spacers or other type of spacers, per manufacturers standard design, in back of frame soffit.
3. Weld a 16-gauge minimum metal clip angle at bottom of each jamb member for anchoring to floor, with a minimum of 2 fasteners per clip.
4. Provide "B-label" type adjustable strap anchors for labeled units.

2.03 PREPARATION FOR FINISH HARDWARE

- A. Prepare frames and door to receive hardware:

1. Furnish hollow metal, manufacturer-approved hardware schedule, hardware templates and samples of physical hardware where necessary to ensure correct fitting and installation.
 2. Preparation includes sinkages and cutouts for mortise and concealed hardware.
 3. Prepare frames for security devices as required by Section 08710 and Division 16 Electrical Specifications. Provide cutouts and backboxes as part of the work of this section.
- B. Provide reinforcements for both concealed and surface-applied hardware.
1. Drill and tap mortise reinforcements at factory, using templates.
 2. Install reinforcements with concealed connections designed to develop full strength of reinforcements.
- C. Provide dust boxes for the following:
1. Strike plate cutouts.
- D. Prepare frames to receive inverted type door silencers; coordinate with approved hardware schedule.

2.04 FINISH

- A. Welded unit frames and doors shall be leveled and ground smooth; exterior frames and doors shall be galvanized.
- B. Apply mineral filler to eliminate weld scars and other blemishes.
- C. All doors, frames, and other components shall be cleaned, phosphatized and finished with one coat of baked-on rust inhibiting primer complying with ANSI A224.1.
1. Door and frame units shall be finished in the field in accordance with Paint Schedule in Section 09900, Painting.

PART 3 - EXECUTION

3.01 INSTALLATION OF FRAMES

- A. Install frames and doors in accordance with the Steel Door Institute's recommended erection procedures (SDI 105). Install labeled doors and frames in accordance with NFPA 80.
- B. Exercise care in setting of frames to maintain scheduled dimensions, hold head level and maintain jambs plumb and square.

- C. Secure anchorages and connections to adjacent construction; grout all frames solid.
- D. Wherever possible, leave frame spreader bars intact until frames are set perfectly square and plumb, and anchors are securely attached.
- E. Where frames are installed in existing wall construction, secure with manufacturers recommended, "retrofit" anchorage devices, or as otherwise indicated on the drawings.
- F. Secure welded unit frames to structural steel framing concealed in hollow metal work, and make field splices.
- G. Allow for expansion movement.
- H. Fill exposed fasteners and other blemishes.
- I. Where non-galvanized frames come in contact with concrete or masonry, coat frame throat with one full coat of bituminous paint.

3.02 DOOR INSTALLATION

- A. Fit hollow metal doors accurately in frames, with clearances specified in SDI 105:
 - 1. 1/8 inch between door and frame at heel and jambs.
 - 2. 1/8 inch at meeting edges of door pairs.
 - 3. 3/4 inch above finish floor at sills without threshold.
 - 4. 1/4 inch at sills with threshold.
- B. Ensure that doors contact frame stops uniformly.
- C. Install fire-rated doors with clearances specified in NFPA No. 80.

3.03 HARDWARE INSTALLATION

- A. Install hardware in accordance with Hardware Manufacturer's written instructions and Section 08710. Drill and tap for machine screws where required; do not use self-tapping screws.

3.04 PRIME COAT TOUCH-UP

- A. Immediately after erection, areas where primer coat has been damaged shall be sanded smooth and touched up with same primer as applied at shop.
- B. Remove rust and apply touch-up primer as specified above.
- C. Touch-up shall not be obvious and shall blend into paint finish.

3.05 ADJUSTMENT AND CLEANING

- A. Remove dirt, excess sealant, mortar, glazing compounds, or other foreign material from exposed door and frame surfaces.
- B. Adjust moving parts for smooth, unhindered operation.
- C. Fill minor dents, holes etc. with metal filler and sand smooth and flush with adjacent surfaces. Prime and paint to match adjacent surface.

3.06 PROTECTION

- A. Protect installed hollow metal work against damage or deterioration from other construction work or undue weathering. Correct any damages to hollow metal work prior to finish painting.

END OF SECTION

SECTION 08211
WOOD DOORS
(PARTICLE CORE)

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and Division 1 Specification Sections, apply to the Work of this Section.

1.02 RELATED WORK

- A. Section 01740: Warranties and Bonds
- B. Section 08100: Metal Doors and Frames
- C. Section 08710: Finish Hardware
- D. Section 08800: Glazing
- E. Section 16610: Fire Detection and Alarm System (Fire rated doors)

1.03 REFERENCES

- A. NFPA 80-99: "Fire Doors and Fire Windows"
- B. NFPA 252-95: "Standard Methods of Fire Tests of Door Assemblies"
- C. Architectural Woodwork Institute (AWI)
- D. Window and Door Manufacturers Association (WDMA)
- E. Intertek Testing Services - Warnock Hersey (ITS-WH)
- F. ICC/ANSI A117-1-1998: "Accessible and Usable Buildings and Facilities"
- G. UL 10C-98: "Positive Pressure Fire Tests of Door Assemblies"

1.04 DESCRIPTION OF WORK

- A. Provide and install interior solid core doors, including fire doors, where shown and scheduled on the drawings.

1.05 QUALITY ASSURANCE

- A. General: Comply with AWI Quality Standards of the Architectural Woodwork Institute (AWI Section 1300, latest edition), and WDMA 1.S.1A latest edition.

- B. Fire Doors: Comply with NFPA 80 for labeled fire doors. Fire doors shall be tested in compliance with NFPA 252 or UL 10-C for positive pressure. A physical label shall be permanently affixed to the fire doors.
- C. Supplier shall be a qualified direct distributor for the door manufacturer.
- D. All doors furnished for this project shall be fabricated by a single manufacturer to ensure uniformity in appearance and construction.
- E. In order to verify compliance with Product Standards in Part 2, Owner reserves the right to randomly select, field cut, and inspect two (2) doors delivered to the Project Site. Failure of the tested doors in meeting Product Standards may, at the discretion of the Owner, require replacement of some or all doors at no cost to the Owner.

1.06 SHOP DRAWINGS AND PRODUCT DATA

- A. Product Data: Submit door manufacturer's product data, specifications and installation instructions for each type of wood door.
 - 1. Include details of core and edge construction, trim for openings, and louvers and similar components.
 - 2. Include finishing specifications for doors to receive factory applied shop finish.
 - 3. Include certifications required to show compliance with specifications.
- B. Shop Drawings: Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for factory sealing and other pertinent data.
- C. Samples: Submit samples indicating veneer and door construction, indicating exposed edges, stile and rail construction, and core composition. Include door finish samples.
- D. Submit manufacturer's warranty statement.

1.07 REQUIREMENTS OF REGULATORY AGENCIES

- A. Where fire rated doors are indicated on the drawings, provide units tested and labeled by Underwriter's Laboratories Inc., Factory Mutual, ITS-Warnock Hersey or other such testing agencies which are demonstrated to be acceptable to the local code officials.
- B. Non-Sprinklered Buildings: All labeled doors in rated enclosed stairways shall comply with the VUSBC for maximum temperature rise of 450° F after 30 minutes

of standard fire test exposure. Such compliance shall be clearly stated on the door label.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wood doors to site only after completion of "wet" trades and after building is dry, heated and ventilated.
- B. Deliver wood doors in manufacturer's original packaging, individually bagged, with manufacturer's identifying label intact. Inspect doors for damage after delivery.
- C. Store wood doors in a secure dry area, safe from extreme variations in temperature and humidity, with HVAC system in operation. Acceptable humidity range shall be no less than 25%, nor greater than 55%.
- D. Stack doors flat on lumber supported at ends and center. Protect top and bottom doors of stack from damage to door surface. Do not drag one door across another when stacking or unstacking.

1.09 WARRANTY

- A. Warranty: Submit signed, warranty executed on manufacturer's standard form. Provide for replacing (including cost of rehang and refinishing), at no cost to Owner, wood doors exhibiting defects in materials or workmanship, including warp and de-lamination, for lifetime of the installation of interior doors as follows:
 - 1. Telegraphing of stile and rail through face, causing surface variation in excess of 1/100 inch in any 3-inch space.
 - 2. Warp or twist of 1/4 inch or more in any plane of door face.

PART 2 - PRODUCTS

2.01 DOOR TYPES

- A. Flush faced type interior wood doors (rated and non-rated).

2.02 DOORS

- A. Flush Interior doors: PC-5 (AWI 1300-S-7), 1-3/4 inch thick, Type I (face assembly), Type II (core assembly), Class I with plain sliced, book matched, stain grade red oak face veneers; Custom Grade for face material and exposed edges.
 - 1. Core construction: Particleboard core complying with AHSI A208.1-LD-2, bonded to stiles and rails.
 - 2. Stiles: Minimum 1-3/8" (after trim) face thickness for vertical edges.

3. Top and Bottom Rails: Minimum 1-3/8" (after trim and standard undercut) face thickness for horizontal edges.
 4. All horizontal and vertical edges shall be solid wood, one piece or laminated without voids or show-through except that Structural Composite Lumber (SCL) shall be acceptable as an alternative to solid wood.
 5. Provide Bonded edge interface of stiles and rails to particleboard core per AWI 1300-S-5. Adhesive shall conform to Type I or Type II, ANSI/WDMA I.S.1-A Series. Abrasively plane and sand surfaces before veneering to avoid telegraphing of core parts through veneer face.
- B. Fire-Rated Solid Core Doors: Grade, face veneers and stile and rail construction shall match non-rated flush interior doors, except as required to meet ratings indicated on drawings, and as noted below. Provide manufacturers standard mineral core construction for fire labeling required by drawings and as tested and labeled by a recognized testing agency listed in 1.07.
1. Provide minimum 5" top rail for door closer mounting.
- C. Doors shall be pre-fit, beveled, and pre-machined at the factory.
- D. Factory Finish: Provide door manufacturer's factory finish, which shall meet or exceed AWI System TR-6, catalyzed polyurethane. Finish shall be clear (no stain). System shall consist of three coats of sealer, sanding, and two topcoats. Cure to produce finish complying with AWI Quality Standards, Section 1500.
1. Factory seal top and bottom rails of door.
- E. CHPS Requirement for Low Emitting Materials
1. Products shall meet the VOC content requirements in the applicable category of South Coast Air Quality Management District (SCAQMD) rule 1113. Architectural coatings current edition.
 2. Provide paints, coatings, adhesives and wood products that have low emission of VOC's as approved by CHPS.

2.03 LOUVERS AND VISION PANELS

- A. Provide factory pre-cut openings for installation of vision panels and metal louvers as indicated by door types shown on the drawings.
- B. Vision Panel Frames, Non-labeled doors: Manufacturers standard flush wood glass lite moldings, matching door face veneer. Set and putty nail attachment locations.
- C. Vision Panel Frames, Labeled Fire Doors: Metal vision frames shall be Air Louvers, Inc. or comparable beveled visionlite with glass retainer (model #VLF-

EZ), listed by Underwriter's Laboratories, Inc. and shall carry U.L. label. All corners shall be mitered and flush welded. Counter-sunk flush mounting holes shall be prepunched and plated thru-bolt fasteners provided by the factory.

Vision frames shall be 18 gauge cold rolled steel, and shall be degreased and given a phosphate preparation prior to a baked silicon polyester powder coat finish.

2.04 FABRICATION

- A. Fabricate doors in accordance with requirements of AWI Quality Standards, Section 1300 and WDMA standards (I.S. 1-A).
- B. Provide doors with minimum 1/4 inch thick edge strips, of wood species to match face veneers.
- C. Bevel-strike edge of single acting doors 1/8 inch in 2 inches. Radius strike edge of double acting swing doors 2-1/8 inches.
- D. Pre-machine and prepare doors to receive hardware. Refer to Section 08710 for hardware requirements. Provide proper blocking to accommodate hardware. Comply with approved hardware schedule and hardware templates.
 - 1. Coordinate with Division 16 for preparation required to accommodate security devices and electromagnetic door holders.
- E. Where doors shall be installed in existing frames, fabricate doors to fit existing frames. Field verify all existing frames prior to door fabrication to ensure correct fit.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Inspect the locations where the doors shall be installed. Notify the Architect and Owner's Representative of any conditions that would adversely affect the installation or normal operation of the doors. Do not proceed until unsatisfactory conditions have been corrected.
 - 1. Verify that door frames are of type required for door and are installed as required for proper installation of doors.
 - 2. Inspect frames prior to door installation. Do not install doors in frames out of plumb or square that would otherwise hinder the proper operation of the doors.
- B. Field Testing: Owner may elect to field cut two (2) doors as described in 1.05 E.

3.02 INSTALLATION

- A. Fitting and Machining (for new doors in existing frames).
 - 1. Fit doors for width by planing; for height by sawing.
 - a. 1/2 inch from bottom.
 - b. 1/8 inch maximum from top.
 - c. Comply with NFPA 80 for fitting clearances of fire-rated doors.
 - 2. Machine doors for hardware. A plus or minus 1/32-inch tolerance is allowable on hardware locations. A plus 1/32-inch, minus 1/64-inch tolerance is allowable for lock front cutouts
 - 3. Seal job site cut surfaces with two (2) coats of varnish before final hanging of doors.
- B. Installation of Doors:
 - 1. Install in accordance with requirements of AWI Section 1300 and WDMA standards. All doors shall be allowed to acclimate to controlled building environment (temperature and humidity) before installation.
 - 2. Clearances:
 - a. Allow maximum of 1/8 inch at jamb and head.
 - b. Allow maximum of 1/8 inch at lock edges.
 - c. Allow maximum of 3/8 inch over threshold or saddle.
 - d. Allow maximum of 1/2 inch over decorative floor coverings (3/4 inch maximum for non-combustible floor).
 - 3. Install fire-rated doors in accordance with NFPA 80.
 - 4. Drill pilot holes for all fasteners for hinges, lock hardware, and other devices.
 - 5. Field finishing: For field modifications only. See Section 09900, Painting. Field finishing shall be performed on all six sides of doors prior to hardware installation.

3.03 WORK AT EXISTING WOOD DOORS *(delete if not applicable to project work scope)*

- A. Trim and refit interior non-rated doors in conjunction with new carpet work where necessary to ensure free door movement. Seal all cut edges immediately after alterations.
- B. Modify exterior doors as required to receive new weatherstripping and hardware specified under Section 08710.
- C. No doors bearing Labels showing compliance with U. L., Warnock-Hersey or Factory mutual fire resistance criteria shall be altered in field.
- D. Work includes removal and replacement of all hardware as required to accomplish Work specified herein, and required for proper reinstallation.

3.04 ADJUSTMENT AND CLEANING

- A. Wood doors that are hingebound, not swinging freely or otherwise operating improperly shall be rehung; replace door(s) if deficiencies cannot be corrected by rehunging.
- B. Protect doors to minimize damage or deterioration prior to Owner acceptance. Temporarily cover doors with original wrapping until accepted.
- C. Refinish or replace doors damaged during construction.
- D. Remove all trash and debris associated with the work of this Section from the Project area and dispose of legally.

END OF SECTION

SECTION 08710

FINISH HARDWARE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General Conditions and Division One Specification Sections, apply to the Work of this Section.

1.02 REFERENCE STANDARDS

- A. The Americans with Disabilities Act Accessibility Guidelines (ADAAG) and ICC/ANSI A117.1.
- B. BHMA – Builders Hardware Manufacturers Association
- C. DHI – Door and Hardware Institute
- D. NFPA – National Fire Protection Association
 - 1. NFPA 80: Fire Doors and Windows
 - 2. NFPA 101: Life Safety Code
 - 3. NFPA 252: Fire Tests of Door Assemblies
- E. UL – Underwriters Laboratories
 - 1. UL 10C: Positive Pressure Fire Tests of Door Assemblies
 - 2. UL 305: Panic Hardware
- F. ITS-WH – Intertek Testing Service - Warnock Hersey
- G. SDI – Steel Door Institute
- H. WDI – Wood Door Institute
- I. AWI – Architectural Woodwork Institute
- J. NAAM – National Association of Architectural Metal Manufacturers

1.03 RELATED WORK

- A. Shop Drawings, Product Data and Samples: Section 01340
- B. Substitutions and Product Options: Section 01630
- C. Cleaning: Section 01710
- D. Metal Doors and Frames: Section 08100
- E. Wood Doors: Section 08211
- F. Cross Corridor Packaged Door Pair Assemblies: Section 08326
- G. Entrances and Storefronts: Section 08400
- H. Interior Signage: Section 10440
- I. Elevators and Lifts: Division 14
- J. Security Intrusion: Section 16620
- K. Fire Alarm System: Section 16710
- L. Door Access Video Entry System: Section 16626 (Elementary & Middle Schools only)

1.04 WORK DESCRIPTION

- A. The work of this section includes, but is not limited to, the following:
 - 1. All door hardware, including cylinder locks for the following.
- B. Contractor shall provide all labor necessary to install hardware and accessories.
- C. Hardware for windows and casework is covered under the applicable Sections in Divisions 8 and 12 respectively.

1.05 DESCRIPTION OF HARDWARE

- A. The required types of hardware include (but are not necessarily limited to) the following:
 - 1. Butts and Hinges
 - 2. Lock Cylinders and Keys
 - 3. Door Closers
 - 4. Protective Plates
 - 5. Stripping and Seals
 - 6. Thresholds

1.06 QUALITY ASSURANCE

- A. Qualifications of Manufacturers: Products used in the Work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect and Owner.
- B. Qualifications of Hardware Supplier: Direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course work for project hardware consultation to Owner, Architect and Contractor and responsible for detailing, scheduling and ordering of finish hardware.
- C. Hardware: New, free from defects, blemishes and excessive play. Each kind of hardware shall be supplied from a single manufacturer.
- D. Departures from Approval Materials: Substitutions shall not be allowed except as provided in Section 01630. Include product data and comparison of proposed substitution and specified product. Furnish operating samples upon request.
- E. Fire Rated Openings: Provide hardware for fire rated openings in compliance with A.I.A. (NBFU) Pamphlet No. 80 and NFPA Standard No. 80. This requirement takes precedence over other requirements for such hardware. Provide only hardware that has been tested and listed by UL for the types and sizes of doors required, and which complies with the requirements of the door and door frame labels.
 - 1. Where panic exit devices are required on fire rated doors, (with supplementary marking on door UL label indicating "Fire Door to be

Equipped with Fire Exit Hardware") provide UL label on exit device indicating "Fire Exit Hardware."

1.07 SUBMITTALS

- A. Existing Buildings: Prior to submittal, carefully inspect existing condition to verify finish hardware required to complete work, including sizes quantities and suitability of specified materials. Conflicts between scheduled materials and actual conditions shall be documented in writing to the Architect and Owner's Representative.
- B. Submit copies of hardware schedule in accordance with Section 01340. Organize vertically formatted schedule into "Hardware Sets" with index of doors and headings, indicating complete designations of every item required for each door or opening. Include the following information:
 - 1. Type, style, function, size, quantity and finish of hardware items. Use BHMA finish codes per ANSI A156.18.
 - 2. Name, part number and manufacturer of each item.
 - 3. Fastenings and other pertinent information.
 - 4. Location of hardware set coordinated with floor plans and door schedule.
 - 5. Explanation of abbreviations, symbols, and codes contained in schedule.
 - 6. Mounting locations for hardware.
 - 7. Door and frame sizes, materials and degrees of swing.
 - 8. List of manufacturers used and their nearest representative with address and phone number.
 - 9. Catalog cuts.
 - 10. Manufacturer's technical data templates and installation instructions with copy of transmittal indicating applicable data has been distributed to the installer.
 - 11. Date of jobsite visit.
 - 12. Key control schedule for all locksets.
 - 13. Material samples.
 - 14. Guarantees
 - 15. Evidence of Coordination of hardware types with work of other trades.

1.08 PRODUCT HANDLING AND STORAGE

- A. Packing and Marking: Individually package each unit of finish hardware, complete with proper fastenings and appurtenances, clearly marked on the outside to indicate the contents and specific locations in the Work.
- B. Protection: Provide secure lock-up for hardware delivered to the project, but not yet installed. Contractor shall exercise care in the handling and installation of hardware items that are not immediately replaceable, so that the completion of the work will not be delayed by hardware losses, both before and after installation.
 - 1. Permanent keys and cores: Provide secure delivery direct to Owner. (Keying Requirements, 2.03)

- C. Replacements: In the event of damage after delivery, the Contractor shall make all repairs and replacements necessary at no additional cost to the Owner.

1.09 SEQUENCING AND COORDINATION

- A. Verify proper wall reinforcement. Coordinate floor mounted hardware with finish floor materials and floor substrates. Furnish manufacturer templates to door and frame fabricators.
- B. Provide door and opening frame submittals to hardware supplier to confirm that adequate provisions are made to ensure proper hardware installation.

1.10 WARRANTIES

- A. Provide manufacturer's warranties as follows:
 - 1. Closers: Ten (10) years for mechanical devices
 - 2. Exit Devices: Three (3) years
 - 3. Hinges: Life of installation
 - 4. All other Hardware: One (1) year

1.11 HARDWARE MOUNTING HEIGHTS

- A. Mounting heights of hardware from standing level (see Drawings) shall be as follows: (Measured from floor to centerline of hardware device)
 - 1. Grades K through 6:
 - a. Push Plates: 42"
 - b. Pull Handles: 42"
 - c. Levers: 36"
 - d. Exit Devices: 36" to centerline of push bar
 - e. Deadlocks: 48" maximum
 - 2. Grades 7 through 12 and adults:
 - a. Push plates: 50"
 - b. Pull handles: 42"
 - c. Levers: 36"
 - d. Exit Devices: 40" to centerline of push bar
 - e. Deadlocks: 48" maximum

PART 2 - PRODUCTS

2.01 GENERAL

- A. References to specific products are used to establish minimum standards of utility and quality. Provide the specific products as indicated or pre-approved in accordance with Section 01630.
- B. Manufacturers: Hardware standards described in this Section shall be considered as standards of quality. Review and approval shall be based on conformity to operation, design, finish and quality of specified hardware. Furnish items for use on doors and frames that are compatible with the thickness, profile, swing and other requirements, which are critical to proper function. Numbers shall be taken from, but not necessarily limited to (except as noted), the catalogs of the following manufacturers.
1. Ball-Bearing Butt Hinges:
 - a. Hager
 - b. Bommer
 - c. Ives
 2. Overhead Closers:
 - a. Norton
 - b. LCN
 - c. Sargent
 3. Locksets/Latchsets: Schlage "ND Series" (no substitutions)
 4. Stops, Coordinators, Bumpers, & Silencers:
 - a. Ives
 - b. Trimco
 - c. Rockwood
 5. Thresholds and Gasketing:
 - a. Pemko
 - b. Zero
 - c. National Guard Products (NGP)
 6. Key System, Cylinders & Key blanks: Schlage (no substitutions)
 7. Cylinder Guards: Schlage
 8. Overhead Stops & Holders:
 - a. Glynn-Johnson
 - b. ABH
 - c. Sargent

- C. All finish hardware shall be furnished and packaged with all necessary screws, bolts, and other fasteners of suitable sizes and type to anchor the hardware in position for long life under hard use.
- D. Furnish fastenings where necessary using expansion shields, toggle bolts, sex bolts and other anchors approved by the Architect, compatible with the material to which the hardware is to be applied, and in conformance with the recommendations of the hardware manufacturer.
- E. All fastenings shall match the hardware material and finish.
- F. Finishes: Take special care to coordinate all of the various manufactured items furnished under this Section. Where practical, ensure uniform finish of all the various hardware components.
 - 1. Unless noted otherwise, all hardware shall have 630 satin stainless steel finish. If stainless steel finish is not available as a standard, then satin chrome Sparta -626 shall be acceptable.

2.02 MATERIALS

- A. Butt Hinges
 - 1. Provide hinge open widths of sufficient throw to permit maximum door swing. Where doors are required to swing 180 degrees, furnish hinges of sufficient throw to clear the trim.
 - 2. Furnish 5-knuckle, ball bearing half surface hinges with through bolts and back plates on mineral core labeled doors.
 - 3. Furnish 5-knuckle, ball bearing full mortise hinges with non-rising pins for non-labeled interior doors.
 - 4. Furnish non-removable pins at out-swinging exterior doors, non-rising pins at interior doors.
 - 5. Provide not less than 3 hinges per door leaf.
 - 6. Interior hinges shall be plated steel; exterior hinges shall be stainless steel with non-removable pins.
 - 7. All hinges shall be standard weight, average frequency.
 - 8. Products as follows:

	<u>Hager</u>	<u>Bommer</u>	<u>Ives</u>
Full Mortise	BB1279	BB5000	5BB1
	BB1168	BB5004	5BB1HW
	BB1191	BB5002	5BB1

	BB1199	BB5006	5BB1HW
Half Surface	BB1163	BB5304	5BB4HW

- B. Locksets, latchsets and deadbolts: Extra Heavy Duty Cylindrical Locks and Latches: as scheduled. (Schlage ND Series)
1. Chassis: cylindrical design, corrosion-resistant, plated cold-rolled steel, through bolted.
 2. Locking Spindle: stainless steel, interlocking design.
 3. Latch Retractors: forged steel. Balance of inner parts: corrosion resistant plated steel, or stainless steel.
 4. Lever Trim: accessible design, independent operation, spring-cage supported, minimum 2" clearance from lever mid-point to door face.
 5. Strikes: 16 gage curved steel, bronze or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.
 6. Provide Schlage auxiliary reinforcement kit (37-001) for reinforcement of lever sets in hollow metal doors.
 7. Certifications:
 - a. ANSI A156.2, Series 4000, Grade 1.
 - b. UL listed for A label and lesser class single doors up to 4 ft. x 8 ft.
- C. Overhead Closers:
1. High Frequency Surface Door Closers
 - a. Locations:
 1. All exterior doors
 2. All doors equipped with panic exit devices
 3. Corridor doors at PE/gym, cafeteria, locker rooms
 4. Group toilets
 5. Library (main access)
 6. Main reception office
 7. Guidance reception office
 8. Other areas as specified
 - b. Shall conform to ANSI A156.4, Grade 1, NFPA 80, NFPA 101 and UL10C
 - c. ISO 9000 certified. Units shall be stamped with date of manufacturer code.

- d. Where parallel arm closers are specified, provide forged rigid heavy duty with large nut at elbow.
- e. Factory representative to inspect all closers prior to final acceptance to ensure proper installation and adjustment. A written report shall be filed with the Architect and Owner after inspection.
- f. Closers shall have metal cover with standard powder coat or painted finish.
- g. All closers to be installed with steel through bolts and non-ferrous back plates. Back plates shall be rectangle in shape and of sufficient size to capture all four bolts in single plate, but not less than 1/2" clearance from edge of plate to edge of bolt hole. Thickness shall not be less than .038" (20ga.) thick.
- h. Locate closers on interior side of exterior doors and on the non-public side of interior doors, unless otherwise specified.
- i. Provide plates, brackets and special templates when needed for interface with particular header door and wall conditions and adjacent hardware.
- j. Closers shall have a stable fluid withstanding temperature range of 120 degrees to 30 degrees hydraulic fluid.
- k. Install closers and templating to provide maximum ADA opening force compliance.
- l. Provide auxiliary stop or closer arm with integral spring stop on closer applications that open past 105-degrees without contacting an adjacent wall.
- m. Closers shall be non-handed cast iron, 1.5" diameter bore with single piece forged piston, one body for all applications. Closers to be multi-size 1 thru 6.
- n. Acceptable Products:

<u>LCN</u>	<u>Norton (xCWF)</u>	<u>Sargent</u>
4040XPM	9500M	281MC-O
4040XPM-EDA	PR9500MxPR7701-5 Arm	281MC-P10
4040XPM-SCNS	UNI 9500M	281MC-CPS

Note: (H) suffix for hold-open feature

2. Standard Frequency Surface Door Closers:

- a. Shall conform to ANSI A156.4, Grade 1, NFPA 80, NFPA 101 and UL 10C.
- b. Full rack-and-pinion type closer, die cast aluminum cylinder, 1.25” diameter bore minimum, with single piece forged piston, non-critical screw valves: back check, sweep and latch.
- c. ISO 9000 certified. Units shall be stamped with date of manufacturer code.
- d. Where parallel arm closers are specified, arms shall be forged, rigid heavy duty, with large nut at elbow.
- e. Closers shall be non-handed, one body for all applications. Closers to be multi-size 1 thru 6. Closers shall be sized to the door and application at time of installation.
- f. Factory representative shall inspect all closers prior to final acceptance to ensure proper installation and adjustment. A written report shall be filed with the Architect and Owner’s Representative after inspection.
- g. Closers shall have “full feature” metal cover with manufacturer’s standard powder coat or painted finish.
- h. All closers to be installed with steel through bolts and non-ferrous back plates. Back plates shall be rectangle in shape and of sufficient size to capture all four bolts in single plate, but not less than ½” clearance from edge of plate to edge of bolt hole. Thickness shall not be less than .038” (20ga.) thick.
- i. Provide auxiliary stop or closer arm with integral spring stop for closer applications that open past 105-degrees without contacting an adjacent wall.
- j. Install closer templating to provide maximum ADA opening force compliance.
- k. Acceptable Products:

<u>LCN</u>	<u>Norton (XCWF)</u>	<u>Sargent</u>
1450MC	8501M	1431-0-CMC
1450EDA-MC	PR8501MxPR8020-5 Arm	1431-PED-CMC
1450SCNS-MC	UNI 8501M	1431-CPS/CMC

Note: (H) suffix for hold-open feature

D. Protection Plates:

1. Fasteners: Provide manufacturer’s standard exposed fasteners for door trim units (kick plates, edge trim, viewers, and similar units), either machine screws or self-tapping screws.
2. Fabricate edge trim of stainless steel, not more than ½” or less than 1/16” smaller in length than door dimension.
3. Fabricate protection plates (armor, kick or mop) not more than 1 ½” less than door width on stop side and not more than ½” less than door width on pull side, x the height indicated. Where protection plates and half-surface hinge backplates conflict, reduce protection plate width by clearance required, plus ½”.
4. Metal Plates: Stainless steel, .050” (U.S. 18 ga.), beveled 3 edges (B3E).
5. Acceptable Products:
 - a. Ives 8400 Series
 - b. Trimco K0050 Series
 - c. Rockwood K1050 Series

E. Door Silencers (all doors): All hollow metal frames shall have gray resilient type silencers. Quantity: (3) for each single door and (6) for each pair of doors.

1. Products:

	<u>Ives</u>	<u>Trimco</u>	<u>Rockwood</u>
Metal Doors:	SR64	1229A	608
Wood Doors:	SR65	1229B	609

F. Doors Stops (all doors): shall be furnished to prevent damage to doors or hardware from striking adjacent walls or fixtures. Provide wall bumpers; except where not practical, furnish floor stops. Where conditions prohibit the use of either wall or floor type stops, furnish surface mounted overhead stops.

1. Acceptable Products:

	<u>Ives</u>	<u>Trimco</u>
	WS406CCV	1270WV
	FS444	1201
	FS495	

G. Thresholds and Gasketing:

1. Thresholds and full perimeter gasketing, including doors sweeps with nylon brush inserts, shall be provided on all exterior doors.
2. Thresholds: Aluminum, saddle type, ADA compliant for handicap accessibility. Size as required for opening condition.

- a. Sealant: Set in full bed of butyl rubber or polyisobutylene mastic sealant.
- 3. Gasketing: Metal type with polyurethane or silicone gasket insert. Vinyl inserts shall not be acceptable.
- 4. Sound Seals: Provide metal sound seals with neoprene or silicone inserts. Provide door sweeps with neoprene inserts. Provide adjustable perimeter seals and automatic door bottoms only when required to achieve STC rating.
- c. Rockwod 18/19 Series, 550 Series

H. Overhead Holders and Stops:

Furnish concealed overhead holder/stop complying with ANSI/BHMA A156.8 of the type, design and function as specified here within.

- 1. All holders shall be non-handed and furnished complete with proper fasteners.
- 2. All holder arms and channels shall be made of extruded bronze or stainless steel.
- 3. Shock absorber to be a shock absorbing coil steel spring with a rubber insert.
- 4. Furnish sex bolts on all wood doors.

Acceptable Products:

<u>Glynn-Johnson</u>	<u>ABH</u>
100 Series	1000 Series
450 Series	4000 Series

- I. Miscellaneous: All other items, not specifically described but required for a complete and proper installation of finish hardware, shall be as selected by the Contractor, but subject to the approval of the architect.

2.03 KEYING REQUIREMENTS

- A. Key System: Schlage “Everest 29 T Family” utility-patented restricted keyway, non-interchangeable core, except interchangeable core type operating cylinders for panic hardware, removable mullions, mortise locksets, overhead/coiling doors, padlocks, elevators. Utility patent protection to extend at least until 2029. Key blanks shall be available only from factory-direct sources; blanks provided by after-market key blank manufacturers shall not be allowed. Requirements are as follows:

- 1. Existing factory registered grand master key system.

2. Non-interchangeable core construction keying: inserted type partial key. At each phase and at substantial completion, remove inserts in presence of Owner's Representative; demonstrate consequent non-operability of construction key. At substantial completion, give all removed inserts and all construction keys to Owner.
 3. Interchangeable core construction keying: Furnish temporary keyed-alike cylinders/cores. Remove at substantial completion and install permanent cylinders/cores in presence of Owner's Representative. Demonstrate that construction keys no longer operate.
 4. Temporary cylinders/cores shall remain property of supplier.
 5. Furnish 10 construction keys.
 6. Stamp each change key with facility code; key set symbol and "DO NOT DUPLICATE". Bitting will not be stamped on change key.
 7. Furnish 2 construction control keys.
 8. Furnish 2 extractor tools 35-057.
 9. Furnish not less than 3 keys each lock or 2 keys each keyed alike group with a minimum of 6 keys per group.
 10. Furnish the following quantities of master keys:
 - a. Elementary Schools: 16 each
 - b. Middle Schools/Centers: 18 each
 - c. High Schools: 36 each
 - d. Secondary schools 41 each
 11. Furnish to Owner a complete bitting list of all keys used on this project in Excel format.
 12. Recombinate entire project at no extra expense to Owner if construction keys or construction cylinder inserts are missing.
 13. Furnish to Owner 10 faculty restroom lock emergency keys for Elementary, Middle and High School Projects.
 14. Provide elevator cores at each level keyed to the school master.
 15. Provide cores for gym curtains and motorized projection screens switches, keyed to the school master.
- B. Key Cylinders: utility patented 6-pin solid brass construction.

- C. Locks and cylinders: keyed at factory of lock manufacturer where permanent records are maintained. Locks and cylinders shall be of the same manufacturer.
- D. All keys and bitting list sent shall be directly from lock manufacturer to Owner marked with project name, via registered mail to:

Director, Design and Construction, Fairfax County Public Schools
Project:
8115 Gatehouse Road, Suite 3500
Falls Church, VA 22042-1203

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Coordinate hardware installation with work of other trades. Supply information related to the approved hardware schedule, including manufacturers' basic written installation instructions.
- B. Install hardware per manufacturer's written instructions and recommendations. Upon completion of the installation, and as a condition of its acceptance, visually inspect all finish hardware furnished under this Section and place in optimum working condition. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation.
 - 1. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use "RivNuts", "NutSerts" or similar anchoring device for screws.
- C. Drill pilot holes for fasteners in wood doors and/or frames.

3.02 ADJUSTING

- A. Adjust and check for proper operation and function. Replace units which cannot be adjusted to operate freely and smoothly.
 - 1. Hardware damaged by improper installation or adjustment methods shall be repaired or replaced at no extra cost to Owner.

3.03 DEMONSTRATION

- A. Demonstrate electrical, electronic and pneumatic hardware systems, including manufacturer's recommended adjustment and maintenance procedures.

3.04 PROTECTION AND CLEANING

- A. Cover installed hardware, protect from paint, cleaning agents, weathering, construction activities, etc. until accepted by Owner. Remove covering materials and clean hardware immediately prior to substantial completion.

- B. In addition to requirements of Section 01710, use all necessary care during installation of the work to prevent scratching, gouging, chipping, etc. of the surface of adjoining work.
- C. At completion of each segment of installation in a room or space, promptly remove all scraps, debris, and surplus materials related to the work of this Section from the work area and dispose of legally.
- D. Clean adjacent wall, frame and door surfaces soiled from installation/reinstallation process.

3.05 EXISTING HARDWARE

- A. Inspect, clean, and lubricate locksets and latchsets designated to remain.
- B. Inspect, tighten, and lubricate hinges to remain.
- C. Inspect all closers designated to remain for proper operation; adjust and tighten fasteners.

3.06 INSPECTION

- A. Inspection: Conduct in the presence of the hardware supplier and Owner's Representative.
- B. Follow-up inspection: Installer shall provide letter of agreement to Owner that, approximately 6 months after substantial completion, installer shall visit project with representatives of the manufacturers of the locking devices and door closers, and shall perform the following:
 - 1. Re-adjust hardware.
 - 2. Evaluate maintenance procedures and recommend changes or additions, and instruct Owner's personnel.
 - 3. Identify items that have deteriorated or failed.
 - 4. Submit written report identifying observed problems and potential future problems.

3.07 HARDWARE SCHEDULE

- A. Hardware sets are included on the drawings and are cross-referenced by set number to the Door/Opening Schedule.

END OF SECTION

SECTION 09110

NON-LOAD BEARING WALL FRAMING SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, shall apply to this Section.

1.02 REFERENCE STANDARDS

- A. ASTM A653 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- B. ASTM A1003 - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
- C. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members.
- D. "Gypsum Construction Handbook" as published by United States Gypsum Company or "SFIA's Technical Guide for Cold-Formed Steel Framing Products" or a comparable manual as published by other acceptable manufacturer.

1.03 SUBMITTALS

- A. Materials Lists: Complete list of materials proposed to be furnished and installed, stating manufacturer's name and catalog number for each item.
- B. Manufacturer's Recommendations: Current recommended method of installation for each item. Recommendations shall be the basis for acceptance or rejection of actual installation methods used.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protection: Use means necessary to protect metal products from rusting and damage before, during and after installation and to protect the installed work and materials of other sections.
- B. Replacement: In event of damage, immediately make repairs and replacements necessary.
- C. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI's "Code of Standard Practice".

1.05 REQUIREMENTS OF REGULATORY AGENCIES

- A. Where fire-resistance classification is specified for walls or partitions with steel stud framing, provide steel studs and accessories of the type, which have been tested and listed for construction indicated.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. ClarkDietrich Building Systems (basis of specification), West Chester, OH (www.clarkdietrich.com).
- B. Directly comparable products of the following manufacturers:
 - 1. MBA Building Supplies, Inc. Frackville, PA 17931 (www.mbastuds.com)
 - 2. [Southeastern](http://www.sestud.com) Stud & Components, Inc., Montgomery, AL (www.sestud.com)
- C. Other manufacturers, pre-bid approved in accordance with Section 01630, shall be acceptable.

2.02 MATERIALS

- A. General: Items specified are products of ClarkDietrich Building Systems. All studs shall be fabricated from steel having 33KSI minimum yield strength or better.
- B. Protective Coating: Comply with ASTM C 645; roll-formed from hot-dipped galvanized steel; complying with ASTM A 1003/A 1003M and ASTM A 653/A 653M G40 (Z120) or having a coating that provides equivalent corrosion resistance. A40 galvanized products are not acceptable.
- C. Metal Studs: ClarkDietrich ProSTUD 20 (20 gauge) with 1-1/4" flange; thickness as indicated on Drawings; 16" o. c. unless denoted otherwise on Drawings.
- D. Ceiling and Floor Runner: ClarkDietrich ProTRAK to match studs with 1-1/4" flange.
- E. Furring Channels: ClarkDietrich metal furring channel, 25 gauge; 7/8" x 2-23/32".
- F. Metal Angle Runners: 24 gauge.
- G. Cold Rolled Channels: ClarkDietrich cold rolled channels, 16 gauge; 3/4" and/or 1-1/2" as required.
- H. All studs and accessories to be galvanized.

- I. Suspended Ceiling Grillage for Gypsum Board Ceilings:
 - 1. 8 gauge hanger wires at 48" o. c.
 - 2. 1-1/2" channels at 48" o. c.
 - 3. Metal furring channels at 16" o. c. anchored to 1-1/2" channels.
 - 4. Shall be in compliance with recommendations of USG's "Gypsum Construction Handbook."
- J. Backing Plate: Proprietary fire-resistance-treated blocking and bracing in width indicated.
 - 1. Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; Danback Fire-Treated Wood Backing Plate [D16F] [D24F], or a comparable product.
- K. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - 1. Product: Subject to compliance with design requirements provide ClarkDietrich Building Systems; [BlazeFrame DSL] [MaxTrak] [SLP-TRK] Slotted Deflection Track, or a comparable product.

2.03 FASTENERS

- A. Runner fasteners, power-driven type, to withstand 193 pounds single shear and 200 pounds bearing force when driven through structural head or base and without exceeding allowable design stress in runner, fastener or structural support.
- B. Screws: Pan self-drilling, self-tapping of size recommended by manufacturer for type of construction involved. See "Selector Guide for USG Screws" as printed in USG "Gypsum Construction Handbook."

2.04 AUXILARY MATERIALS

- A. Isolation Strips at exterior walls: Provide one of the following:
 - 1. Asphalt-Saturated Organic Felt; ASTM D 226, Type I (No. 15 asphalt felt) nonperforated.

2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8" (3.2 mm) thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Prior to work, carefully inspect installed work and verify work is complete to point where installation may commence.
- B. Verify that metal studs may be installed in accordance with original design and manufacturer's recommendations.
- C. In event of discrepancies, immediately notify Owner's Representative and Architect. Do not proceed with installation until discrepancies have been fully resolved.

3.02 PREPARATION

- A. Accurately lay out partitions and wall lines from dimensions given.

3.03 INSTALLATION

- A. Install metal studs and accessory items in accordance with manufacturer's instructions, anchoring member's securely in position.
- B. Align partitions and wall assemblies to a tolerance of 1/8 inch in 8 feet, maximum variation from plumb or level in exposed line or surface.
- C. Securely fasten floor and ceiling runners 24 inches o. c. with suitable fasteners or to suspended ceiling at 16 inches o. c.
- D. Installation, Standard Metal Studs: ASTM C 754.
 1. Position vertically in the runners, spaced 16 inches o. c.
 2. Anchor studs located adjacent to door frames, partition intersections and corners to runner flanges by positive screw engagement with panhead screws through each stud flange and runner flange.
 3. Splice, when necessary, by nesting two studs with a minimum lap of 8 inches and attaching flanges together with two screws in each flange.
 4. Locate studs not more than 2 inches from doorframe jambs, abutting partitions, partition corners and other construction.

5. Securely anchor to jamb and head anchor clips of each doorframe by bolt or screw attachment.
 6. Over metal door frames install a cut-to-length section of runner with flanges slit and web bent to allow flanges to overlap adjacent vertical studs and securely screw-attach to adjacent studs.
 7. Position a cut-to-length stud extending from doorframe header to ceiling runner at the vertical joint over the doorframe.
 8. When partitions abut an exterior wall, place an additional stud no greater than 6 in. from abutment.
 9. Extend and brace partitions to structure above ceiling as required and indicated on drawings.
 10. Install additional studs, blocking and/or headers to framing as necessary to provide for secure rigid attachment for doors, cabinets, fixtures and accessories.
 11. Reinforce partitions to support grab bars adequately for resisting 300 pounds shear. Install additional studs and/or blocking as necessary.
 12. Install continuous isolation strips at all exterior wall and metal framing junctures to fully isolate metal from contact with exterior wall construction.
- E. Isolation of Partitions from Structure: Where partitions abut ceiling or deck construction or vertical structural elements, provide slip or cushion-type joint between partition and structure as recommended by stud manufacturer to prevent the transfer of structural loads or movements to partitions.
- F. Extend partition framing full height to structural supports or framing above suspended ceilings, unless partitions are indicated to terminate at suspended ceilings.

END OF SECTION

SECTION 09251

ABUSE RESISTANT GYPSUM WALLBOARD

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and Division 1 Specification Sections, apply to the Work of this Section.

1.02 SCOPE (Install Abuse Resistant Gypsum Wallboard at the following locations or as shown on the drawings)

- A. Library if shown on the drawings
- B. Administration Area if indicated on the drawings
- C. Lecture Hall if indicated on the drawings
- D. Or other areas as shown on the drawings

1.03 RELATED WORK

- A. Section 09110 - Non-load Bearing Wall Framing Systems
- B. Refer to Section 09250 for gypsum sheathing and regular, fire-rated, exterior ceiling and moisture-resistant gypsum wallboards.

1.04 REFERENCE STANDARDS

- A. U.S. Gypsum Company Guide SA929, "Abuse Resistant Systems."
- B. National Gypsum "Gypsum Wallboard Systems" Guide
- C. ASTM C36 - Gypsum Wallboard
- D. ASTM C475 - Joint Treatment Materials for Gypsum Wallboard Construction
- E. ASTM E119 - Fire Test of Building Construction Materials
- F. ASTM C473 - Humidified Deflection
- G. ASTM D1037 - Linear Variation
- H. ASTM E72 - Racking Resistance
- I. Gypsum Association Manual GA-214, "Recommended Specifications for Levels of Gypsum Board Finish"

- J. Gypsum Association Fire Resistance Design Manual, GA-600
- K. ICC ES Legacy Report, NER-684.

1.05 CONSTRUCTION STANDARDS

- A. ASTM C840 – Standard Specification for Application and Finishing of Gypsum Wallboard
- B. Construction manual of approved gypsum manufacturer.

1.06 SUBMITTALS

- A. Submit the following:
 - 1. Fire test reports where fire rated gypsum wallboard assemblies are indicated on the Drawings.
 - 2. Fire hazard classification.
 - 3. Certified Test Reports for testing performed in accordance with Reference Standards.
 - 4. Wallboard Manufacturer's product specifications and printed installation instructions for each type of installation required for the Project.
 - 5. Provide GREENGUARD Certification as a low emitting material that meets CHPS requirements.
 - 6. Provide Data for the weighted average recycled-content value both in postconsumer and secondary.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wallboard, trim, and accessories in Manufacturer's unopened bundles or packaging, clearly identified by Manufacturer's name, brand, type, and grade.
- B. Protect materials from weather, soiling, and damage in accordance with manufacturer's recommendations.
- C. Store materials in a dry, secure location protected from physical damage. Store all panels flat (not vertically).

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. United States Gypsum Company, Chicago, IL, 1-800-USG-4YOU (874-4968) (www.usg.com).
- B. National Gypsum Company, Charlotte, NC, 1-800-NATIONAL (www.nationalgypsum.com).
- C. Other Manufacturers pre-bid approved in accordance with Section 01630, and complying with the requirements of this Section, shall be acceptable.

2.02 WALLBOARD

- A. Fiberock Aqua-Tough Interior Panel. Abuse-Resistant Gypsum Fiber Panels, 5/8" (15.9mm) thick. (Basis of Specification). Provide ASTM C36, Type "X" for fire rated assemblies, where shown on the Drawings.
- B. National Gypsum Gold Bond Hi-Abuse brand XP Gypsum Board, 5/8" (15.9 mm).
- C. Products Characteristics Gold Bond Hi-Abuse brand XP
 1. Type "X" gypsum core panel with white abrasion resistant paper on the finished side and liner paper on the concealed side. 0.20" "Lexan" shall be bonded to the back side. *(Note: this product is not recommended for use on the interior side of exterior walls).*
 2. Surface Abrasion (ASTM D4977): 0.015" at 50 cycles.
 3. Surface Indentation (ASTM D5420): 0.158".
 4. Hard Body Impact (Complete panel penetration by a 2 3/4" steel cylinder): 110 ft-lbs.
- D. Product Characteristics ("Abuse Resistant Sheetrock Moldtough AR"):
 1. Abuse Resistance Surface abrasion: Tested in accordance with ASTM C1629. Level 2.
 2. Surface indentation: Tested in accordance with ASTM C1629. Level 2.
 3. Soft-body impact test: Tested in accordance with ASTM C1629. Level 1.

2.03 ACCESSORIES

- A. Accessories listed in paragraphs B through E are products of U.S. Gypsum Co. Comparable products by National Gypsum and compatible with the "Hi-Impact" Fireshield panel shall be acceptable.
- B. Fasteners: Corrosion-resistant, ASTM C-840. Self-drilling, self-tapping, bugle head screws for use with power driver. Use type S, 1" long for single layer applications; 1-5/8" for two layer applications.
- C. Joint Tape: "Sheetrock Joint Tape", U. S. Gypsum Co., ASTM C475. Use of fiberglass tape is not acceptable.
- D. Joint Compound: "Sheetrock" Setting-Type ("Durabond") Joint Compound.
- E. Metal Trim (U. S. Gypsum Co.):
 - 1. Corner Bead: #103
 - 2. Control Joint: #093
 - 3. Casing Bead: #200A

PART 3 - EXECUTION

3.01 INSPECTION

- A. Prior to installing wallboard panels, carefully inspect metal framing for accurate spacing and alignment.
- B. Verify that spacing of metal framing does not exceed that shown on Drawings and recommended for the thickness of wallboard to be installed.
- C. Verify that depth of doorframes is compatible with the finished thickness of wall.
- D. Do not proceed with wallboard installation until deficiencies are corrected and framing surfaces are acceptable for installation as recommended by Manufacturer.

3.02 INSTALLATION

- A. Comply with ASTM C840 and Manufacturer's wallboard installation instructions.

3.03 METAL TRIM AND CORNER BEADS

- A. Carefully inspect Drawings and verify location of metal trim required.
- B. Install trim in accordance with Manufacturer's recommendations.

3.04 TAPING AND FINISHING

A. Environmental conditions:

1. Control heating and ventilating during finishing operations to ensure the maintenance of 55 degrees F. minimum temperature, with a maximum range of 55 to 70 degrees F.
2. Fill joint recesses and metal trim.
3. Center the reinforcing tape on joint and press into fresh compound, wiping down with sufficient pressure to remove excess compound, but leaving sufficient compound under the tape for proper bond.
4. Feather edges and leave surface free from blisters and type wrinkles.
5. Apply compound to fastener recesses, leaving it flush with adjacent surfaces.
6. Fold reinforcing tape along centerline and apply to interior angles, following the same procedure as for joints.

B. Second Coat:

1. Light sand dry compound with fine sandpaper to remove irregularities.
2. Apply a second coat of compound to joints, feathering approximately three inches beyond edges of tape.
3. Apply second coat to fastener recesses; allow to dry.

C. Third coat:

1. Lightly sand dry compound with fine sandpaper to remove all irregularities.
2. Apply final skim coat, feathering out approximately two inches beyond second coat.
3. Third coat fastener recesses and metal trim and interior angles; allow to dry.

D. "Smooth" finish:

1. Carefully sand coat to uniformly smooth surface free from irregularities visible to unaided eye at distance of five feet.

3.05 CLEAN UP

- A. Do not allow accumulation of scraps and debris. Maintain the premises in a neat and orderly condition. In the event of spilling or splashing compound onto other surfaces, immediately remove spilled or splashed material and traces of residue.
- B. Remove all excess materials from project area after completion and dispose of legally.

END OF SECTION

SECTION 09510

ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section.

1.02 REFERENCE STANDARDS

- A. ASTM A366 - Standard Specification for Steel, Carbon Cold-Rolled Sheet, Commercial Quality.
- B. ASTM A641 - Standard Specification for Zinc-Coated (galvanized) Carbon Steel Wire.
- C. ASTM C635 - Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- D. ASTM C636 - Standard Practice For Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- F. ASTM E1264 - Classification for Acoustical Ceiling Products.
- G. Provide data that the products meet or exceed the VOC content requirements of CHPS and GreenGuard certification.

1.03 WORK EXCLUDED

- A. Bulkheads (for changes in ceiling elevations greater than 8") and moisture resistant ceiling systems are covered elsewhere in applicable sections of Division 9.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's technical literature and installation instructions for each type of panel and grid suspension system specified in this section.
- B. Samples: Provide 6" x 6" samples of each type of specified panel, and 12" long samples of exposed grid system (main runner, cross tee, and wall molding). Provide four (4) samples of each component specified.

C. Certifications:

1. Provide manufacturer's certifications indicating compliance with specified requirements, including laboratory test reports conducted in accordance with specified tests and standards.
2. Provide VOC Emission Test Certificate in compliance with California Department of Public Health (CDPH).
3. Provide data information of the Recycled Content.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated and overhead mechanical work is completed, tested and approved and until ceiling concealment inspection has been satisfactorily completed.
- B. Allow wet work to dry thoroughly prior to commencement of installation.
- C. Maintain uniform temperature of minimum (61 degrees F) and humidity of 20 percent to 40 percent prior to, during and after installation.

1.06 WARRANTIES

- A. Provide manufacturer's 10 year limited warranty against visible sag of panels when subjected to environmental conditions of 104°F and 90% relative humidity.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original unopened packaging with all identification labels intact. Store in a dry; secure area, protected from exposure to moisture, sunlight, surface contamination, construction damage and other harmful conditions.
- B. Handle components to prevent damage to panel edges, grid components and panel and grid finishes.

1.08 FIRE RATED SYSTEM (*WHERE APPLICABLE*)

- A. See Drawings for location and hourly rating.
 1. UL rated ceiling/roof design: UL Design shall be strictly adhered to for all aspects of assembly design and UL classified components.
 2. UL rated ceiling/floor design: Strictly comply with all aspects of UL assembly design, including required UL classified components.

3. Fire classified panels shall have the embossed label indicating UL classification for suitability of use in the rated assembly.

1.09 CEILING CONCEALMENT INSPECTION

- A. See Section 01700 for inspection that is to be conducted prior to installation of ceiling panels.

1.10 REPLACEMENT OF EXISTING ACOUSTICAL TILE CEILING

- A. Work shall include removal and replacement of existing acoustical tile ceilings (panels and grid) where called for on the drawings.
- B. Remove and replace acoustical tile ceilings (panels only) where called for on the drawings.

1.11 REMOVAL, STORAGE, AND REPOSITIONING OF EXISTING TILE CEILING

- A. Where panels and/or grid members must be removed to accommodate work in existing ceiling space, carefully remove, store and protect such items from construction damage. Prior to removing, tag any panels or grid that are damaged, and notify Architect and Owner's Representative. Carefully reposition panels and grid once overhead work in ceiling is completed.

PART 2 - PRODUCTS

2.01 SUSPENSION SYSTEM

- A. Acceptable System: ASTM C-635 heavy duty system, double web exposed main runners and cross tees. Intermediate duty shall not be acceptable. Approved manufacturers shall be as follows:
 1. Standard of Quality: Chicago Metallic Series 200 main runners and Series 229 cross tees, at 24" and 209 at 48".
 2. Armstrong "Prelude XL": Series 7301 for main runners and Series 7328 for 24" cross tees (Series XL 7348 for 48" cross tees).
 3. Pre-bid approved manufacturer in accordance with Section 01630.
- B. Standard Grid: Non-fire rated, 15/16" exposed face, with components die cut and interlocking. Where indicated on Drawings, provide fire rated grid in compliance with UL Design Assembly.
- C. Accessories: Splices, and edge moldings as required to complete and compliment suspended ceiling grid system.
- D. Materials/Finish: Commercial quality rolled steel with galvanized coating; white baked enamel finish on exposed surfaces.

- E. Hangers: Minimum 12 gauge (0.106") galvanized carbon steel wire per ASTM A641 (Class 1); soft temper, pre-stretched with a yield stress load of at least 3 times design load; size and type to suit application and to rigidly secure complete acoustic unit ceiling system, with maximum deflection of 1/360.
- F. Retention clips: for fire resistive ceiling/floor and ceiling/roof assemblies, and for ceiling areas adjacent to exterior doors in corridors; provide spring steel clips as required by rated assemblies, and as recommended by manufacturer for impact resistance.
- G. Fascia Mouldings: For changes in ceiling elevations that are 8" or less:
 - 1. Material/Finish: Commercial quality rolled steel with galvanized coating; white baked enamel finish (to match grid components) on exposed surfaces.
 - 2. Approved Manufacturers:
 - a. Armstrong #7814 (4" height), #7816 (6" height) or #7818 (8" height) depending on change in elevation. Flange width: 1".
 - b. Comparable products of other ceiling system manufacturers approved under 2.01A of this Section shall be acceptable.

2.02 LAY-IN PANELS

- A. Standard Acoustical Panels (Type 1)
 - 1. General characteristics: Mineral fiber composition, wet formed, factory applied white finish, class A flame spread, Type III, Form 2 per ASTM E1264; square edge design. Surface pattern shall be available in Fire Rated panels where rated assemblies occur.
 - a. Pattern: Fissured, non-directional surface
 - b. Light Reflectance: 0.70 - 0.81
 - c. NRC: .70
 - d. CAC: 40
 - e. Size: 24" x 48" x 5/8" thick
 - 2. Approved Manufacturers

- a. Armstrong World Industries, Inc., "School Zone Fine Fissured" with "HumiGuard Plus" #1714
 - b. United States Gypsum Company (USG) "Radar Clima Plus," #2444
 - c. Certain Teed "Fine Fissured" (HHF-497 DP)
 - d. Pre-bid approved Manufacturer in accordance with Section 01630
- B. Fire Rated Acoustical Boards: Of same manufacturer as standard and impaction Acoustic Boards and in same surface pattern and size. See plans for locations of areas requiring fire rated board. Fire rated boards shall be embossed to provide evidence of classification.
- C. "Attic Stock": Provide extra ceiling panels of each type specified, in quantities equal to 2% of the total square footage of each type installed. All attic stock shall be clearly marked to indicate type of panel.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas where Work of this Section shall be installed. Notify the Architect and Owner's Representative of any adverse conditions encountered that would interfere with the proper installation of acoustical ceiling systems. Do not proceed until such conditions have been corrected. Work shall not commence until the work of "wet" trades has been finished and is thoroughly dry, and all major above-ceiling work is complete.

3.02 INSTALLATION

- A. Install acoustical ceiling systems in accordance with ASTM C-636 and manufacturer's written instructions to produce finished ceiling true to lines and levels, free from warped, soiled or damaged grid or lay-in panels.
- B. Install ceiling systems in a manner capable of supporting superimposed loads, including light fixtures, with maximum permissible deflection of 1/360 of span and maximum surface deviation of 1/8 inch in 20 feet.
- C. Coordinate the location of hangers with other installed work. Ensure hangers are located to accommodate fittings and units of equipment placed after installation of ceiling grid systems.
- D. Suspend main runners from overhead structure with hanger wires spaced 4'-0" on center along the length of the runner. Hanger wire shall be plumb and straight.

- E. Where ducts or other equipment prevent regular spacing of hangers, provide additional hangers to adequately support ceiling.
- F. Hang suspension system independently of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of the longitudinal axis or face plane of adjacent members.
- G. Center ceiling systems on room axis leaving equal borders unless indicated otherwise by reflected ceiling plan shown on drawings.
- H. Install edge moldings at intersection of ceiling and vertical surfaces, using maximum lengths, straight, true to line and level. Miter corners. Provide edge moldings at junctions with other ceiling finishes. Where bullnose concrete block corners occur, provide preformed closers to match edge molding.
- I. Fit acoustic lay-in panels in place, free from edge damage or other defects detrimental to appearance and function. Fit border units neatly against abutting surfaces.
- J. Install lay-in panels level, in uniform plane and free from twist, warp and dents.

3.03 ADJUSTMENTS

- A. Adjust sags or twists which develop in the ceiling systems and replace parts that are damaged or faulty. Remove and replace damaged components that cannot be successfully adjusted or restored.

3.04 CLEANING

- A. Clean acoustical ceilings, including trim, edge moldings and suspension members in accordance with manufacturer's written recommendations.
- B. Remove all excess materials, packaging, installation debris, and other rubbish associated with the work of this Section from the work site and dispose of legally.

END OF SECTION

SECTION 09662

RESILIENT TILE FLOORING, BASE AND ACCESSORIES (VCT)

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Conditions of Contract, including Division 1 Specification Sections, apply to the Work of this Section.
- B. Cement-Based Floor Underlayment: Section 03650

1.02 REQUIREMENTS OF REGULATORY AGENCIES

- A. VCT: Meet or exceed standards of ASTM F1066 Class 2 “through” pattern.
- B. Flammability: 1.0 critical radiant flux or higher when tested in accordance with ASTM E648, Flooring Radiant Panel Test.
- C. Smoke Density: Less than 450 when tested in accordance with ASTM E662 Smoke Chamber Test.
- D. Standard method for the testing and evaluation for emission of VOCs of concern with respect to chronic inhalation exposures of adhesives to comply with the specifications of the current version of the California Department of Public Health’s (CDPH).
- E. SCAQMD Rule 1168- Adhesive shall meet the VOC content requirements of South Coast Air Quality Management District and tested and third party certified (FloorScore) to comply with the CDPH standard.

1.03 WORK INCLUDED

- A. All resilient base, including base installed at cabinet bases, shall be part of the work of this Section. See Section 12302 Wood Casework, Section 12304, Plastic Laminate Faced Casework, and Section 12360, Library Casework. All VCT floor tile and all rubber studded flooring and treads.
- B. Flash patching and skim coating of underlayments.

1.04 WORK EXCLUDED

- A. Floor leveling is covered under Section 03650.

1.05 QUALITY ASSURANCE

- A. Installer shall provide evidence of a minimum of five (5) years successful experience in installation of resilient flooring and base.or installer shall be a certified installer by the manufacturer

1.06 SUBMITTALS

- A. Samples: Provide samples of each type of flooring material and accessory in manufacturer's range of colors and patterns for each grade indicated.
- B. Manufacturer's Literature: Include descriptive information, installation, maintenance and cleaning instructions for each type of material specified in this Section.
- C. Primer and Adhesive: Provide specifications data and MSDS information for the type and brand that shall be used for installation, and which is recommended by floor covering manufacturer for the specific application.
- D. Provide data that the products meet or exceed the VOC content requirements of South Coast Air Quality Management District (SCAQMD) Rule 1168, Adhesive and Sealant Applications or current version.

1.07 ENVIRONMENTAL CONDITIONS

- A. Maintain minimum 65°F and a maximum of 100 F temperature in the work area for at least 48 hours prior to, during, and after installation.
- B. Areas to receive resilient flooring shall be clean, fully enclosed, weather tight with permanent HVAC in operation.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver flooring, adhesives and other accessories in original unopened packaging with identification labels intact, and store in a secure, dry location. Protect adhesive from freezing temperatures. Materials shall be allowed to reach and maintain the same temperature as the work area at least 48 hours prior to installation.

1.09 WARRANTY

- A. Provide a minimum five (5) year full unconditional warranty, starting on effective date of warranty of commencement. The manufacturer shall warrant the floor will be free from manufacturing defects and will not:
 - 1. Permanently indent
 - 2. Rip, tear or gauge

3. Permanently stain from normal household stain.
4. Yellow from exposure to rubber backed mats.
5. Permanently discolor from mold or mildew growth in the vinyl when installed directly over a concrete subfloor.
6. Permanently scuff from shoe soles.
7. Wear through the wearlayer so that the printed pattern or design of the floor is altered.

PART 2 - PRODUCTS

2.01 STANDARD VINYL COMPOSITION TILE - VCT

- A. VCT shall be 12"x12"x.125" (1/8") thick uniform in size; with edges cut accurately and square.
 1. Colors and patterns shall be selected from the manufacturer's color palette for Standard VCT.
 2. Refer to Drawings for special flooring features such as borders, accent designs and/or tile patterns.
- B. Approved Manufacturers:
 1. Armstrong (Basis of Specification)
 - a. Standard Excelon "Imperial Texture, MultiColor or Rave"
 2. Tarkett
 - a. "Azrock VCT"
 3. Other pre-bid approved substitutions in accordance with Section 01630.
- C. Locations: Provide the manufacturer's Standard Grade for VCT at all locations.

2.02 RUBBER STUDED FLOORING AND TREADS

- A. Locations
 1. All ramps.
 2. Stair landings, treads, and nosings.

3. Provide visually impaired contrast- 2" strip at the tread close to the nose.
- B. Round stud, low profile; tile size 24" x 24", .155" - .130" thick, stud height .025" - .031".
- C. Acceptable manufacturer/product:
 1. "Endura", Burke Flooring (Basis of Specification)
 2. "Radial", Flexco Inc.
 3. "Disc-O-Tile" and "Disc-o-tread" No. 788, R.C. Musson Rubber Co., Inc.
 4. R.C.A. Rubber Co., Inc.
 5. "Mondo" (Mondo Rubber International, Inc.)
 6. Johnsonite
 7. "996 Vantage" Raised Circular (Roppe) and #96
 8. Other pre-bid approved manufacturer(s) in accordance with Section 01630.

2.03 BASE MATERIALS

- A. General:
 1. Uniform in thickness
 2. Base material shall be supplied in rolls.
- B. Standard rubber base:
 1. ASTM F 1861, Type TP – Thermoplastic, Group 1 – Solid, Style B Cove
 2. 4-inch high; coved style for resilient flooring and carpet
 3. Color shall be as selected by the Architect from manufacturer's standard colors
- C. Basis of Specification: Armstrong World Industries, Inc.

2.04 FLOORING ACCESSORIES

- A. Provide at junctions of flooring materials of differing thickness in order to provide a smooth transition. Refer to drawings in order to identify flooring junctions.
 1. Include reducers/transition joinery at carpet and VCT junctions.

B. Acceptable Manufacturers

1. Burke Flooring
2. Flexco
3. Johnsonite
4. Roppe
5. Armstrong
6. Other pre-bid approved manufacturer(s) in accordance with Section 01630.

2.05 APPLICATION MATERIALS

A. General: Provide type and brands of adhesives as indicated below for the covering materials, substrate conditions and times of installations:

1. VCT Adhesive:
 - a. For work adjacent to occupied areas during school operating hours:
 - 1) Henry, L.P., "530 TilePro" No Solvent, "Fast Track" Adhesive (water-based, acrylic). Suitable for use over existing cutback adhesives.
 - 2) Armstrong S-515 Clear Thin Spread VCT Adhesive. VOC content 0 g/l calculated & reported SCAQMD 1168.
 - 3) Tarkett "100 Clear Thin Spread Adhesive", "975 Two-Part Urethane Adhesive" or "901 SpraySmart Resilient Flooring Adhesive".
 - 4) Resilient Tile Manufacturer's privately labeled, solvent free adhesive, suitable for installation over existing substrates and existing cutback adhesive.
 - b. For work in unoccupied areas after school operating hours:
 - 1) Resilient Tile Manufacturer's privately labeled asphalt cutback adhesive.
2. Wall Base Adhesives:

- a. Henry, L.P., "595" Cove Base Adhesive. Zero VOC content; water based, rubber resin.
 - b. Armstrong S-725 Wall Base Adhesive. Low VOC content; water based, rubber resin.
- B. Primer: Type and brand recommended by floor covering manufacturer.
- C. Leveling and Patching Compounds for Floors:
- 1. Finishing Underlayment: ARDEX L.P., "SD-F Feather Finish" Cement-Based Finishing Underlayment.
 - 2. Patching Compound: ARDEX L.P., "SD-P Instant Patch" Concrete Underlayment Patch.
 - 3. Finishing Underlayment and Patching Compound: Armstrong S-194 Patch, Underlayment and Embossing Leveler / S-195 Underlayment Additive

PART 3 - EXECUTION

3.01 INSPECTION OF SURFACES

- A. Examine substrate for evidence of excessive moisture content, residues, contaminants, and unevenness that would prevent execution and quality of resilient flooring assembly as specified.
- B. Verify that new concrete substrates have been cured for at least 30 days. Verify that no chemical curing compounds have been used or are present on surface of substrates.
- C. Notify Owner of any adverse conditions encountered during examination of substrate. Do not proceed with installation of resilient flooring until defects have been corrected except where correction is indicated under PREPARATION in this Section.

3.02 PREPARATION

- A. Comply with the flooring manufacturer's written recommendations for existing and new substrate preparation as applicable.
- B. Remove dirt, oil, grease, or other foreign matter from surfaces to receive floor-covering materials.
- C. Broom clean or vacuum surfaces to be covered.

- D. Remove substrate ridges and bumps.
- E. Use finishing underlayment to fill small cracks and depressions in substrate including uneven existing glue residue that may telegraph through the new tile flooring. Assume finishing underlayment is required at 100 percent of all existing floor areas where new vinyl composition is scheduled. Provide at all locations where uneven existing floor slab conditions are not satisfactory for the application of the scheduled new floor finish. Apply finish underlayment in accordance with manufacturers written instructions.

3.03 APPLICATION OF ADHESIVES

- A. Mix and apply adhesives in accordance with manufacturer's instructions.
- B. Provide safety precautions during mixing and applications as recommended by adhesive manufacturer.
- C. Apply uniformly over surfaces.
 - 1. Cover only that amount of area that can be covered by flooring material within the recommended working time of the adhesive.
 - 2. Remove any adhesive that dries or films over.
 - 3. Do not soil walls, bases or adjacent areas with adhesives.
 - 4. Promptly remove any spillage.
- D. Apply adhesives with notched trowel or other suitable tool recommended by adhesive manufacturer.

3.04 INSTALLATION OF VCT

- A. Comply with the flooring manufacturer's written installation instructions. Roll tile with a 100 lb. roller if recommended by the flooring manufacturer.
- B. Mix tiles from cartons to minimize shade variations.
- C. Lay tile beginning from center of room or space; work toward perimeter.
- D. Do not lay tile less than 1/2 the width of a field tile except where accepted by Architect or irregularly shaped rooms or spaces.
- E. Cut border tile neatly and accurately to fit within 1/64 inch of abutting surfaces.
- F. Fit flooring material neatly and tightly into breaks and recesses, against bases, around pipes and penetrations, under saddles or thresholds, and around permanent cabinets and equipment.

- G. Lay tile parallel to room axis in straight courses with cross-joints perpendicular.
- H. Install reducers/transition joinery at flooring terminations and junctions.
- I. Tiles should not be exposed to rolling load traffic for at least 72 hours after installation to allow setting and drying of the adhesives.

3.05 INSTALLATION OF BASE

A. General:

- 1. Install base around perimeter of room and columns.
- 2. Unroll material and cut into accurate lengths as desired or as required for minimum number of joints.
- 3. Match edges at all seams or double cut adjoining lengths.
- 4. Install with tight butt joints with no joint widths greater than 1/64 inch.

B. Topset base:

- 1. Apply adhesive and firmly adhere to surfaces, utilizing hand roller.
- 2. Press down so that bottom cove edge follows floor.
- 3. Form internal and external corners by using premolded corners.
- 4. Scribe material accurately to abutting materials.

3.06 FINISHING, CLEANING AND PROTECTION

- A. Upon completion of the installation of floor covering, adjacent work, and after materials have set, sweep or vacuum thoroughly to remove all loose dust and dirt. Damp mop the floor with a neutral cleaner as recommended by the manufacturer for the type of floor covering material installed. Do not wet wash, scrub, or strip the floors prior to setting of adhesive (consult manufacturer's literature for setting time and maintenance recommendations).
- B. Apply two coats of high-quality commercial floor polish. The use of a high quality stain-resistant sealer beneath the polish should be considered in areas of high traffic, high soil load and areas where staining potential is high.
- C. Protect completed work from traffic and damage until acceptance by the Owner.
- D. Remove all debris and excess material from the project site.

END OF SECTION

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SECTION 09900

PAINTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section.

1.02 RELATED WORK

- A. Section 15050: Basic Materials and Methods. (Mechanical Color Coding).

1.03 WORK EXCLUDED

- A. Interior epoxy wall coatings are covered under Section 09800.
- B. Interior epoxy floor coatings are covered under Sections 09810 and 09815.

1.04 PRODUCT HANDLING

- A. Deliver materials to the site in original, new and unopened packages and containers bearing manufacturer's name and label.
- B. Provide paint manufacturer's printed label on each container with the following information:
 - 1. Name or title of material
 - 2. Manufacturer's stock number
 - 3. Manufacturer's name
 - 4. Analysis of major pigment and vehicle constituents
 - 5. Thinning instructions
 - 6. Application instructions
 - 7. Color name or number
 - 8. Manufacturer's recommended wet and dry film thickness in mils

1.05 COLOR SELECTION

- A. Prior to beginning work, the Architect will furnish sample color chips with a color schedule for surfaces requiring painting.
- B. Proprietary names of a specified manufacturer used to designate colors or materials are not intended to imply that products of the specified manufacturer are required to the exclusion of equivalent approved colors or materials of other manufacturers.

1.06 PAINT COORDINATION

- A. Provide finish coats compatible with prime paints used. Review other sections of specifications in which prime coats are specified to ensure compatibility of the total coating system.

1.07 DESCRIPTION OF WORK (EXISTING CONSTRUCTION ONLY)

- A. Addition and Alterations in Existing Building: All painting and staining required for all new work and existing surfaces affected by such work shall be as specified in the following painting schedule.

1.08 DESCRIPTION OF WORK (NEW SCHOOL ONLY)

- A. Extent of painting is indicated on drawings and specified in the work of this Section.
- B. The work includes painting of both interior and exterior exposed items and surfaces included in the scope of work, except where otherwise indicated. Surface preparation priming and finish coats for such surfaces are included herein, except for items that are shop-primed or factory finished.

1.09 WARRANTY

- A. See Section 01740 for warranty requirements.

1.10 SUBMITTALS

- A. Provide data that the products shall meet or exceed the VOC content requirements of South Coast Air Quality Management District (SCAQMD) Rule 1113.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Provide materials that meet or exceed the VOC content requirements of South Coast Air Quality Management District (SCAQMD) Rule 1113.
- B. Provide undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.
- C. Painting materials scheduled are products of Akzo Nobel (Glidden Professional and Devoe Coatings) (www.gliddenprofessional.com), except as otherwise noted. Comparable products produced by the following manufacturers are acceptable alternates to those scheduled:
 - 1. Sherwin-Williams Co., (www.sherwin-williams.com)

2. Benjamin Moore and Company (www.benjaminmoore.com)
 3. PPG Paints-PPG Architectural Coatings (www.ppg.com)
 4. Duron Paints and Wallcoverings (www.duron.com)
 5. Comparable products of other manufacturers, pre-bid approved in accordance with Section 01630, shall be acceptable.
- D. Paint materials specified in the Painting Schedules of Part 3 are compliant with the Ozone Transport Commission (OTC) Regulations, as required by the Federal Clean Air Act. Comparable materials by other approved manufacturers shall be compliant with these regulations.
- E. Renovations and Alterations: Oil-based paints shall not be applied on interior building surfaces, or other areas when exposure of occupants to fumes is a possibility. Coordinate performance of this work with the Construction Phasing Plan for the Project

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine areas and conditions under which painting work will be performed. Notify Architect, in writing, of conditions detrimental to proper execution of the work. Do not proceed with work until unsatisfactory conditions have been corrected.
- B. Starting of painting work will be construed as acceptance of surfaces within particular area.
- C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

3.02 SURFACE PREPARATION

- A. General:
 1. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions for each substrate condition.
 2. Remove hardware, hardware accessories, machine surfaces, plates, lighting fixtures and similar items in place and not to be finish painted, or provide surface applied protection prior to surface preparation and painting operations. Following completion of painting of each space or area, reinstall removed items.
 3. Clean surface to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program the cleaning and painting so that dust and other contaminants from the cleaning process will not settle on to wet, newly painted surfaces.

4. Dislodge dirt, mortar splatters, and other dry materials from surfaces by scraping and brushing. Remove loose material by brushing, sweeping and vacuuming.

B. Previously Painted Surfaces:

1. A representative from the approved paint manufacturer shall visit the site and, together with the Owner's Representative, Architect and Contractor, shall inspect existing painted surfaces prior to preparation and repainting.
2. Thoroughly clean all surfaces in accordance with this Section, and the recommendations of the Paint Manufacturer's Representative.
3. Remove all loose or peeling paint by scraping or by means of low or non-VOC containing stripping system approved by the Owner's Representative and Architect.
4. Prepare existing epoxy surfaces by scuff sanding. Remove all loose particles.
5. Where new coatings are to be applied over existing oil-based paint, the surface shall be scrubbed clean and dried. The gloss shall be dulled using sandpaper or wire brushing. Remove all dust or other loose particles.
6. All previously painted surfaces shall be completely re-primed, using a primer recommended by Paint Manufacturer for type of substrate and compatible with new topcoats.
 - a. Prior to re-priming, perform a "patch test" covering approximately 2 to 3 square feet in area, by applying recommended primer and specified topcoats. Allow patch to dry thoroughly, and test for adhesion in the presence of Manufacturer's Representative, Owner's Representative, Architect and Contractor.

3.03 MATERIALS PREPARATION

- A. Mix and prepare paint materials in accordance with manufacturer's directions.
- B. Stir materials before application to produce a mixture of uniform density, and stir as required during the application of the materials. Do not stir surface film into the material. Remove the film and if necessary strain the material before using.

3.04 APPLICATION

- A. General:

1. Apply paint by brush, roller, or spray in accordance with manufacturer's directions and paragraphs E and F. Use brushes best suited for type of material being applied. Use roller of carpet, velvet back or high pile sheep's wool as recommended by paint manufacturer for material and texture required. Spray paint uniformly with suitable equipment.
 - a. Spray applications shall not be allowed when adjacent areas are occupied.
 2. Number of coats and paint film thickness required is same regardless of application method.
 3. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint, until paint film is of uniform finish, color and appearance.
 4. "Exposed surfaces" shall mean areas visible when permanent or built-in fixtures, convector covers, grilles, etc., are in place in areas scheduled to be painted.
 5. Paint interior surfaces of ducts, where visible through registers, grilles, decorative ceiling, with flat, non-specular black paint.
- B. Minimum Coating Thickness:
1. Apply each material at not less than manufacturer's recommended spreading rate, to provide a total wet and dry film thickness of not less than that indicated on manufacturer's printed label.
- C. Pigmented (Opaque) Finishes:
1. Cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage.
- D. Transparent (Clear) Finishes:
1. On exposed portions, use multiple coats to produce glass-smooth surface film continuity of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
 2. Provide satin finish for final coats, unless otherwise indicated.
- E. Brush Application:
1. Brush-out and work brush coats onto surface in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

F. Mechanical Applications:

1. Limit roller applications to interior wall and ceiling finish coats. Apply each roller coat to provide equivalent hiding as brush-applied coats.
2. Confine spray application to metal framework, siding, decking, wire mesh, and similar surfaces where hand brush work would be inferior.
3. Wherever spray application is used, apply each coat to provide the equivalent hiding of brush-applied coats. Do not double back with spray equipment for the purpose of building up film thickness of two coats in one pass.
 - a. Do not use spray applications at acoustical concrete block units.

G. Complete Work:

1. Match samples for color, texture and coverage. Remove finish, or repaint work not in compliance with specified requirements.

3.05 PAINTING SCHEDULE, INTERIOR (See paragraph 3.02 for Surface preparation of existing surfaces; all existing surfaces shall be re-primed)

A. Metal:

- 1 coat: PPG Paints; 90-912 Pitt Tech Plus WB DTM Metal Primer (eliminate on shop primed items).
2 coats: PPG Paints; 90-1210 Series Pitt Tech Plus WB DTM S/G Enamel
1 coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series.
2 coats: S-W Pro Industrial DTM Acrylic Semi-Gloss Coating, B66 -1150 Series

B. Hollow Metal Frames:

- 1 coat: PPG Paints; 90-912 Pitt Tech Plus WB DTM Metal Primer
2 coats: PPG Paints; 90-1210 Series Pitt Tech Plus WB DTM S/G Enamel
1 coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series.
2 coats: S-W Pro Industrial DTM Acrylic Semi-Gloss Coating, B66 -1150 Series

C. CMU:

- 1 coat: PPG Paints; Professional: Block Filler Interior/Exterior Primer 3010-1200
2 coats: PPG Paints; 6-4510X series SPEEDHIDE zero Interior Zero-VOC Latex Semi-Gloss
1 coat: S-W PreRite Latex Block Filler B25W00025 (new block).
2 coats: S-W Pro Mar 200 Zero VOC Int. Latex Semi-Gloss B31-2600 Series.

D. CMU - Epoxy Paint - See Special Coatings, Section 09800.

- E. Wood - Transparent (wood surfaces):
1. 1 coat: PPG Olympic 42784; Water Based Gloss Varnish
2 Coats: S-W Pro Classics Int. WB Polyurethane Varnish, Satin or Gloss
1 coat: PPG Olympic 42786; Water Based Satin Varnish
 2. Sand prior to application of first coat, and between coats, using #220 grit sandpaper
- F. Wood – Transparent (Doors):
- 1 coat: PPG Olympic 42786; Water Based Satin Varnish, over factory finish (refer to Section 08211, Part 2.02).
1 Coat: S-W Pro Classics Int. WB Polyurethane Varinis, Satin.
- G. Acoustical Wall Panels (spray application):
- 2 coats: PPG Paints; 6-4110XI Series SPEEDHIDE zero Interior Zero VOC Latex Flat
2 coats: S-W Pro Mar 200 Zero VOC Int. Latex Flatl B320-2600 Series
- H. Gypsum Wallboard:
- 1 coat: PPG Paints; 6-4900XI SPEEDHIDE zero Interior Zero-VOC Latex Sealer
2 coats: PPG Paints; 6-4310XI Series SPEEDHIDE zero Interior Zero VOC Latex Eggshell
1 coat: S-W Multi-Purpose Primer (repaint) or, Pro Mar Zero VOC Primer (new).
2 coats: S-W Pro Mar 200 Zero VOC Int. Latex Eg-Shel B20-2600 Series
- I. Metal (Exposed Ceilings)
- 2 coats: PPG Paints; 6-7xx series SPEEDHIDE Super Tech® WB Interior 100% Acrylic Flat Dry-Fog
2 coats: S-W Pro Industrial WB Acrylic Dryfall Flat, B24-181 Series
- J. Fire walls:
- All fire walls shall be labeled with a minimum of 2" high RED letters 12" above the finished ceiling with the rating of the assembly and the type of the assembly (for example, TWO HOUR FIRE WALL) at horizontal intervals no more than 8' on center per 2015 VUSBC 703.7.
1. Where firewalls change direction provide on both sides along the change of direction and then 8' on center maximum.
 2. Provide at all fire wall penetrations along the accessible route only.

3.09 CLEANING

- A. Touch-up and restore where finish is damaged.
- B. Remove spilled, splashed, or splattered paint from all surfaces
- C. Remove all debris, painting accessories, paint cans, and other associated equipment from the premises and legally dispose of off-site. Do not leave surplus painting materials on the premises as "attic stock."

END OF SECTION

SECTION 10100

MARKERBOARDS AND TACKBOARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General Conditions and Division 1 Specifications, apply to the work of this section, with special attention to Section 01092 (Mounting Heights).

1.02 SUBMITTALS

- A. Comply with requirements of Section 01340 for shop submittals, product data, and samples.
- B. Submit Shop Drawings, indicating size, length, joints, and room location of each type of board.
- C. Submit GRENGUARD Indoor Air Quality Certification and must meet stringent standards for low chemical emissions based on established health standards.

1.03 WARRANTY

- A. Provide manufacturer's written warranty agreeing to replace markerboards which have lost original writing and erasing qualities.
- B. Warranty Period: Manufacturer's standard warranty

1.04 QUALITY ASSURANCE

- A. All markerboards and tackboards shall be provided by a single source manufacturer.
- B. Contractor shall, upon request by Architect and Owner's Representative, disassemble one board of each type specified in order to demonstrate that all components comply with requirements of this Section.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store in a secure area, protected from weather and unauthorized access. Follow Manufacturer's written recommendations for storage and handling.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Claridge Products and Equipment, Harrison, AR, 1-870-743-2200, www.claridgeproducts.com, (shall be the basis of the specification and standard of quality).
- B. Best-Rite Manufacturing, Temple, TX, 1-866-886-6935, www.bestrite.com
- C. ADP Lemco Corporation, West Jordan, UT, 1-800-575-3626, www.adplemco.com
- D. Schalow Manufacturing Company, Powhatan, VA, 1-804-794-5102.
- E. Platinum Visual Systems, Corona, CA, 1-800-498-2990, www.pvusa.com
- F. Marsh Industries, Cincinnati, OH, 1-800-260-2776, www.SchoolOutfitters.com
- G. Aarco Products Inc, Yaphank, NY, 1-800-989-2348, www.aarcoproducts.com
- H. Pre-bid approved manufacturer (see Section 01630).

2.02 WHITE MARKERBOARDS

- A. White markerboards shall be as follows:
 - 1. New boards: Series 1, Type "A" (Factory Built),
- B. Porcelain writing surface shall be a vitreous ceramic baked-on 24 gauge minimum steel at 1500° F White markerboards: "LCS-3" (#100 White Low Gloss suitable as a projection surface) - Claridge as the basis of design. All markerboards are to be Magnetic surface and 100% non-combustible surface.
- C. Surface shall conform to requirements set forth in "Standards for Architectural Porcelain" by the Porcelain Institute.
- D. Color of writing surface shall be as selected by Architect from Manufacturer's standard finishes.
 - 1. Elementary School, Middle School and High School music rooms: Writing surface shall have four (4) sets of music staff lines with two treble notes and two bass clef notes in alternating arrangement.
- E. Particle board core shall be 3/8 inch thick.
- F. Backing sheet shall be minimum 0.015 inch thick aluminum sheet.
- G. Joints shall have concealed continuous steel splines, or a tongue and groove finished to a smooth even plane. "H" bars are not acceptable and shall be rejected.

2.03 TACKBOARDS

- A. Tackboards shall be as follows:
 - 1. Series 1, Type "CO".
- B. Tackboard Material: Claridge Bulletin Board Cork; cork and oxidized linseed oil, resin, jute, and pigments on burlap backing, self-healing, soil-resistant, washable, non-toxic, dimensionally stable.
- C. Board Construction: Burlap on hardboard; 1/4" thick tackable surface on 1/4" hardboard (1/2" total thickness).
- D. Color shall be as selected from Manufacturer's standard finishes.

2.04 TRIM AND ACCESSORIES

- A. Trim for white markerboards, and tackboards shall be as noted below. Provide the following:
 - 1. Aluminum trim tray for and white markerboards, joint splines, end closures, and perimeter trim.
 - 2. Trim shall be extrusions of not less than 3/32-inch thick aluminum, for installation without visible fastenings at full-face view; one piece with joints at corners only, no splices. Provide cast aluminum end closures for marker trays.
- B. Provide six map hooks and one flag holder per classroom.

2.05 TACK STRIPS

- A. Tack strips shall be No. 74 Deluxe Map and Display Rail. Provide tack strip at each white markerboard of length equal to length of markerboard
- B. Provide tack strips along the corridors; 3'-0" min to any door for a max length of 20'-0" and a 5'-0" interval before another tack strip.
- C. Tack strips shall be constructed of heavy-gauge extruded aluminum.
- D. Tack strips shall be approximately 1 3/8" wide and 8'-0" long each.
- E. Insert: Same material as tackboard. Natural cork is not acceptable and shall be rejected.
- F. Provide end caps at terminations of strips.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Series 1 – White markerboards and tackboards shall be surface-mounted with 2 inch clip angle hangers at 24 inch o. c. top and bottom. "Snap-on" installation shall utilize Manufacturer's standard ground clips.
- B. Grounds shall be continuous, aligned and shimmed to a true plane and shall be properly secured to wall surface. Maximum spacing of fasteners shall be 12-inch maximum o. c. under chalkboard and 20 inch o. c. maximum elsewhere.
- C. Clips shall be secured with cadmium-plated sheet metal screws. Power activating anchoring is not accepted.
- D. Markerboards and tackboards shall be set plumb and true, using spotting adhesive applied in spots 12 inch o. c., both horizontally and vertically.
- E. Mounting heights for markerboards and tackboards shall be as indicated by paragraph 1.04, Equipment Mounting Heights in Section 01092, Applicable Standards.
- F. Install corridor tackstrips in two rows, with clearances and maximum runs in accordance with criteria set forth in this section and Section 01092, and as indicated on the Drawings.

3.02 CLEANING

- A. Clean all materials in accordance with Section 01710 of these Specifications and with Manufacturer's printed recommendations.
- B. Remove all trash, debris, packaging, and other items associated with the work, and dispose of legally.

END OF SECTION

SECTION 10440

INTERIOR SIGNS AND ROOM SIGNAGE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including Conditions and Division One Specification Sections, apply to work of this Section.

1.02 RELATED WORK

- A. Building Identification Signage: Section 10430.
- B. Site signage, including site accessibility signage, is covered on Civil Drawings.

1.03 DESCRIPTION OF WORK

- A. Furnish and install interior signs in the following locations:
 - 1. Each permanent room and space within the project area.
 - 2. Utility rooms: Exterior doors accessing storage rooms, sprinkler rooms, electric rooms, boiler rooms, elevator machine rooms, and other mechanical or electrical spaces as indicated on the Drawings.
 - 3. Where indicated on the Drawings, signs providing direction to, or information about, permanent rooms and spaces.
 - 4. Provide international symbol of accessibility signage at all gang toilets, individual staff and student toilets, and accessible entry and egress doors.
 - 5. Doors into enclosed courtyards: Provide signs with the following text: "Door shall remain unlocked from Courtyard during occupied hours".
- C. Furnish and install AED Wall sign (Model number # 989803170921 by Philips)
 - 1. Mount sign above each Defibrillator Cabinet at 82" AFF to bottom of plate.
 - 2. Mount sign to allow optimum visibility in two directions (T-mount).
 - 3. Color shall be RED.
- B. Furnish and install Raised Character and Braille Exit Signs.
 - 1. A sign stating "EXIT" in raised characters and Braille.

2. Provide to an area of Refuge, an exterior area for assisted rescue, an exit stairway, an exit ramp, an exit passageway and the exit discharge.
3. Size: 6" W x 4" H

1.04 REQUIREMENTS OF REGULATORY AGENCIES

- A. Signage shall comply with applicable provisions of the Americans with Disabilities Act (ADA), including but not limited to, the following:
 1. 1/32" high raised letters, numerals and Grade 2 Braille in type, style and sizes as defined in ADA standards. (Braille not required for doors serving utility spaces).
 2. Locate on latch side of doors; except at door pairs, locate on nearest adjacent wall. Locate to comply with path of approach and to avoid protruding objects.
 3. Comply with finish and contrast requirements.

1.05 SUBMITTALS

- A. Submit manufacturer's specifications and technical data indicating compliance with this Section.
- B. Submit samples of letters, numerals, sign type, colors and materials.
- C. Submit shop drawings for each type of sign showing dimensions of plaque and characters.
- D. Submit list of all signage required for permanent rooms and spaces, including directional signage where indicated on the drawings. Room names and numbers indicated on floor plans and Finish Schedule shall not be used for signage fabrication. The list of actual names and numbers will be provided by the Architect or Owner's Representative prior to preparation of submittals.

1.06 WARRANTY

- A. Submit manufacturer's written product warranty covering materials and fabricated signs.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Best Sign Systems, Inc., Montrose, CO, 1-800-235-BEST (www.bestsigns.com)

- B. Mohawk Sign Systems, Inc., Schenectady, NY, 1-518-370-3433 (www.mohawksign.com)
- C. National Sign, Inc., Ambridge, PA, 1-800-363-1203 (www.natsign.com)
- D. Signs and Wonders, Inc.
- E. Bayuk Graphic Systems, Inc., Parkesburg, PA, 1-717-442-0247
- F. Other pre-bid approved manufacturer(s) in accordance with Section 01630.

2.02 MATERIALS AND FABRICATION

- A. Plaque: Basic stock shall be 1/8" thick, melamine laminate or matte acrylic with face and backplate; provide radiussed corners.
- B. Characters: Provide 3/4" raised letters, 1" numerals, and braille characters where required on background stock by means of a blast process or by chemically welding characters to stock.
- C. Raised Copy: Provide up to seventeen (17) characters for letters, up to three (3) characters for numbers. Provide accompanying raised braille.
- D. Character Type: Upper case, sans serif or simple serif.
- E. Room signs, excluding utility rooms, gym, library, cafeteria, toilet rooms and storage rooms: Provide one 3/4" high window with Lexan insert.

PART 3 - INSTALLATION

3.01 SIGN MOUNTING

- A. Mounting Method: MM (Mechanical Fastening). Mounting by means of double-faced adhesive tape shall not be acceptable.
- B. Drill and insert appropriate type plugs or expansion anchors into wall substrate.
- C. Attach signs to wall using countersunk tamperproof screws. Screw heads shall be flush with sign face.
- D. Mount so that bottom of the letters above finished floor surface is as follows:
 1. All Schools: 48" min – 54" max.

3.02 CLEANING

- A. Remove all construction debris and excess materials associated with the work of this Section from the job site and dispose of legally.

END OF SECTION

SECTION 10520

FIRE EXTINGUISHERS AND ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section.

1.02 RELATED WORK

- A. Mounting blocks for fire extinguishers not in cabinets: Section 06400.

1.03 REQUIREMENTS OF REGULATORY AGENCIES

- A. Fire extinguishers shall be listed and rated by Underwriters Laboratories, Inc. (UL).

1.04 SUBMITTALS

- A. Submit manufacturer's catalog data indicating type, weight and rating of fire extinguisher, type of cabinet and/or mounting bracket, fastenings, supports and anchorage to wall, clearances and connections to adjacent construction.
- B. Submit manufacturer's certification of Underwriters Laboratories, Inc. (UL) listing and rating.

PART 2 - PRODUCTS

2.01 FIRE EXTINGUISHERS

- A. Dry chemical, 10 lb., 4A-60BC as rated by UL.
 - 1. Provide at locations as indicated on Drawings, and where applicable, at existing locations to replace existing extinguishers where noted on the Drawings.
- B. Approved Manufacturers:
 - 1. JL Industries, Bloomington, MN, 1-800-554-6077, (www.jlindustries.com) "Cosmic" 10E
 - 2. Potter-Roemer, City of Industry, CA, 1-800-366-3473, (www.potterroemer.com) Model 3010
 - 3. Amerex Corporation, Trussville, AL, 1-800-654-5980 (www.amerex-fire.com) Model B456

4. Pre-Bid approved manufacturer in accordance with Section 01630
- C. Provide manufacturer's standard wall brackets at locations not receiving cabinets.

2.02 FIRE EXTINGUISHER CABINETS

- A. Approved Manufacturers:
 1. JL Industries "Panorama" Series (Basis of Specification).
 - a. 1015PQ48 for fully recessed conditions.
 - b. 1012Q48 for semi-recessed conditions.
 2. Potter-Roemer 7100 Series
 - a. 7120-E-18-HR-RR for recessed conditions.
 - b. 7123-E-18-HR-RR for semi-recessed conditions.
- B. Characteristics: Flat trim with rolled edge style in white epoxy finish. Door shall be a frameless, opaque acrylic door with scratch-proof lettering on white background with horizontal RED LETTERS with the word, "FIRE EXTINGUISHER" on each cabinet. Provide standard pull handle in Zinc finish with "**SAF-T-LOK**".
- C. Semi-recessed Cabinets shall be ADA compliant for projection into corridors (accessible path of travel).

2.03 FIRE BLANKETS AND CABINETS (*Middle and High School Science Labs*)

- A. Approved Manufacturers:
 1. Larsen's Manufacturing Co., Minneapolis, MN, 1-800-527-7367 (www.larsenmfg.com) FB1016 Series (10"x16"x8")
 2. JL Industries Royal Series, Type 2 FB (16"x13"x5")
- B. Characteristics:
 1. Cabinet: "Drop Type" operation, surface mounted, cold rolled steel with baked on enamel finish and "FIRE BLANKET" lettering.
 2. Blanket: Processed wool fire blanket, complying with Federal Specification CS-191-53.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Deliver fire extinguishers to Owner's Representative for installation in cabinets or brackets after substantial completion.
- B. Mounting height shall be as follows:
 - 1. All grades and adults: 56" from floor to top of cabinet.

END OF SECTION

SECTION 10670
METAL SHELVING UNITS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

- A. Work Included: Provide all metal storage shelving, set completely in place, as indicated on the Drawings, specified herein, with all accessories required for a proper installation.
- B. Standard shelving sizes shall be used.
- C. Long runs of shelving shall be a combination of standard sizes to arrive at a total length of shelving, as close to the length indicated on the Drawings as possible.
- D. Shelf depths shall be as indicated on the Drawings, or the manufacturer's next largest standard size.
- E. Metal shelving located in the Gym storage area must have a "Ball lip" to the edges of the shelves, so that balls cannot roll off of the shelves.

1.03 QUALITY ASSURANCE

- A. Manufacturer's Requirements: Manufacturers shall have had a minimum of five (5) years successful experience in the manufacture of metal shelving.

1.04 SUBMITTALS

- A. Comply with requirements of Section 01340.
- B. Provide manufacturer's catalog cuts indicating all dimensions, gauges of metal, construction and shelf support details, wall attachment details, etc., for each type of unit. Include shelf load capacity information.
- C. Submit shop drawings indicating locations of shelving units, configurations of shelving runs and shelving dimensions.
- D. Submit manufacturer's color chart indicating standard color selections.
- E. Submit manufacturer's recommended assembly instructions.

1.05 DELIVERY, HANDLING, AND STORAGE

- A. Deliver all shelving in manufacturer's original, unopened cartons, with all identifying labels intact.
- B. Outside of carton shall designate model numbers, colors, and other descriptive information.
- C. Shelving shall be handled and stored in a manner that will insure against abuse and construction damage, such as denting, bending or scraping.
- D. Store in a clean, dry, secure area.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Approved Manufacturers (Subject to requirements of this Section):
 - 1. Penco Products, Oaks, PA, 1-800-562-1000 ,
(www.pencoproducts.com) ("Clipper" Shelving)
 - 2. Lyon Workspace Products, Aurora, IL, 1-800-433-8488,
(www.lyonworkspace.com) (8000 Series)
 - 3. Hallowell (Division of List Industries, Inc.), Deerfield, FL, 1-800-776-1342
 - 4. AMP (Art Metal Products) Deerfield Beach, FL, 1-800-252-5633,
www.ArtMetalproducts.com
 - 5. Pre-bid approved equal in accordance with Section 01630
- B. Intermediate shelving units shall have open sides with solid metal reinforced shelves; provide double cross bracing not less than 12 gauge on the back of each unit for freestanding units; all wall units shall be anchored to wall.
- C. Shelving units shall support minimum of 65 lbs. per square foot of total shelf area. Provide seven (7) shelves per unit. Shelf shall be box formed. Front and rear flange shall utilize box beam construction. Flanges shall be welded on not less than 8" centers. Corners shall be lapped and welded. Sides shall be double flanged, not less than 22 gauge for 36" wide units, and 20 gauge for 48" wide units.
- D. All shelves shall be adjustable, utilizing compression type clip of not less than 14 gauge (bolted assembly shall not be acceptable).

- E. Exposed Ends: Provide and install solid end panels of not less than 24 gauge at the end of each run of units.
- F. All posts shall be angle post type not less than 14 gauge, punched on 1" or 1 1/2" centers. (14 gauge beaded or 16 gauge "T" posts welded on 3" centers are acceptable).

2.02 COLORS

- A. Colors shall be selected from manufacturer's standard colors (at least 6 color choices shall be available).

2.03 FABRICATION

- A. Shelving units shall be thoroughly degreased with phosphate coating and dipped in chromic acid rinse for resistance to corrosion. Final coat shall be manufacturer's standard baked-on enamel.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Contractor shall inspect areas to receive shelving and notify Architect or Owner's Representative if shelving cannot be installed in accordance with the Drawings and the final approved shop drawings.
- B. Contractor shall be responsible for approved shelving fitting properly into designated areas.

3.02 INSTALLATION

- A. All wall shelving shall be attached to walls with the appropriate device for the type of wall.
- B. Erect shelving according to manufacturer's recommended written assembly instructions, in locations indicated on the Drawings.
- C. Clearance for ceiling mounted sprinkler coverage: Where shelving shall be erected in rooms with pendant mounted sprinkler heads, maximum installed height shall not exceed 6'-0". Coordinate with ceiling heights shown on the Drawings for spaces scheduled to receive shelving. Verify actual ceiling heights prior to installation.

3.03 CLEANING

- A. Remove all debris and excess materials from the Project Site and dispose of legally.

- B. Remove all dust, dirt, grease, and other foreign substances from all shelving.

END OF SECTION

SECTION 10800
TOILET ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provision of Contract, including General Conditions and Division 1 Specification Sections, apply to the Work of this Section, with special attention to the following:
 - 1. Mounting Heights: Section 01092.

1.02 SUBMITTALS

- A. Submit shop drawings indicating fabrication, assembly and erection details, sizes of members, fastening, supports and anchors, and clearances and connections to adjacent construction.

1.03 DELIVERY AND STORAGE

- A. Deliver and store materials in a manner to prevent damage.
- B. While stored on job site, protect materials from weather and construction damage.
- C. Accessories shall be stored in original packaging until ready for installation.

1.04 WARRANTY

- A. Provide written ten (10) year warranty against silver spoilage on all mirrors.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Bobrick Washroom Equipment, Inc., North Hollywood, CA, 1-818-503-1630 (www.bobrick.com) (basis of specification and standard of quality). Or, specific manufacturer listed under each item.
- B. Other acceptable manufacturers (subject to compliance with specification requirements):
 - 1. Bradley Corp., Menomonee Falls, WI, 1-800-BRADLEY (www.bradleycorp.com) (except item "H")
 - 2. Pre-bid approved manufacturer in accordance with Section 01630.

2.02 TOILET ACCESSORIES

- A. General: All catalog numbers shown are Bobrick, except for soap dispenser, toilet tissue dispenser, and paper towel dispenser.
 - 1. Stainless Steel: 18-8, type 304 stainless steel, gauges as indicated.
 - 2. Finish: All stainless steel shall be satin finish unless otherwise noted.
- C. Soap dispenser: "Deb ProLine White Soap Dispenser 9121" supplied by Owner, installed by Contractor using mechanical attachment.
- D. Paper towel dispenser (all locations): 772828 Tork Mechanical Hand Towel Roll Dispenser available at www.torkusa.com
- E. Anchors and Fasteners
 - 1. Provide all anchors and fasteners necessary to develop retaining force required for the toilet accessory to be mounted, well suited to the type of supporting wall construction and as recommended by the accessory manufacturer.
 - 2. Provide concealed mounting plates where called for by accessory manufacturer

PART 3 - EXECUTION**3.01 PREPARATION**

- A. Prior to beginning work, examine the work area and supporting wall construction to which the toilet accessories shall be mounted. Notify owner of any conditions that would adversely affect the installation. Do not proceed until such deficiencies are corrected.

3.02 INSTALLATION

- A. Secure toilet accessories firmly in place with anchors, fasteners, and mounting plates supplied or recommended by the accessory manufacturer for the type of supporting wall construction provided.
 - 1. Anchor accessories to masonry walls using lead expansion shields and fasteners provided or recommended by manufacturer.
 - 2. Anchor accessories to metal stud partition using concealed anchorage recommended by the manufacturer for the type of accessory to be mounted.

- B. Protect installed accessories from damage until formally accepted by Owner's Representative.

3.03 CLEANING

- A. Once installation is complete, remove all excess materials, trash and debris from the Project Site and dispose of legally.
- B. Remove all dust, dirt, grease or other foreign substances from all accessories.

END OF SECTION

INSTRUCTIONS FOR EDITING

SECTION 12304

PLASTIC LAMINATE FACED CASEWORK AND FIXTURES

INSTRUCTIONS FOR EDITING:

1. GENERAL

- A. 1.04, DESCRIPTION OF WORK and 2.05, TOPS, SINKS AND ACCESSORIES:
Edit and Delete, or add information as required by Project Scope and in order to fit requirements of Elementary, Middle and High Schools.

SECTION 12304

PLASTIC LAMINATE FACED CASEWORK AND FIXTURES

PART 1- GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including Division One Specification Sections, apply to this Section with special attention to the following:
 - 1. Shop Drawings, Product Data and Samples: Section 01340
 - 2. Substitutions and Product Options: Section 01630.

1.02 RELATED WORK

- A. Section 06400- Architectural Woodwork (miscellaneous wood shelving, mounting blocks, and other millwork)
- B. Section 06651- Solid Surface Fabrications
- C. Section 08710- Finished Hardware
- D. Section 09660- Resilient Tile Flooring and Base
- E. Section 11061- Musical Instrument Storage Equipment
- F. Section 11425- Residential Appliances
- G. Section 12302- Wood Casework and Fixtures
- H. Division 15-Service waste lines, connections and vents.
- I. Division 16- Electrical Service Fixtures.

1.03 REFERENCED STANDARDS

- A. Architectural Woodwork Institute (AWI), "Architectural Quality Standards Illustrated."
- B. National Electrical Manufacturer's Association (NEMA) "Architectural Quality Standards." (www.awinet.org)

1.04 DESCRIPTION OF WORK

- A. Full Overlay Door (Laminate Clad Casework)
- B. Countertops
- C. PVC body edging for doors and drawers and cabinet bodies.
- D. Independent toe base.
- E. Extent of plastic laminate-faced casework and fixtures is shown on the Drawings.
 - 1. Laboratory casework is any casework item within Biology/Chemistry, Physics, Geo-Systems, Multi-Purpose Science, Chemical Storage, Special Education Science, D/HoH & Science labs, Focus Science and associated Prep Rooms.

- F. Work shall include the fabrication and installation of base cabinets, wall cabinets, storage cabinets, cabinet under-structures for fume hoods, shelf units, mailboxes, and other components as indicated on the Drawings.
- G. Tops, box curbs and splash rims associated with plastic laminate-faced casework are included in the work of this Section.
- H. Cutouts in tops to accommodate sinks, faucet assemblies, and other hardware are included in the work of this Section.
- I. Furnishing and installing of sinks, sink accessories (including tailpieces), mechanical and electrical services fixtures associated with laboratory casework (as indicated below in Part 2) are included in the Work of this Section. Utility rough-ins and final connections of service fixtures (including sink traps) are part of the Mechanical Work of Division 15 and Electrical Work of Division 16.
- J. Middle and High School sinks with the exception of Clinic sinks which are furnished under Division 15, are included in the work of this section.

1.05 WORK EXCLUDED

- A. All final connection to plumbing fixtures are provided by Division 15. Contractor shall coordinate with Division 15 trades to ensure proper location and size of such cutouts.
- B. Furnishing and installing of rough framing, in-wall reinforcement, or other means of support shall be provided under the Work of other Sections.

1.06 QUALITY ASSURANCE

- A. Manufacturer: Provide single source responsibility for all plastic laminate-faced casework. Submit evidence of at least five years' experience in successful manufacturing for installations of laminated-faced casework similar in size and scope to the work required for this project.
- B. Casework: Manufacturer shall comply with the design, quality of materials, level of workmanship and standards of detailing established by the approved manufacturer in Part 2 of this Section.
- C. Installation: Install casework under the supervision of the Manufacturer's authorized representative, using mechanics certified by the Manufacturer.

1.07 WARRANTY

- A. All casework shall be warranted for a period of five (5) years from date of warranty commencement against manufacturing defects and workmanship.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store casework, countertops and related products in undamaged condition and in original protective packaging. Protect from weather, temperature and humidity extremes, construction hazards and unauthorized access. Packaging shall remain intact on casework until ready for final placement.
- B. Remove casework from storage only when "wet trades" have completed their work in the area of placement.

1.09 COORDINATION

- A. Coordinate layout and installation of rough framing, in-wall reinforcement, blocking, and other means of support for the work of this section.
- B. Coordinate locations of utilities that will penetrate tops, splashes and cabinets.

1.10 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, specifications and installation instructions for each type of casework and hardware type.
- B. Samples: Submit 6" x 6" samples of each type of exposed and semi-exposed finish construction specified, including countertops, cabinet and drawer fronts, interior and underside cabinet surfaces, and edges.
- C. Colors: Provide manufacturer's standard color selections for high-pressure plastic laminate and pressure fused laminated finishes.
- D. Shop Drawings: Submit shop drawings for each type of casework, including the following:
 - 1. Plans and elevations showing relationship to surrounding and adjacent walls, doors, and windows.
 - 2. Cross sections
 - 3. Anchoring details and locations of anchorage
 - 4. Locations of sink cutouts
 - 5. Joinery details for each type of joinery condition used in the fabrication process.

PART 2- PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. Case Systems, Inc., Midland, MI, as represented by Diversified Educational Systems (DES), 540-687-7060.

- B. Paragon Casework, Chantilly, VA 703 802-1517.
- C. TMI Systems Design Corporation, Dickinson, ND as represented by VA School Equipment, 434-455-2000.
- D. Stevens Industries, Inc., Teutopolis, IL, as represented by Nycom, Inc. 804-794-3044.
- E. Specified Woodworking, Laurel, MD, 301-598-8200.
- F. Blair-Dumond, Inc., Richmond, VA, 804-359-2090.
- G. Mastercraft Woodworking, Inc., Shoemakersville, PA, 610-926-1500.
- H. Cabinets by Design Inc., Duluth, GA: 814-619-6232 or 770-418-1200.
- I. Other manufacturers pre-bid approved in accordance with Section 01630 and complying with the standard of quality described in this Section.

2.02 MATERIALS

- A. Definitions: The following definitions apply to casework units;
 - 1. "Exposed" portions of casework include surfaces visible when doors and drawers are closed. Bottoms of cases more than 4'0" above floor shall be considered as exposed. Visible members in open cases or behind glass doors also shall be considered as exposed portions.
 - 2. "Semi-exposed" portions of casework include those members behind solid doors and drawers, such as shelves, dividers, interior faces of ends, case back, drawer sides, backs and bottoms, and back face of doors. Tops of cases 6'-6" or more above floor shall be considered semi-exposed.
 - 3. "Concealed" portions of casework include sleepers, web frames, dust panels, and other surfaces not usually visible after installation.
- B. Laminated Plastic Finishes
 - 1. Exterior cabinet surfaces (exposed finish): High pressure decorative laminate (HPDL), NEMA LD3-1995-VGS 0.028" thick. Provide HPDL Manufacturer's full range of standard colors for selection. Exposed surfaces include the following:
 - a. Doors and drawer fronts (when closed).
 - b. Exterior cabinet ends.
 - c. Bottoms of wall cabinets

- d. Interiors of open cabinets (no doors)
2. Semi-exposed surfaces: Pressure fused laminate; Melamine, resin-impregnated, 80-gram PSM minimum, complying with NEMA LD3-1995-VGS GP 28 and LD3-1991 CL20. All concealed surfaces shall be balances with phenolic backer. Color: Colorfast "white", "gray", or "putty". Semi-exposed surfaces include the following:
 - a. Interior of all cabinet surfaces (cabinets with doors).
 - b. Tops of tall cabinets and wall cabinets.
3. Countertops: High pressure decorative laminate, NEMA LD3-1995 HGS .050" thick, solid color, horizontal grade. Provide HPDL Manufacturer's full range of standard colors for selection. All countertop edges shall be self-edge with laminate.
4. Balancing sheet: White or neutral colored, .020" cabinet liner, NEMA CL-20 for balanced construction.
5. "Acid Resistant Laminate" NEMA LD3-1995, Wilsonart "Chem Surf" Pointe "Chemguard" or comparable at exposed cabinet surfaces in combination Chemistry/Biology Science Labs.
- C. Cabinet Edging: High impact, solid, acid resistant PVC, with homogenous color throughout; machined applied with hot melt adhesive. Minimum number of color selections: 27.
 1. Doors and Drawers: 3 mm thick.
 2. Cabinet body edging: 1 mm thick.
- D. Particle Board Core: minimum 47 lb. density; balanced construction with moisture content not to exceed 8%. Comply with ANSI A208.1-2009 or current edition, type M-2 Industrial Grade.
- E. Fiberboard: Fiberboard Core is not Acceptable.
- F. Hardware:
 1. Hinges: Five knuckle 270° swing, institutional type hinge; wrap around, tempered steel. Provide one pair per door to 48" in height, one and one-half pair per door over 48" high. Finish: Chrome plated with satin finish.
 2. Pulls: Satin chrome, 4" wire pull.
 3. Drawer slides: Minimum 75-pound dynamic load rating, with adjuster cam to control side swat, and in-stop, out-stop and keeper to maintain 80% open position.

4. Catches: 6-pound magnetic catch for base and wall cabinet doors. Provided two catches at tall cabinets.
5. Elbow catches: Ives #2, A14 (chrome) or comparable.
6. Shelf-supports: Adjustable type, twin pin design to prevent rotation and provided with anti-tip shelf restraints. Load rating: 300 pounds per support. Support shall retard shelf slide-off. Shelf supports shall friction-fit into end panels and intermediate vertical dividers.
7. Locks: CompX National or CompX Timberline –Disc tumbler design; provide locks for all drawers and doors. All locks shall have metal strike/receiver. All locks shall be keyed alike by room.
 - a. Rough-ins for locks shall comply with manufacturer's recommendation to avoid gaps around the locks.
 - b. Provide four (4) Master keys.

2.03 GENERAL WORKMANSHIP

- A. All casework shall be square, plumb and true.
- B. Cabinet parts shall be accurately machined and bored, utilizing concealed dadoes, dowels or interlocking mechanical fasteners, as appropriate.
- C. No nails, screws or other fasteners shall be visible on exposed surfaces.
- D. Provide 3/4" hang rails at all cabinets to provide rigidity and ease of installation.
- E. High-pressure decorative laminate tops shall be fabricated in longest possible lengths. Field joints shall not be allowed within 12" of a sink cutout. Splice field joints with bolt type fasteners.
- F. Bolt high-pressure decorative laminate sheets to core using adhesive recommended by the HPDL manufacturer.
- G. Provide balanced construction of all unfinished core stock surfaces (with the exclusion of stock edges).
- H. Fabricate casework, countertops and related products to dimensions, profiles and details as shown on drawings.

2.04 CABINET CONSTRUCTION

- A. Toe Base: Separate and continuous water resistant, 3/4" exterior grade plywood platform. Provide concealed fastening to cabinet.
- B. Cabinet tops and bottoms:

1. Base cabinet and tall cabinet bottoms: $\frac{3}{4}$ " thick particle board backed with cabinet liner on concealed side, fused laminate on interior side.
 2. Base Cabinet: $\frac{3}{4}$ " particleboard, prefinished.
 3. Wall cabinet bottoms: $\frac{3}{4}$ " thick particle board with 0.30" plastic laminate on exposed side, fused laminate on the interior (semi-exposed side).
 4. Wall cabinet tops: $\frac{3}{4}$ " thick particle board with fused laminate on both sides.
- C. Exposed cabinet body edges: .020" PVC, color matched to cabinet, or as otherwise selected from standard colors.
- D. Wall and base cabinet ends (between units): $\frac{3}{4}$ " thick particle board with fused laminate on interior (semi-exposed) side, backing sheet on concealed side.
- E. Exposed wall and base cabinet ends: $\frac{3}{4}$ " thick particle board with .030" plastic laminate on exposed side; fused laminate on interior (semi-exposed) side.
- F. Fixed and adjustable shelves: $\frac{3}{4}$ " thick particle board for shelves in cabinets up to 27" wide; provide 1" thick particle board for shelves over 27" wide. Provide fused laminate on both sides with color matched PVC edges.
- G. Cabinet backs: $\frac{1}{2}$ " thick, particleboard, or $\frac{1}{4}$ " thick MDF, core pressure fused; cabinet backs shall be recessed and fully housed (4 sides), with stiffeners and hot melt adhesive. Finish: manufacturer's standard white or neutral finish.
1. Optional back construction: Full overlay, plant-on back; edge of back shall not be exposed at finished ends. Secure with minimum #8, low root, high treated screws spaced 8" on center maximum.
 2. Comply with AWI Standards 400 B-T-10 and 1600-T-11.
- H. Door and Drawer Fronts: $\frac{3}{4}$ " particle board core with plastic laminate on exposed face, backing sheet on interior (semi-exposed) face; backing sheet to be color matched to interior faces of cabinet body. Doors and drawer fronts shall overlay cabinet body with a maximum $\frac{1}{8}$ " reveal. Exposed PVC edges shall be machine radiused and buffed for consistent finish and profiled, corners and length, inside and out.
- I. Door catches: Dual, self-aligning, magnetic type. Strike shall be plated steel. Inactive leaf of door pair shall have one (1) magnetic catch and one (1) elbow catch. Inactive doors over 4'-0" tall shall have one (1) magnetic catch and one (1) surface bolt.
- J. Drawers:

1. Subfronts, sides and backs: White or neutral finish, 1/2" minimum thick particleboard, laminated with Thermally Fused Melamine, doweled and glued into sides. 5/8" particleboard thick for subfronts. Edges: color matched PVC.
 2. Bottoms: 1/2" minimum pressure fused laminate particleboard, spreader-reinforced (one at 24", two at 36", four at 48").
- K. Countertops, and splashes for base cabinets: High pressure, decorative laminate on minimum 3/4" thick particle board, with 1/2" buildup for a total of 1 1/4" thickness. Concealed sides shall be balanced with backing sheet. Where multiple units are set end to end in a line, provide continuous tops to minimize seams.
1. Countertops and splashes for sink base units: Same construction features as above, except provide moisture resistant particle board countertops and splashes extending a minimum of 24" past both sides of the sink. Where sinks occur in countertops where multiple base units are grouped together, and the total length is six feet or less, the entire countertop and all splashes shall be moisture resistant.
 2. Moisture resistant particleboard: "Duraflake MR" as manufactured by Willamette Industries, Inc., or equivalent. Material shall comply with ANSI 1-M-3, 47 pounds per cubic foot (pcf) density. Material shall demonstrate maximum of 1.5% thickness swell and 7% absorption after exposure to a 24-hour water soak test.
 3. Provide drip groove on underside of countertop overhang at sink locations.
- L. Countertops for computer counters: High pressure, decorative laminate on 3/4" thick particle board and 3/4" thick plywood (for a total core thickness of 1-1/2"). Concealed side shall be balanced with backing sheet. Tops shall be as long as practical in order to minimize seams.
- M. Vertical and Horizontal Dividers: 3/4" particle board with pressure fused laminate both sides, color matched PVC at edges.
- N. Provide moisture resistant, solid core 1 1/4" thick particleboard for divider/supports at computer workstations.
- 2.05 TOPS, SINKS AND ACCESSORIES FOR LABORATORY CASEWORK
- A. Tops, Box Curbs, and Splash Rims:
1. Epoxy Resin: Chemical and abrasion resistant, 1" thick cast material consisting of epoxy resins and other inert ingredients, homogeneous throughout, oven cured and annealed, with a uniform low sheen black

finish. Material shall have been tested for 24-hour exposure to a variety of reagents. All exposed edges shall have a 1/8" x 45-degree chamfer.

- a. Compressive Strength (ASTM D695): 35,000 PSI
 - b. Flexural Strength (ASTM D790): 16,000 PSI
 - c. Tensile Strength (ASTM D638): 10,500 PSI
 - d. Density (ASTM D792): 123 lbs/ft³
 - e. Rockwell M Hardness (ASTM D785): 110
 - f. Heat distortion (Temp. @ 264 PSI per ASTM D648): 350° F
 - g. Fire Resistance (ASTM D635): Self extinguishing
- B. Top Sizes: Furnish tops in maximum practicable lengths, to minimize field splined joints. No joints shall be allowed at or within 12" of a sink cutout.
- C. Drip Edge and Overhang: Provide front and end overhang of 1" over base cabinets, formed with continuous drip groove on underside of overhang 1/2" from edge on units with sinks.
- D. Epoxy Resin Sinks: (Standard Drop-in Sinks) One-piece, molded modified epoxy resin, resistant to mechanical and thermal shock. Interior corners shall be rounded to 1-1/2" radius. Slope sink bottom to outlet opening. Finish: Soft gloss, black. Provide the following sink sizes:
1. Type 1: At Student location: HC location: 18" x 15" x 5" depth, corner drain hole.
 - a. Durcon Number A25.
 2. Type 2: At Student location: Non-HC locations: 18" x 15" x 11" depth, corner drain hole
 - a. Durcon Number D30.
 3. Type 3: 25" x 15" x 5" depth, corner drain hole, at ADA Accessible Sinks
 - a. Durcon Number A55.
 4. Type 4: 25" x 15" x 10" depth, corner drain hole (all other locations)
 - a. Durcon Number D 55.
 5. Provide the following accessories:
 - a. 1 1/2" sink outlets and strainers, 70464

- b. Overflows, 70466
 - c. Stoppers, 70468
 - d. Supplemental support assemblies for under-slung sinks.
- E. Service Fixtures: 85% copper content, brass castings, and forgings. Provide fixtures complete with supply nipples, locknuts and tailpieces where applicable for type of fixture. Provide as scheduled or noted on the drawings:
- 1. Emergency Eyewash Assemblies: (Unit must comply with current ANSI provisions)
 - a. Counter type: Guardian G1805 Eyewash, deck mounted Auto Flow 90° Swivel, Right Hand Mounting, with backflow preventer and hands-free provision. Provide ANSI- compliant identification sign.
 - b. Provide Eyewash with these accessories (see drawings for locations):
 - 1. Stainless Steel dust cover for each spray head
 - 2. In-line vacuum breaker for installation between valve and spray head.
 - 3. Provide G3600LF –Thermostatic Mixing Valve
 - c. Other acceptable manufacturers per this section:
 - 1. Bradley company
 - 2. Water Saver company
 - 3. Pre-bid approved manufacturer (see Section 01630)
 - 2. Deck Mounted Service Faucets (vandal resistant): Water Saver Faucet Company. Gooseneck type with hose tip and vacuum breaker. Polished chrome finish.
 - a. (VR411-VB) Provide at non-HC locations (provide BO124 splash eliminator for use with BO127S Aspirator). the BO127 Aspirators are located at student's workstation sinks in High School Chemistry and Biology Labs only.
 - b. (L411VB-BH) Provide at all HC locations.
 - c. Pre-bid approved manufacturer (see Section 01630)

3. Gas cock (vandal resistant): Water Saver Faucet Company VR4100-132AWSA Turret base, deck-mounted, 90°.
 - a. Ground key hose cock (2).
 - b. Provide mounting shank.
4. Emergency Eyewash and shower safety station Water Saver Faucet Company SSBF909
 - a. Combination WideArea eye/face wash and shower safety station with vandal-resistant construction.
 - b. Unit shall comply with ADA requirements for accessibility by handicapped persons.
 - c. Shower Head: 10" diameter chrome plated cast brass shower.
 - d. Eye/Face Wash Bowl: 11 ½" stainless steel with 4 GS-plus heads
 - e. Stainless steel cover for eye/face wash bowl
 - f. Power coated orange finish on galvanized pipe and fittings
 - g. ANSI-compliant identification sign
 - h. Other acceptable manufacturers per this section:
 1. Bradley company
 2. Guardian Equipment
 3. Pre-bid approved manufacturer to comply with this section and Section 01630)
5. Acid Neutralization Tank
 - a. Neutralizing Tank: Provide in Chemical storage room and all science Prep room labs. Tank to be installed inside the cabinet as shown on drawing. Storage shall be as manufactured by Town & Country Model NT-5, 5 Gallon, seamless, High Density Polyethylene Tank (HDPE) with either a bolted or a threaded cover. Provide 100 pounds of limestone chips for each basin. Tanks fully equal to the item specified as manufactured by Nalge (Nagle Nunc International, www.nalgenunc.com) or Enfield shall be acceptable.

- 2.06 SINKS FOR HIGH AND MIDDLE SCHOOLS. (See Division 15 for Health Room sinks and High and Middle School only and Elementary school sinks are provided in Division 15.
- 2.07 FAMILY AND CONSUMER SCIENCES CASEWORK (ADDITIONAL MATERIALS AND ACCESSORIES)
- A. Elkay LR-3319 double bowl sink (3 holes) with LK-2442 faucet. Include sink outlet, strainer and stopper.
- B. Elkay LWR-3322-R double bowl sink with LK-2442 faucet. Include sink outlet, strainer and stopper. Provide at the handicapped station.
- C. Garbage Disposal: Provide GE GFC530F, ½ HP motor; 2600 RPM, direct wire at all sinks including handicapped stations.
- D. Demonstration Mirror: Advance Tabco MI-60 Tilting demo Mirror, (24 x 60) Stainless Steel
1. Stainless steel Tilting demo mirror with unbreakable mirror
 2. Ceiling Mounted
 3. Stainless Tubular mounting support (4 feet, 1 5/8" post, Rainbow uprights for added support)
 4. Overall size :66" L x 25 1/2" W
 5. NSF certified
 6. Pre-bid approved manufacturer to comply with this section and Section 01630)

PART 3- EXECUTION

3.01 INSPECTION

- A. Inspect areas where casework shall be installed in order to ensure that utility rough-ins, where applicable, have been correctly installed in the proper locations and are sufficiently complete to prevent damage to casework by rough-in trades. Verify that no adverse conditions exist that would prevent the proper installation of casework. Notify Owner's Representative and Architect if any such conditions have been corrected.
- B. Verify dimensions of on-site cabinet locations prior to fabrication of casework.

3.02 PREPARATION

- A. Condition casework to the average prevailing humidity for the conditioned room and spaces in which the casework will be permanently installed.

3.03 INSTALLATION AND PROTECTION

- A. Install casework in accordance with the Drawings and final approved shop drawings. Install casework plumb, level, true and straight. Shim where required using only concealed shims.
- B. Where casework abuts other adjacent finished work, carefully scribe and cut for close, accurate fit.
- C. Provide filler strips, scribe strips, or other trim required by the drawings.
- D. Anchor casework securely in place using manufacturer's recommendations.
- E. Install all hardware using at least the minimum number of fasteners required by the manufacturer.
- F. Adjust all doors, hinges and drawers for proper operation, fit and finished appearance. Moving parts shall operate freely, without excessive bind.
- G. Repair minor damage in accordance with manufacturer's written recommendations. Replace other casework units, components and hardware that exhibit significant damage or defects.
- H. Protect installed casework and accessories from damage until acceptance by Owner, in accordance with manufacturer's recommended written instructions.

3.04 CLEAN UP

- A. Remove all installation debris such as cartons, protective wrapping, sawdust, scraps and fasteners from the premises, and dispose of legally off-site.
- B. Clean all exposed and semi-exposed surfaces of casework and tops in accordance with manufacturer's recommended written procedures.

END OF SECTION

SECTION 15010

GENERAL PROVISIONS

PART I - GENERAL

1.01 GENERAL

- A. The Bidding and Contract Requirements and Division 1 -General Requirements for the Construction of this project shall apply to this division and all sections herein.
- B. Where items under the Bidding and Contract Requirements, and Division 1 - General Requirements are repeated in this section, it is intended to call particular attention to or qualify the items. It is not intended that any other parts under the Bidding and Contract Requirements of Division 1 - General Requirements shall be assumed to be omitted if not repeated herein.

1.02 SCOPE

- A. The work included under this Division shall include a complete mechanical system as shown on the drawings and as specified herein. 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 in all respects and ready for operation, even if not particularly specified, shall be furnished, delivered and installed by the contractor without additional expense to the Owner.
- B. 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 a complete system.
- C. It is the intention of the specifications and drawings to call for finished work, tested, and ready for operation. Wherever the word "provide" is used, it shall mean, "provide and install complete and ready for use."
- D. Minor details not usually shown or specified but necessary for proper installation and operations shall be included in the contractor's estimate, the same as if herein specified or shown.
- E. This contractor shall be responsible for participation and coordination with the Commissioning process as specified in section 01660.

1.03 APPLICABLE SPECIFICATIONS, CODES, STANDARDS AND PERMITS

- A. All equipment, materials and installation shall conform to the requirements of national, state and local codes, laws, ordinances, rules and regulations. All utility connections shall conform to the requirements of the local utilities.

- B. Unless otherwise specified herein or shown on the contract drawings, the work and materials shall conform to the applicable requirements of the following codes, standards and regulations:
1. VUSBC Virginia Uniform Statewide Building Code
 2. BOCA Building Officials & Code Administrators International, Inc.
 3. ICC International Code Council
 4. AMCA Air Movement and Control Association International, Inc
 5. ARI Air Conditioning & Refrigeration Institute
 6. ASHRAE American Society of Heating, Refrigerating and Air Conditioning Engineers
 7. ASME American Society of Mechanical Engineers
 8. ASTM American Society of Testing Materials
 9. NEC National Electrical Code
 10. NFPA National Fire Protection Association
 11. OSHA Occupational Safety and Health Association
 12. SMACNA Sheet Metal and Air Conditioning Contractors National Association
 13. UL Underwriters Laboratories, Inc.
 14. ANSI American National Standards Institute
 15. AWS American Welding Society
 16. NEMA National Electrical Manufacturer's Association
 17. CISPI Cast Iron Soil Pipe Institute
 18. IRI Industrial Risk Insurers
 19. CAA Clean Air Act Amendment of 1990 (Title VI, Section 608)
 20. CTI Cooling Tower Institute
- C. Contractor shall give all necessary notices, obtain all permits and pay all Government taxes, fees and other costs, including costs for water, sewer, and

gas connections or extensions including meters, in connection with his work, file all necessary plans, prepare all documents and obtain required certificates of inspection for work and deliver same to Owner before request for acceptance and final payment for work.

- D. The contractor shall be responsible for purchasing equipment and appliances that bear the label of an agency, as approved by the Department of Public Works and Environmental Services (DPWES), Fairfax County. It shall be the responsibility of the contractor to pay for any label testing of equipment or appliances that are installed without the label of a DPWES approved agency.

1.04 SHOP DRAWINGS

- A. The contractor shall submit eight (8) copies of the shop drawings to the Architect for review with ample time for checking prior to delivery of any of this equipment or material to the job site. The project's and the contractor's names shall be on each submittal.
- B. Shop drawings shall be submitted on all major pieces of equipment and material. Each item of equipment proposed shall be a standard catalog product of an established manufacturer. The shop drawing shall give complete information on the proposed equipment such as: capacity, size, construction, material, dimensions, arrangement, operating clearances, performance characteristics, weight and rating authority. Each item of the shop drawing shall be properly labeled, indicating the intended service of the material.
- C. The contractor shall, before submitting the shop drawings of the equipment to the Architect, check each item of the shop drawings to verify the proper equipment. Items to check shall include but not be limited to:
 - 1) Will equipment physically fit into space;
 - 2) proper equipment for the job; electrical characteristics;
 - 3) voltage matches that of electric service; proper arrangements for connections;
 - 4) meets code requirements.
- D. The shop drawings shall be neatly bound and submitted to the Architect with a letter of transmittal, which shall list each item, submitted with the manufacturer's name.
- E. Review of the shop drawings shall not be considered as a guarantee of measurements or building conditions. Where drawings have been reviewed, said review does not mean that drawings have been checked in detail; said review does not in any way relieve the contractor from his responsibility or the necessity of furnishing material or performing work as required by the contract drawings.

1.05 EQUIPMENT DEVIATIONS

- A. Where the contractor proposes to use an item of equipment other than the prototype equipment (a specified manufacturer's equipment used as the basis of design) or that detailed on the drawings which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical or architectural layout, all such redesign and all new drawings and detailing required therefore shall be prepared by the contractor at his own expense and be approved by the Owner and Engineer.
- B. Where such deviation from the prototype equipment requires a different quantity and arrangement of materials and equipment, the contractor shall furnish and install any such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit and any other additional equipment required by the system at no additional cost to the Owner.

1.06 QUALIFICATIONS FOR BIDDERS

- A. The contractor shall examine drawings and specifications relating to work of all trades and become fully informed as to the extent and character of work required and its relation to all other work in the project prior to submission of bid or prior to start of any construction covered by these specifications and drawings.
- B. Before submitting bid the contractor shall visit the site and examine all adjoining existing building, equipment and space conditions on which his work is in any way dependent, for the best workmanship and operation according to the intent of the specifications and drawings. Contractor shall verify dimensions and fully inform himself as to the nature and scope of the proposed work and also the conditions under which it is to be conducted. He shall report to the Owner any conditions that in his estimation might preclude him from installing his equipment and work in the manner intended and noted on the drawings and in this specification. Failure to take the above precaution will in no way relieve the contractor from his obligations to provide the material and work as indicated and as specified without additional cost to the Owner or extension of completion time.

1.07 TEMPORARY FACILITIES

- A. Are specified under Temporary Facilities, the General Conditions, Supplementary General Conditions, and Division I. General requirements are hereby made a part of this section as fully as if repeated herein.

1.08 DRAWINGS

- A. The drawings are diagrammatic, indicating general arrangement of work, and should not be scaled to establish location of work. The drawings show the size of piping and ductwork branches, risers and equipment, and must be followed. Where a change of location or method of running becomes necessary due to obstructions or other construction difficulties, such changes shall be made after

- securing approval of the Owner in writing and at no increase in amount of contract.
- B. Decisions regarding any and all substitutions and options permitted by the specifications shall be submitted for approval to the Owner. Approval will only be recognized when in writing.
 - C. In finished spaces all piping and ductwork shall be concealed or run behind furring unless shown otherwise. Where concealing is not possible piping and ductwork may be exposed after obtaining the Owner's approval.
 - D. All horizontal piping and ductwork not run below slab on grade shall be run as close as possible to underside of floor and parallel to building lines. Maintain maximum headroom in all areas.
 - E. All vertical piping and ductwork shall be run as close to walls and partitions as practicable.
 - F. Coordination of all other trades prior to erecting any piping or ductwork is required to avoid conflict between various components of the building.

1.09 COOPERATION WITH OTHER TRADES

- A. The contractor shall give full cooperation to other trades and shall furnish in writing, with copies to the Owner, any information necessary to permit the work of all trades to be installed satisfactorily with the least possible interference or delay.
- B. Where the work of the contractor will be installed in close proximity to work of other trades, or where there is evidence that work will interfere with work of other trades, he shall assist in working out space conditions to make a satisfactory adjustment. This contractor shall prepare composite working drawings at a scale not less than 1/4" = 1'-0" clearly showing how his work is to be installed in relation to the work of the other trades. If the contractor installs his work before coordinating with other trades or as to cause any interference with work of other trades he shall make necessary changes to his work to correct the condition without additional cost to the Owner.
- C. The contractor shall furnish to other trades as required all necessary templates, patterns, setting plans and shop details for the proper installation of the work and for the purpose of coordinating adjacent work.
- D. Structural support elements as shown on the drawings must be in place prior to the installation of piping or the setting of rooftop equipment. The contractor shall not install any piping or rooftop equipment until such elements are in place.

1.10 ELECTRICAL WIRING

- A. The contractor shall, regardless of voltage, furnish and install all temperature control wiring, all interlock wiring, and equipment control wiring for the equipment that the contractor furnishes unless otherwise noted. Division 16 will furnish and install power wiring to the mechanical equipment and make electrical connections unless otherwise noted on the drawings.
- B. All electrical wiring furnished under the mechanical contract shall conform with Division 16.

1.11 FOUNDATIONS AND SUPPORTS

- A. Contractor shall provide all necessary foundations, supports, pads and bases required for mechanical equipment and any other equipment furnished under this contract, unless covered under the architectural or structural work.
- B. For buried concrete or cast iron sewer piping installed in filled cuts over four (4) feet in depth the contractor shall provide brick or approved equal supports or piers under piping and fittings with piers or supports extending to a depth to provide sufficient firm and adequate support to overcome the possibility of any deflection in the piping system.
- C. For pumps, compressors and other rotating machinery and all equipment where foundations are indicated, furnish and install concrete pads 4" in height (unless otherwise noted) extending not less than 4" beyond equipment base in all directions. Equipment installed in areas other than slab on grade shall be installed with the appropriate vibration assembly.
- D. Construction of foundations, supports, pads, bases and piers where mounted on the floor, shall be of the same materials and same quality of finish as the adjacent and surrounding flooring material.

1.12 SCAFFOLDING, RIGGING AND HOISTING

- A. Unless otherwise specified, contractor shall furnish all scaffolding, rigging, hoisting, shoring and services necessary for erection and delivery into the premises for any equipment and apparatus furnished and shall remove same from premises when no longer required.

1.13 EXCAVATION AND BACKFILL

- A. The contractor shall be responsible for excavation, backfill, tamping, shoring, bracing, pumping, street cuts, repairing of finished surface and all protection for safety of persons and property as required for installing a complete mechanical/plumbing system. All excavation and backfill shall conform to the architectural section of the specifications.

- B. It shall be the responsibility of the contractor to check the indicated elevations of utilities entering and leaving the building. If such elevations require excavations lower than the footing levels, the Owner shall be notified of such conditions and redesign shall be made before excavations are commenced. It is also the responsibility of the contractor to make the excavations at the minimum required depths in order not to undercut the footings.
- C. The trench shall be excavated below the installation level of the bottom of the pipe. The trench shall be filled with sand or fine gravel so entire length of barrel of piping rests on solid bed of sand or fine gravel. The backfill shall be filled in layers of 6" max depth and such layers shall be compacted after each placement.
- D. Excavation shall be made in a manner to provide a uniform bearing for pipes. The pipe elevation shall be determined by the contractor to meet the plumbing codes. Where rock is encountered, excavate 3" below pipe grade and back fill with sand to the installation level of the pipe. The pipe, including the joints, shall not rest on rock at any point.
- E. After required test and inspections, backfill the ditch and tamp. The first foot above the pipe shall be hand backfilled with rock free clean earth. The backfill in the ditches on the exterior and interior of the building shall be tamped to 95% of the standard Proctor maximum dry density (ASTM D-698). The contractor shall be responsible for any of his ditch walls that cave in.

1.14 CUTTING AND PATCHING

- A. On new work the contractor shall furnish sketches showing the locations and sizes of all openings and chases, and furnish and locate all sleeves and inserts required for the installation of the mechanical work before the walls, floors and roof are built. The contractor shall be responsible for the cost of cutting and patching where any mechanical items were not installed or where incorrectly sized or located. The contractor shall do all drilling required for the installation of his hangers.
- B. On alterations and additions to existing projects, the contractor shall be responsible for the cost of all cutting and patching unless otherwise noted.
- C. No structural members shall be cut without the approval of the Owner, and all such cutting shall be done in a manner directed by him. All patching shall be performed to match the existing surface in shape, texture and color.

1.15 ACCESSIBILITY

- A. The contractor shall locate equipment, which must be serviced, operated or maintained in fully accessible position. Equipment shall include but not be limited to: valves, traps, or low limit devices, damper operators, motors, controllers, drain points, fusible links of fire dampers, fire dampers, filters, etc. If required for better accessibility, furnish access doors for this purpose. Minor deviations from

drawings may be made to allow for better accessibility, and any change shall be approved. Motor starters shall be installed not more than 6'-0" above finished floor unless otherwise approved by the Owner.

- B. All filters furnished with air handling equipment shall be readily removable from sides or bottom of cabinet as required by equipment location. Contractor shall verify location of all equipment and proper location of access to filters for removal before submitting shop drawings, placing order for equipment and setting and connecting of equipment. Any filters deemed by the owner to be inaccessible after installation will be made accessible by the contractor at no additional cost to the owner.

1.16 RECORD DRAWINGS

- A. The contractor shall keep daily updated accurate records of all deviations in work as actually installed from work indicated on the contract drawings. The record drawings shall be kept at the job site, available to the Owner at all times and labeled as "Project Record Information - Job Set". When work is completed one complete set of marked-up prints shall be delivered to the Owner.

1.17 PERSONNEL INSTRUCTION AND OPERATING INSTRUCTIONS

A. Operation and Maintenance Manuals

1. The contractor shall submit for approval three (3) copies of all of the manufacturer's installation, operating and maintenance manuals for all new mechanical equipment listed in the equipment schedule, all necessary components of mechanical equipment, testing and balancing reports, equipment start-up records, equipment capacity (input and output) and a list of filter sizes and belt sizes for all mechanical equipment that requires filters and belts (this includes, but is not limited to, fan coils, unit ventilators, rooftop units, cabinet heaters, exhaust fans and air handlers).
2. Submit four (4) copies of the operating and maintenance manuals for the automatic temperature control system components and diagrams for approval. A complete written narrative of how each system is intended to operate shall be included.
3. Provide laminated as-built drawings and manufacturer's refrigeration piping layout showing the layout and refrigerant volume of each variable refrigerant system. This shall show actual room numbers, not from construction documents, and addressing scheme. Laminate shall have minimum thickness of 10 mil. Drawing size shall be 11" x 17". Provide multiple drawings should zones not fit onto one page. These will be mounted in the water heater room unless otherwise shown.
4. Manuals shall be assembled in black vinyl hardback loose-leaf binders,

labeled with job name, address and date. Information on each piece of equipment of system shall be in a separate tab labeled section. Provide a complete index of the contents. After approval by the Engineer the binders shall be forwarded to the Owner.

- B. After all tests are conducted and approved as specified below, furnish a competent operating engineer for a period of two days to instruct and demonstrate to the Owner or his authorized representative the operation of the system. The mechanical systems demonstration shall not coincide with the electrical demonstration. Notify the owner in writing of the person to whom this instruction was given and the date it was given.
- C. On phased construction projects the aforementioned equipment start-up records shall be completed and made available to the owner for review prior to the occupancy of the completed phase.

1.18 TESTS

- A. The contractor shall, at his expense, conduct capacity and general operating tests on each system. The test shall demonstrate the specified capacities of the various pieces of equipment and shall be conducted in the presence of the Owner or his authorized representative. The general operating tests shall demonstrate that the entire equipment is functioning in accordance with the contract documents. Furnish all instructions and test equipment.
- B. After all systems are completely tested, submit three copies of the test results to the Owner for approval before final acceptance of project.

1.19 EQUIPMENT AND SYSTEMS CHECKOUT AND START-UP

- A. This contractor is responsible for the checkout and start-up of all equipment and systems. Equipment start-up shall be in accordance with the manufactures requirements and recommendations and shall be performed by personnel who are knowledgeable with the equipment and its requirements. When required by the equipment manufacturer or as noted in the specifications, equipment checkout and start-up shall be performed by personnel certified by the manufacturer. Evidence of proper certification of startup personnel shall be provided to the owner.
- B. All checkout and start-up activities are the responsibility of this contractor.
- C. This contractor shall notify FCPS two weeks prior to equipment checkout and start-up.
- D. Systems and equipment shall be operated at both full and part load conditions to ensure specified requirements can be achieved.

- E. The equipment manufacturer's checkout and start-up logs shall be completed in their entirety; should a reference be non-applicable it shall be marked as such. Copies of completed logs shall be submitted to FCPS personnel the day of checkout and start-up activities, as well as included in the Operation and Maintenance manual.

1.20 WARRANTY

- A. The contractor shall deliver the work described herein in a first-class operating condition in every respect. The contractor shall also warrant that the material, equipment and workmanship furnished shall be entirely free from defects for a period of one year. All apparatus will develop capacities and characteristics specified, and that if during the period of one year - from date of substantial completion (See Section 01740) any such defects in workmanship, materials or performance appear, he will, without cost to the Owner, remedy such defects within a reasonable time. In default thereof, Owner may have such work done and charge the cost to the contractor. In cases where equipment warranties through the manufacturer exceed the periods listed in these specifications, the manufacturer's warranty shall take precedence. The contractor is responsible for all periodic service and maintenance required to maintain such warranties on completed work for the duration of the project (See Section 01740.1.05). Once the entire project is substantially complete, periodic maintenance shall be the responsibility of the owner.

1.21 CONNECTING INTO EXISTING UTILITIES

- A. Procedures: The procedures used for the accomplishment of connecting into existing work shall provide for safe conduct of the work, careful removal and disposition of materials specified to be salvaged, protection of property which is to remain undisturbed, coordination with other work in progress, and timely disconnection of utility services.
- B. Scheduling of Work: Work shall be performed in the sequence, locations and time periods agreed to by the Owner prior to commencement of work.
- C. Dust Control: The amount of dust resulting from connecting existing utilities shall be controlled to avoid creation of a nuisance in the surrounding area. Masks shall be worn for protection against dust inhalation by all persons in the vicinity of work involving removal of masonry.
- D. Protection of Existing Work:
 - 1. Existing work and furnishings to remain shall be protected from damage. Work damaged by the Contractor shall be repaired to match existing work without any additional cost to the Owner.
 - 2. Cover equipment as necessary, to protect it from dust.

3. Floors shall be protected from damage.
 4. At the end of each workday and during inclement weather, close exterior openings with weatherproof cover.
 5. Provide temporary filter media on any portions of existing ductwork which communicate with corridors and construction areas. This media shall be checked frequently and changed as necessary.
- E. Environmental Protection: Contractor shall comply with all Federal and local regulations pertaining to Environmental Protection.
- F. Removal of Existing Equipment and Materials: Existing equipment and materials shall be dismantled and/or cut-up so as to be removable through existing building's access passages. No alterations to the building shall be made for the purpose of removing existing equipment and material.
- G. Clean-up:
1. Debris and Rubbish: Remove debris and rubbish from the site daily. Do not allow to accumulate in building or on site.
 2. Debris Control: Remove and transport debris in a manner so as to prevent spillage on site or adjacent areas.
 3. Regulations: Local regulations regarding hauling and disposal shall apply.

1.22 DOWNTIME

- A. The contractor shall so arrange his work that domestic water, gas, storm sewer, sanitary sewer, air conditioning, and heating systems shall be maintained at all times while the school classes are in session.
- B. Construct work in accordance with project schedule established under Section 01310. Coordinate the schedule and operations with the Owner's Representative. There shall be no shutdown of electricity, water, sanitary/storm sewers, air conditioning, or heat during the life of the project unless approved in writing by Owner. The Contractor is responsible for providing temporary air conditioning or heating for those areas which are scheduled to be occupied for school use and the Contractor has demolished the existing air conditioning or heating system. Maintain minimum corridor temperature at 68°F during heating season.
- C. In occupied areas or spaces, where existing HVAC systems are rendered nonfunctional, due to construction the contractor shall provide temporary HVAC and maintain space conditions per ASHRAE 55 section 5 and ASHRAE 62.1 section 6.

- D. The contractor shall submit written requests to disconnect any existing utility services and to obtain equipment downtime. Only after receiving Owner approval of these requests shall work be allowed to proceed. This contractor shall be responsible for restoring the existing utilities.
- E. If contractor fails to provide domestic hot/cold water, gas, sewers, air conditioning and/or heating systems as specified herein it is understood and agreed that there will be liquidated damages deducted in the amount as stated in Division 01010, per school per consecutive calendar day.

1.23 CONSTRUCTION LIMITATIONS

- A. In renewal projects which require work to be continually done, above the corridor ceilings, while school is in progress. The following requirements shall be met:
 - 1. No construction material may be stored in a corridor at any time.
 - 2. Any work done in the corridors after school hours must allow a minimum corridor of 72" to remain for safe egress. No work such as welding, soldering, etc., which is considered hazardous to the occupants of the building, may take place during school hours.
 - 3. The contractor shall immediately clean any area of debris, if work is done in any occupied space.
 - 4. No gas powered construction equipment will be allowed in the building during school hours.

END OF SECTION

SECTION 15050

BASIC MATERIALS AND METHODS

PART I - GENERAL

1.01 GENERAL

- A. The Bidding and Contract Requirements, Division 1 - General requirements and section 15010 - General Provisions, shall apply to this section.

1.02 SCOPE

- A. The work covered under this section covers the basic materials and methods for a complete mechanical system.

PART 2 - PRODUCTS

2.01 PIPE AND PIPE FITTINGS

- A. All materials shall be of an approved type and shall be designed for the pressures and temperatures at which they are to be operated, for the materials they are to handle and for their intended use.
- B. Materials shall conform to the standard reference numbers listed below. See individual sections of the specifications for use.
 - 1. Ductile Iron Water Pipe - (Water Service) - AWWA C151.
 - 2. Copper Tubing (Water Distribution - Type L or K) - ASTM B75, B88, B251
 - 3. Cast Iron Fittings – ASME B16.4, B16.12; ASTM A74, A888; CISPI 301
 - 4. Copper Fittings - ASME B16.15, B16.18, B16.22, B16.23, B16.26, B16.29, B16.32
 - 5. Cast Iron Soil Pipe - ASTM A74, A888; CISPI 301
 - 6. Copper Pipe (Waste, Vent, & Hydronic) - ASTM B42, B302
 - 7. Galvanized Steel Pipe (Waste & Vent) - ASTM A53
 - 8. Polyvinyl Chloride (PVC) Plastic Pipe - ASTM D2665, D2949
 - 9. Plastic Fittings - ASTM D2466, D2467, D2468, D3311, F409, F438, F439
 - 10. Concrete Pipe - ASTM C14, C76

11. Steel Pipe - ASTM A53, A106
12. Malleable Iron Fittings - ASME B16.3
13. Steel Butt Welding Fittings - ASME B16.9
14. Steel Fittings - ASTM A420
15. Gray Cast Iron Fittings - ASTM A126
16. Steel Pipe Flanges - ASME B16.5

2.02 PIPING SPECIALTIES

Piping Specialties shall be designed and installed to meet the intended use including pressures and temperature.

- A. Gaskets - Shall be full face with a working pressure of 300 lbs. and temperature up to 212 * F. Gaskets shall be manufactured by JM CLIPPER, US PIPE, FNW, or AMERICAN.
- B. Strainers - HONEYWELL-BRAUKMAN, ARMSTRONG or SARCO.
- C. Unions
 1. Unions shall be of an approved type, shall meet the requirements for the pressure and temperature at which they are to operate and shall be compatible with the pipe materials.
 2. Brass Couplings - Shall be used for connecting steel pipe to copper tubing.
 3. Die-electric unions or waterways shall not be permitted.
- D. Escutcheons - Escutcheon plates shall be stamped brass chromium plated, shall be of sufficient size to cover sleeved openings for the pipes, shall be of sufficient depth to cover sleeves projecting above floors, and shall be manufactured by BLATON AND CALDWELL, DEARBORN BRASS, MASON or GRINNELL.
- E. Gauges and Thermometers - Shall be as listed below unless otherwise specified under other sections of the specifications.
 1. Temperature Gauges or Thermometers - Shall be the separable socket, adjustable angle type, not less than 9" scale V-shaped, organic filled, blue reading column. Range shall be applicable for the service. Thermometers shall be adjustable type to permit easy reading from floor and outside of insulation, as manufactured by ASHCROFT, WEKSLER,

TAYLOR or TRERICE.

2. Pressure Gauges - Shall be of the liquid filled, bourdon-tube type with dial diameter not less than 4" and operating range 0 - 160 psig. Install a shut-off cock in line to each gauge. Gauges as manufactured by ASHCROFT, WEKSLER, TAYLOR or TRERICE.
3. Compound Gauges - Shall be of the liquid filled, bourdon-tube type with dial diameter not less than 4" and operating range 30" - 0 - 30 psig. Install a shut-off cock in line to each gauge. Gauges as manufactured by ASHCROFT, WEKSLER, TAYLOR or TRERICE.

2.03 PIPE HANGERS AND SUPPORTS

- A. Pipe Hangers and Supports Material - Provide a combination of pipe hangers and supports such as steel and copper clad clevis hangers, round steel rods, concrete inserts, clamps, brackets and other items as applicable. Hangers and supports shall meet the recommendations of the manufacturer. Parallel runs of horizontal piping shall be grouped together on adjustable trapeze hangers. All hangers in contact with copper pipe shall be copper-plated. Pipe hangers and support shall be of the size to accommodate the pipe and insulation where applicable. Pipe hangers and supports manufacturer: MASON, GRINNELL, CARPENTER AND PATERSON, ANVIL or NIBCO.

1. VRF Pipe hangers and supports.
 - a. Multiple runs of VRF piping shall be grouped together on preformed U channel, (trapeze) hanger spacing and hanger rods as described below.
 - b. VRF piping shall be mounted to be preformed U channel with two piece pipe straps (clamps) with cushioned insert. Klo-Shure 7 series Strut Mount Insulation Couplings or approved equal.
 - c. The two piece pipe straps (clamps) shall be sized to snugly fit the outside diameter of the pipe insulation.
 - d. Hangers shall be installed on each side of pipe direction changes and within 2 feet of each direction change.
 - e. Hangers for GelCopper pre-insulated copper tubing shall be Hydro-Zorb model TRH with 3/8 diameter rod, or approved equal.

- B. Hanger Spacing for Horizontal Pipe shall not exceed:

1. Cast Iron Soil Pipe (all diameters) 5'-0"

2.	Plastic Pipe (all diameters)	4'-0"
3.	Schedule 40 Steel Pipe	
	1/2" to 1" Pipe	6'-0"
	1-1/4" to 2" Pipe	8'-0"
	2-1/2" to 4" Pipe	10'-0"
	5" and Larger Pipe	12'-0"
4.	Type 'L' Copper Tubing	
	1/2" to 3/4" Pipe	5'-0"
	1" Pipe	6'-0"
	1-1/4" Pipe	7'-0"
	1-1/2" to 2" Pipe	8'-0"
	2-1/2" Pipe	9'-0"
	3" Pipe	10'-0"
	3-1/2" Pipe	11'-0"
	4" Pipe	12'-0"
	5" Pipe	13'-0"
	6" Pipe	14'-0"

C. Hanger Spacing for Vertical Pipe shall not exceed:

Cast Iron Soil Pipe	At the base and at each story
Threaded Pipe	At each story
Plastic Pipe	At each story and at the midpoint between floors
Copper Tube	At each story

D. Hanger Rods shall be at least:

Pipe to 2"	3/8" diameter
2 1/2" to 3"	1/2" diameter
4" to 5"	5/8" diameter
6" to 8"	3/4" diameter
10" to 12"	7/8" diameter

E. Sheet Metal Saddles - Supports for insulated pipes shall not contact the pipe but shall surround the unbroken covering. Provide galvanized steel sheet metal saddles properly formed to the jacket between hanger and the lower 1/3 of the circumference. The size of the saddles shall be as follows:

Pipe to 3"	24 gauge x 12" long
4" to 6"	18 gauge x 12" long
8" and larger	16 gauge x 12" long

2.04 VALVES

- A. Valves shall be of an approved type and shall meet the requirements for the pressure and temperature at which they are to be operated, for the material they are to handle and for their intended use. Valve manufacturers are listed in the individual sections of the specifications.
- B. Valve and Tag Chart - Furnish and install on each valve a brass tag with a number and the abbreviation PLMB (for plumbing) HVAC (for mechanical systems) embossed in the brass tag for each valve and securely fastened to each valve wheel with beaded chain or brass wire. Provide a laminated chart in the water heater room, showing the locations and use of each valve. Laminating film shall be at least 10mil thick. Two charts shall be provided - one for the plumbing valves and one for the heating and cooling valves. The plumbing valves shall start with number 1 and continue consecutively until all plumbing valves are numbered. The heating and cooling valves shall start with number 1 and continue consecutively until all heating and cooling valves are numbered. A copy of the valve tag charts shall also be contained in the operation and maintenance manual.

2.05 ACCESS DOORS

- A. The contractor shall furnish access panels not smaller than 16 X 16" for access to concealed valves, traps, dampers, etc. where no other means of access is provided. Access panels shall be all steel construction with nom. 16 gauge wall or ceiling and nom. 14 gauge panel door with not less than 1/8" insulation secured to inside of the door. Doors shall be supported with concealed hinges and secured with suitable clips and countersunk flush screws. Outside of access panels shall be flush with finished wall or ceilings, except that where panels are located in acoustic tile or paneling, the door shall be recessed to receive adjacent finish material. The contractor shall determine the final position of each access door and the size to be used. Access panels shall be as manufactured by MILCOR. Fire ratings of access door shall not be less than the surface on which the door is installed. Where required by specifications locking access doors shall be fitted with a HL302 lock cylinder and key.

2.06 ELECTRIC MOTORS

- A. The contractor shall provide and install all electric motors for equipment furnished under Division 15. All motors shall be NEMA standard design for quiet operation. The motors shall be of ample size to operate at their proper load and full speed continuously without causing noise, vibration or temperature rise in excess of the rating. Provide high efficiency motors when called for on the drawings or hereinafter specified.
- B. Motors with belted drives shall be mounted in a manner to allow for belt adjustment. All belts shall be adjusted before turning project over to owner. All

motors with belt drives shall have belt guards.

2.07 ELECTRIC MOTOR STARTERS

The contractor shall furnish all motor starters complete with lugs sized to receive conductors specified and with accessories as required such as stop-start push button switches, hand-off-auto selector switches, pilot lights, remote switches, auxiliary contacts, transformers, relays, fuses and overload thermal units or heaters. Contractor coil voltage shall be 24 volts. All components are to be housed within enclosure.

- A. The motor starters shall be the type to meet the requirements of the motor and shall be in accordance with NEMA Standards, sizes and horsepower ratings. The starters shall be manufactured by SQUARE 'D', GENERAL ELECTRIC, CUTLER-HAMMER or SIEMENS.
- B. Three phase motors shall have across-the-line magnetic starter and single-phase motors shall have manual starters. The starters shall have NEMA 1 enclosures unless otherwise noted or required. Outdoor starters shall have weatherproof enclosures.
- C. The starter shall have an overload thermal unit in each phase conductor. The thermal units shall be sized as recommended by the manufacturer for full protection of the motor.
- D. All three phase motors and equipment with compressors shall be provided with three phase motor protectors as manufactured by DIVERSIFIED, SLM-ASE series (match voltage to corresponding model number). Unit shall include range plug, output fuse, output switch, line adjustment, status/trouble lights and adjustable/selectable operation with built-in time delays. Unit shall be U/L labeled. Protectors as manufactured by TIMEMARK #265 or MOTECTOR Power Guardian PLUS shall also be acceptable.

2.08 EQUIPMENT

- A. Equipment shall be furnished and installed as listed in the specifications or as required for a complete project.
- B. All equipment shall be new and shall bear the manufacturer's name and trade name. The equipment furnished under each section of the specifications shall be essentially the standard product of a manufacturer regularly engaged in the production of the required type of equipment.
- C. All three phase equipment and equipment with compressors shall be provided with three phase motor protectors as manufactured by DIVERSIFIED, SLM-ASE series (match voltage to corresponding model number). Unit shall include range plug, output switch, line adjustment, status/trouble lights and adjustable/selectable operation with built-in time delays. Unit shall be U/L labeled. Protectors as manufactured by TIMEMARK #265 or MOTECTOR

Power Guardian PLUS shall also be acceptable.

- D. Nameplates/Labels – Provide engraved pin-attached laminated plastic nameplates for all pumps, air handling units, exhaust fans, boilers, chillers, fan powered heaters unit ventilators, fan coil units, blower coil units, terminal devices, VAV boxes, VRF units, fire dampers, smoke detectors and roof mounted equipment. Where equipment is located above the ceiling, nameplates shall be mounted on the ceiling below the device. Exhaust fans located on the roof will require two separate nameplates; one is to be attached to the fan, the other on the ceiling grid directly below the fan. Each nameplate shall identify the item served, such as “PRV-2.” or “SMOKE DETECTOR AHU-1” Laminated plastic shall be one eighth (1/8) thick, black with white center core, exception: fire damper nameplates shall be red with white center core. Nameplates shall be a minimum of one inch by three inches, with minimum one-quarter inch high block lettering. Adhesive backed, embossed lettering tape is not acceptable. Exhaust grilles or registers in each space shall be labeled. Each label shall identify the exhaust fan serving this grille or register, such as “PRV-2”. Identification labels shall be BROTHER type “P-TOUCH”, clear tape with upper case letters, minimum ¼ inch high block lettering, and black printing and shall be located on the ceiling grid next to the grille or register.
- E. Filters- Filters shall have a minimum MERV rating of 13.

PART 3 - EXECUTION

3.01 PIPE, FITTINGS AND JOINTS

- A. Pipe and Fittings
1. Pipe, fittings and specialties stored at the job shall be stored in such a manner as to prevent dirt and moisture from collecting in the material. Openings in the piping system during construction shall be protected at all times from foreign matter entering the piping system. PVC piping shall not be stored in direct sunlight.
 2. Installation - The piping shall be installed complete and shall be of the size required by code. When a size is not indicated or is in conflict with other drawings, the contractor shall request the pipe size from the engineer. All piping shall be cut accurately from dimensions established at the project site and allowances shall be made for the clearance of windows, doors and other openings. No part of the building structure may be cut to allow for the installation of piping unless specifically approved in writing.
 3. All piping shall be installed parallel or perpendicular to the building construction and shall be installed so as to allow for expansion and

drainage. Due to the small scale of the drawings, it is not possible to show all elbows and swing joints required to allow for expansion; however, the contractor shall install three elbow swing joints at all runouts and other connection to mains.

4. Install continuous galvanized sheet metal drip pan under all water piping passing through all rooms with electrical equipment such as electrical, elevator equipment and transformer rooms and all other spaces provided primarily for the installation of electrical equipment. Drip pan shall be channeled out of the space and be extended to the closest drain.
5. Eccentric reducing fittings or eccentric reducing couplings shall be installed to bring top of mains in line and prevent pockets. Eccentric fittings will not be required on water mains. Ends of pipes shall be reamed out before being installed.
6. Pipe Sleeves
 - a. Pipe sleeves shall be installed on all pipes passing through walls, ceilings and floors except floor slabs on grade. On insulated pipes the sleeves shall be large enough to pass the insulation without damaging the vapor barrier. The ends of the sleeves shall extend 1/2" above the finished floor and made watertight around sleeve. Where pipes pass through fire rated floors and wall the space between the pipe and the sleeve shall be fire stopped and smoke stopped with the appropriate U.L. rated assembly. Sleeves not in contact with the earth shall be schedule 40 black steel pipes, except sleeves in poured concrete slabs above grade may be a manufactured pipe sleeve. PVC sleeves shall not be used in plenum spaces.
 - b. Pipe Sleeves in contact with the earth shall be cast iron. The space between the pipe and the cast iron pipe sleeve shall be packed with oakum with a lead joint and made watertight. The pipe passing through and under footings and wall below grade shall have cast iron sleeves. The sleeves not entering the building need not be watertight.

B. Piping Joints

1. Screwed Joints - Screwed joints shall be made with full cut American Standard Pipe Thread. All pipes shall be reamed to full diameter of the pipe. Pipe thread compound shall be applied to the male thread only.
2. Welded Joints
 - a. Welded joints for steel pipe 2 1/2" and larger shall be made in

accordance with the procedure standard in the American Standards Association piping code, and before assigning any welder to work covered, the contractor shall provide for the approval of the name(s) of pipe welders to be employed in the work, together with certification that each of these welders has passed qualification tests as prescribed by the National Certified Pipe Welding Bureau or by other reputable testing laboratory or agency using procedures approved by the ASME or American Welding Society. The contractor shall use only approved factory manufactured welding type fitting for the intersection welding or branching to mains. Valves and specialties shall have screwed or flanged joints.

- b. Welding tees, ells, reducers and caps shall be of wrought or forged construction similar to those manufactured by TUBE TURNS, INC. In lieu of wrought or forged welding tees for branch outlets, weldolets or welding nipples may be used; provided, first that the nipples are accurately coped in the shop to fit the pipes and leveled for field welding; and provided, second that openings in the walls of pipes are cut to full inside diameter of the nipples; and third, that the outlet diameter shall be less than 3/4 the diameter of the main.
 - c. For connections on welded piping to valves 2 1/2" and over and that of other accessories required to be flanged, weld neck or slip-on companion flanges shall be used. The flange face shall be in every case perpendicular to the axis of the pipe valve.
3. Solder Joints - the solder joint above grade shall be made, unless otherwise noted, with 95/5, lead free solder using approved flux. All underground joints and refrigeration joints shall be made with an approved silver bearing solder. Cut pipe shall be reamed to full diameter. Copper to steel pipe shall be made with proper fittings.
 4. Cast Iron Pipe Joints - for bell-and-spigot soil pipe the joint shall be firmly packed with oakum and filled with molten lead not less than 1" deep and not to extend more than one-eighth inch below the rim. The use of a neoprene gasket when installed in accordance with the manufacturer's recommendations is also acceptable.
 5. Concrete Pipe Joint - Shall be bituminous joint compound or a cement plaster installed in accordance with the manufacturer's recommendations. Joints firmly packed with oakum and filled with a concrete mortar, which shall extend mortar to 3" beyond the hub, shall also be acceptable. All joints shall be made with precast concrete fittings.
 6. Flanged joint - The flanged joint shall be made with the proper number

and size of bolts and with the proper gasket between the flanges.

7. Plastic Pipe Joints - Shall be made with solvent as recommended by the pipe manufacturer.

3.02 PIPE SPECIALTIES

- A. Pipe specialties shall be installed as indicated in the specifications and as required to make a complete system.
- B. Escutcheon Plates shall be mounted on all exposed pipes extending through wall, floor, ceiling or cabinet bases. On insulated pipes the escutcheon shall be on the outside of the insulation.
- C. Pressure and Compound Gauges shall be installed with shut-off cock in the line to each gauge.

3.03 PIPE HANGERS AND SUPPORTS

- A. All pipes shall be supported from the building structure, and wherever possible, parallel runs of horizontal piping shall be grouped together on adjustable trapeze hangers. Single runs of horizontal piping shall be supported with clevis type hangers. The hangers shall be on the outside of the insulation. Vertical risers shall be supported at each floor line with steel pipe clamps. All hangers in contact with copper pipe shall be copper plated. The use of wire or perforated metal to support pipe will not be permitted. In no case shall copper pipe be in contact with a ferrous metal.
- B. The pipe hanger spacing and support shall be as listed under 2.03 in this section.
- C. Where piping is supported from the steel, the support shall be attached at the top of the steel. Attachments shall be made either by welding or using top beam clamps.
- D. Any supplemental steel required between building structural members shall be provided by this contractor.

3.04 VALVES

- A. The contractor shall install valves where indicated on the drawings and where required for adequate control of the system. Provide shut-off valves at the base of the risers and main branches at points of take-offs from the supply or return mains. Branches shall be considered main branches when they serve three or more units or fixtures. Provide valves necessary to isolate each piece of equipment separately from the remainder of the system. Valves shall be installed in accessible locations. Allow isolation for inspection, maintenance and repair of each piece of equipment and each service loop. Provide valves to allow

for the phasing of work where required. Valve size shall be the same as the pipe size except for control valves.

- B. Valves shall be installed with their stems in an upright or horizontal position. Stems shall not be inverted.
- C. After approval of a particular valve, this type valve shall be used throughout the project. Do not mix styles or manufacturers.
- D. Ball valves shall be provided with a 2" extended handle of a non-thermal conductive material and shall include a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Extended handle shall be internally insulated.

3.05 ACCESS DOORS

- A. Install hinged and lock type access doors as required for operation and maintenance of equipment. The access doors shall be installed so that they maintain the rating integrity of the material in which they are mounted. Those with an exposed surface in a finished area shall be flush with the finished material with a recessed space for installation of flush matching materials when in panel or acoustical tile.

3.06 ELECTRIC MOTORS

- A. Electric motors shall be supplied with equipment furnished under Division 15. All moving parts shall be protected as required by OSHA.

3.07 ELECTRIC MOTOR STARTERS

- A. Electric motor starters and accessories shall be installed under Division 16.
- B. Three phase motor protectors shall be installed in accordance with manufacturers' recommendations and installation instructions. Unit shall be selected for voltage specified.

3.08 EQUIPMENT

- A. The contractor shall receive and properly store the equipment pertaining to the mechanical work. The equipment shall be tightly covered and protected against dirt, water, chemical or mechanical injury and theft. The manufacturer's directions shall be followed completely in the delivery, storage, protection and installation of all equipment and materials.
- B. The contractor shall provide and install all items necessary for the complete installation of the equipment as required by code without additional cost to the owner, regardless of whether the items are covered in the specifications. Such

items could be - but are not limited to: concrete pad, supports, vibration eliminators, additional piping and valves, motor controllers, relief valves and piping, insulation, electrical wiring, lubrication, refrigerants and start-up and service.

- C. It shall be the responsibility of the contractor to clean the equipment, make necessary adjustments and place the equipment into operation before turning equipment over to the Owner. Any paint that was scratched during construction shall be touched-up with factory color paint. Any items that were damaged during construction shall be replaced.
- D. Where equipment is supported from the steel, the support shall be attached at the top of the steel. Attachments shall be made either by welding or using top beam clamps.
- F. Three phase motor protectors shall be installed in accordance with manufacturer's recommendations and installation instructions. Unit shall be selected for voltage specified. Motor protectors shall be installed prior to start-up.
- G. Permission for the use of new HVAC equipment to be used as a method for providing temporary heating or cooling shall be at the discretion of the owner. The use of new HVAC equipment for temporary heating or cooling shall not modify the terms of the warranty nor shall it constitute substantial completion or beneficial use. The mechanical contractor is responsible for providing a dust free HVAC system and shall correct all equipment or system damage caused by construction operations. New HVAC equipment used for temporary heating or cooling shall have the filters changed on a regular basis or as directed by the owner and prior to turning over equipment for permanent operation. The spare filters provided by the specifications shall not be used for this purpose. The equipment fan belts shall be inspected for excessive wear and replaced as directed by the owner. The equipment cooling coils, condensing coils, heat exchangers, energy recovery devices and associated ductwork shall be inspected for cleanliness and cleaned as directed by the owner, to a level satisfactory to the owner which may include this work to be done by an independent third party contractor at this contractors expense.
- H. The mechanical contractor shall set all outside air dampers to the approximate minimum position during equipment installation and prior to the start- up of equipment.
- I. The installer shall be responsible for providing and installing new fan or motor sheaves and belts when required to obtain the designed airflow.

END OF SECTION

SECTION 15250

INSULATION

PART I - GENERAL

1.01 GENERAL

The Bidding and Contract Requirements, Division I - General Requirements, Section 15010 - General Provisions and Section 15050 - Basic Materials and Methods, shall apply to this section.

1.02 SCOPE

The work covered under this section shall include providing and installing the insulation on the items listed in this section or as shown on the drawings.

1.03 QUALITY ASSURANCE

A. All insulation shall have a composite fire hazard rating as tested by ASTM E-84, NFPA 25 or UL 723 not to exceed 25 flame spread, 50 smoke developed, and 50 fuel contributed.

1.04 SUBMITTALS

Provide shop drawings on proposed insulation as described in section 15010 - 1.04. Shop drawings shall include proposed uses of all insulation components.

PART 2 - PRODUCTS

2.01 GENERAL

A. The manufacturer of the products specified in this section shall be OWENS-CORNING, CERTAIN-TEED, JOHNS-MANVILLE, ARMSTRONG, MANSON or KNAUF.

2.02 PIPING INSULATION

A. The piping shall be insulated with heavy density rigid molded fiberglass pipe insulation with factory applied all service jacket (ASJ) with a 'K' factor not to exceed .25 @ 75°F mean temperature. The minimum insulation thickness for the various items shall be as follows:

1. Domestic Cold Water Piping and Cold Water Makeup Piping - 1/2".
Exceptions: Exterior walls and plumbing chases shall be 1".

2. Trap Primer Supply Piping - 1/2" elastomeric, expanded closed cell, seamless pipe insulation from the drain tap to the trap primer valve or distribution unit.
 3. Domestic Hot Water, Tempered Water and Hot Water Recirculating Piping -1". Piping greater than 1 1/2" shall have 1 1/2" thick insulation. Exceptions: Fixture runouts in interior plumbing chases and walls may be 1/2".
 4. Storm Water (includes main and overflow piping) - The horizontal section of the rain leaders, riser to and including the interior part of the roof drains shall have 1" of insulation. The drain body and sump receiver of the roof drain shall have 1" of rigid fiberglass board insulation. Above slab piping serving open site drains shall have 1" pipe insulation from the open site drain to the rain leader.
 5. Hot Water Heating Supply and Return
 - a. Pipe Size 1-1/2" and Under - 1".
 - b. Pipe Size 2" and larger - 2".
 6. Chilled Water Supply and Return
 - a. Pipe Size 3" and under – 1 ½
 - b. Pipe Size 4" and larger – 2"
 7. Condenser Water Supply & Return – 1-1/2".
 8. Condensate Piping - 1".
 9. Refrigerant Piping - 1" closed cell, semi-slit pipe insulation with a composite fire hazard rating as tested by ASTM E-84 not to exceed 25 flame spread and 50 smoke developed. Prototype: ARMSTRONG Armaflex AP.
 10. Domestic water piping in the cells of masonry walls shall have be polyolefin pipe insulation such as "IMCOLOCK" with a ½ inch wall thickness
 11. Where chilled/hot water piping is installed within the airstream of mechanical equipment, piping shall be insulated with flexible closed cell elastomeric pipe insulation. Insulation thickness shall be 3/4 inch.
- B. Sheet Metal Saddles - See section 15050 - 2.03.
- C. Finish - Exposed Piping - Cover with 8 oz. canvas jacket.

1. Exposed piping in the kitchen shall be insulated per the specification and covered with a PVC jacket 20 mil thick, white in color, washable and approved by the USDA and the FDA.

2.03 PIPING, FITTINGS, VALVES AND SPECIALTIES INSULATION

- A. Fittings, valves and specialties for the piping systems shall be insulated by two-piece molded fiberglass fittings with an insulating value equivalent to the pipe insulation. Acceptable alternative insulation methods shall be as described in paragraph 3.02 D.
- B. The following piping, fittings, valves, and specialties shall be insulated.
 1. Domestic cold water piping
 2. Domestic hot water, tempered water and hot water recirculating piping
 3. Hot water heating supply and return
 4. Chilled water supply and return
 5. Condensate piping
 6. Condenser Water Supply & Return
- C. Finish - Insulation on exposed piping fittings, valves and specialties shall be covered with an 8-oz. canvas jacket.

2.04 EQUIPMENT INSULATION

- A. Chilled Water Pump, Chilled Water Standby Pump, Cooling Tower Pump and Cooling Tower Standby Pump- Pumps shall be encased with a sectional fabricated, flanged insulated split metal housing to provide ease of maintenance without damage to the insulation. Housing shall incorporate integral latching devices. Housing shall be tight sealing to prevent air infiltration. See drawing detail. All internal surfaces shall be insulated with 6 pounds per cubic foot density fiberglass board having a "K" value of 0.22@ 75 Deg F mean temperature with a factory applied all service jacket (ASJ). Minimum insulation thickness shall be one inch.
- B. Chiller Cooler and Chilled Water Air Separators - All cold surfaces shall be insulated with one inch thick fiberglass insulation. 'K' factor shall not exceed 0.27 @ 75°F mean temperature with a density of 6.5 pounds per cubic foot. Chilled and hot water expansion tanks are not required to be insulated.
- C. Finish - All insulation on chiller cooler and chilled water air separator shall be covered with an 8-oz. canvas jacket.

2.05 DUCTWORK INSULATION

- A. Concealed Supply/Return, including flexible connections (horizontal FCU's) And Outside Air Ductwork - Unless noted otherwise on the drawings shall be insulated with fiberglass duct wrap insulation at 1 pound per cubic foot density,

having a facing of laminated composite aluminum foil and kraft paper reinforced with a glass reinforcing, with a perm rating not exceeding .05. The 'K' value shall not exceed .29 @ 75 degrees F mean temperature. The duct wrap insulation shall have a minimum thickness of 2 inches. Insulate flexible connections on horizontal fan coil units.

- B. Exposed Supply/Return and Outside Air Ductwork - Unless noted otherwise on the drawings shall be insulated with 6 pounds per cubic foot density fiberglass insulating board having a facing of laminated composite aluminum foil and kraft paper reinforced with a glass reinforcing with a perm rating not exceeding .05. The 'K' value shall not exceed .23 @ 75°F mean temperature. The duct board shall have a minimum thickness of 1-1/2 inches. Exposed ductwork shall include but is not limited to, ductwork in accessible attics, equipment mezzanines, boiler rooms and equipment rooms The exposed supply/return and outside air ductwork shall also be covered with an 8-ounce canvas jacket and be prepared for painting.
- C. See Section 15840 for description of any additional ductwork that shall be lined.

PART 3 - EXECUTION

3.01 GENERAL

- A. All insulating material shall be installed in accordance with the manufacturer's recommendations by personnel regularly employed in the pipe, duct and equipment insulating trade.
- B. The insulation shall not be applied until all surfaces are clean and dry and until inspected and released for insulation application.
- C. A complete moisture and vapor seal shall be provided on cold surfaces where vapor barrier jackets or coatings are required. Anchors, hangers, and other projections shall be insulated and vapor sealed to prevent condensation.
- D. Pipe or duct insulation shall be continuous through walls and floor openings except where walls or floors are required to be fire stopped or required to have a fire resistance rating.

3.02 PIPE INSULATION APPLICATION

- A. Pipe insulation shall be installed in accordance with the manufacturer's instructions.
- B. Piping (except refrigeration piping) - Butt all joints firmly together. Ends of pipe insulation shall be sealed off with a vapor barrier coating at all fittings and valves. The insulation laps and butt strips shall be sealed by one of the following methods:

1. Insulation without self-seal laps shall have lap adhesive manually applied to all laps and butt strips. Stapling is not acceptable.
 2. Insulation with self-seal laps shall have lap adhesive manually applied to the outside of all laps and butt strips after installation. Stapling is not acceptable.
- C. Refrigeration Piping and domestic water piping using closed cell insulation – Butt joints and seams shall be joined together with contact adhesive Prototype-Armstrong 520 or manufacturer's recommended adhesive. Both surfaces to be joined shall be coated with the adhesive.
- D. Fittings and Valves - Shall be insulated with molded fiberglass fittings, segments of pipe covering, or with firmly compressed foil faced fiberglass blanket. Mitered joints are not acceptable. Secure in place with 20 gauge corrosion resistant wire and apply a smoothing coat of insulating cement. Vapor seal by applying a layer of open weave glass cloth fabric embedded between flood coats of vapor barrier mastic. Lap glass fabric 2 inches onto adjacent pipe. PVC covers are acceptable only if the item covered is fully insulated first. Insulation shall be installed so the cover cannot be deformed. Contractor shall request an inspection by the Owner of the insulated items prior to cover installation.
- E. Finish - All exposed piping, and piping fittings, valves and specialties insulation shall receive an 8 oz. canvas jacket smoothly pasted in place with lagging adhesive and sized with one brush coat of lagging adhesive. The finished surface shall be suitable for painting. Exposed piping includes piping in accessible attics, equipment mezzanines, boiler rooms and equipment rooms.
- F. Outdoor Piping - Weatherproofing Finishes for All Outdoor Insulation.
1. Piping - Apply aluminum metal jacket 0.016" with moisture barrier around pipe and slip edge into preformed Z lock positioned to shed water. Butt next jacket section leaving approximately 3/8" gap. Place preformed 2" butt aluminum band and wing seal.
 2. Fittings - Apply prefabricated metal fittings in composition to pipe jacketing.
- G. Sheet Metal Saddles shall be provided and installed on all pipe hangers as stated under section 15050, 2.03.
- H. Pipe Insulation Support - All insulated piping shall be supported at hanger and sleeve locations by either using a high density pipe insulation or wooden blocking, installed inside the vapor barrier for all pipe sizes one inch and larger. High-density pipe insulation shall be of the type as recommended by the manufacturer and shall be substituted for no less than the bottom half section of the fiberglass pipe insulation. The lengths of the high-density insulation shall be at least two inches longer (each end) than the length of the saddle. The lengths

of wooden blocking shall be eight inches. Wooden blocking shall be the same thickness as the pipe insulation, the same width as the pipe, shall be tapered within the insulation and shall be centered at the hanger. Remove portions of the fiberglass pipe insulation by peeling back the factory applied all service jackets from the insulation and cut out and replace the required sections for either method of insulation support. Re-wrap the vapor barrier to completely enclose the installation. Manually apply lap adhesive to the outside lap and apply butt strips. The installations shall also meet any additional requirements recommended by the insulation manufacturer.

I. Underground Pipe Insulation

1. Insulation- insulation shall be cellular glass insulation manufactured in accordance with ASTM C 552. The insulation shall be fabricated in half sections wherever possible. For large diameter piping where half sections are not practical, curved sidewall segments are permitted.
2. Jacketing- a 50 mil (1.3mm) thick self-sealing, modified bituminous membrane reinforced with a glass fabric, and a 1mil (0.3mm) aluminum top film on the outer surface.
3. Mastic- shall be asphalt cutback mastic.
4. Reinforcing Fabric- shall be open mesh polyester fabric with 6x5.5 mesh/inch configuration.
5. Sealant- shall be a non-setting butyl sealant.
6. Banding- shall be ½ inch aluminum or fiberglass reinforced nylon for insulated lines with OD's of 48 inches or less.

3.03 EQUIPMENT INSULATION APPLICATION

- A. Chiller Cooler and Chilled Water Air Separators - Shall be insulated with fiberglass insulation cut to a smooth uniform fit with butting edges. Complete installation shall not have wrinkles, bulges or overlapping edges. Secure insulation to all surfaces with adhesive designed for that purpose.
- B. Finish - All insulation on chilled water chiller cooler and chilled water air separator shall be covered with an 8-oz. canvas jacket installed as described in paragraph 3.02 D.

3.04 DUCTWORK INSULATION APPLICATION

- A. Fiberglass Duct Wrap Insulation - The duct wrap insulation shall be secured to the ductwork with fire retardant adhesive in sufficient quantities to prevent sagging. Ducts with a width of over 30" shall be further secured on the underside with mechanical fasteners on 18" maximum centers. Insulation shall be butted

with facing overlapping all joints at least 2" and sealed with fire retardant vapor barrier adhesive. Seal all breaks and punctures with vapor barrier tape and same type of fire retardant adhesive. Stapling is not acceptable.

B. Fiberglass Insulating Board Application

1. The insulating board shall be secured to the ductwork with mechanical fasteners. The fasteners shall be spaced 12" to 18" on center with a minimum of two rows per side of duct. Secure insulation in place with washers firmly embedded in insulation. Seal all joints, breaks and punctures with fire retardant vapor adhesive reinforced with a 3" wide strip similar to that of facing.
2. Finish - A glass cloth shall be applied over the facing into a wet coat of fire retardant adhesive, overlapping seams at least 2". Apply finish coat of same fire retardant adhesive.

END OF SECTION

SECTION 15401

DOMESTIC WATER PIPING SYSTEM

PART I - GENERAL

1.01 GENERAL

The Bidding and Contract Requirements, Division 1 - General Requirements, Section 15010 - General Provisions, and Section 15050 - Basic Materials and Methods shall apply to this section.

1.02 SCOPE

The work covered under this section shall include a complete domestic water piping system.

1.03 QUALITY ASSURANCE

All water piping shall be tested for leaks before the insulation is applied and before the piping is covered up. The test shall be at least 100 psi of water pressure for duration of 12 hours.

All grooved couplings, and fittings, valves and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

All casting used for coupling housings, fittings, valve bodies, etc., shall be date stamped for quality assurance and traceability.

1.04 SUBMITTALS

Provide shop drawings on all piping and valves as described in Section 15010 - 1.04.

PART 2 – PRODUCTS

2.01 PIPE AND FITTINGS

- A. Water service piping- Shall be class 150 ductile iron lined tar coated piping with mechanical or slip joints.
- B. Water piping below grade- Shall be type 'K' soft drawn copper tubing with 125 psi wrought copper sweat fittings soldered with silver solder.
- C. Water piping below grade (trap primer supply) - Shall be type 'K' soft drawn copper continuous tubing.
- D. Water piping above grade- Shall be one of the following:

1. Type 'L' hard drawn copper tubing with 125 psi wrought copper sweat fittings and all joints soldered with 95/5 or silver solder.
2. The use of mechanically formed tee connections is acceptable. Branches shall be formed up to the run tube size as shown in ASTM 2014. Forming procedures shall be in accordance with tool manufacturer's recommendations.
3. Grooved mechanical pipe couplings, fittings, valves and other grooved components may be used as an option to brazing, soldering or flanged methods. All grooved components shall be of one manufacturer and conform to local code approval. Grooved end product manufacturer to be ISO-9001 certified. Grooved couplings shall meet the requirements of ASTM F-1476. Grooved components shall be manufactured by VICTALUIC. Grooved components manufactured by GRINNELL or ANVIL INT. are acceptable providing all aspects of the specification are met. No substitutions.
 - a. All products shall be UL classified in accordance with ANSI /NSF-61 for potable water service and shall meet the low-lead requirements of NSF-372.
 - b. Copper pipe shall be roll grooved in accordance with manufacturer's current listed standards.
 - c. Mechanical couplings for joining copper pipe shall be cast of ductile iron conforming to ASTM A-395, grade 65-45-15 and ASTM A-536, grade 65-45-12. Housings shall be cast with an angle pattern bolt pad for direct connection of copper without flaring to IPS dimensions. Coupling bolts shall be zinc plated (ASTM B-633) heat treated carbon steel track head conforming to physical properties of ASTM A-449 and ASTM A-183. Couplings shall be coated with copper colored alkyd enamel paint. Zinc electroplated bolts and nuts conforming to ASTM B633 shall be provided for couplings.
 - d. Gaskets for grooved piping shall be molded of synthetic rubber in a configuration conforming to the copper tube size outside diameter and coupling housing. Gaskets shall be "E" EPDM compound designated for domestic water use and complying with ASTM, UL/ULC and ANSI/NSF standards.
 - e. Couplings shall be installation-ready, for direct slab installation without field assembly.
 - f. Fittings for grooved piping shall be full flow smooth turn copper fittings with copper tube size grooves designed to accept grooved end couplings. Fittings shall be wrought copper per ASTM B-75 alloy C12200 and ANSI B16-22; bronze sand castings per ASTM B-584 copper alloy CDA 836 (85-5-5-5) per ANSI B16.18. Victaulic

copper connection.

4. Exposed water piping to plumbing fixtures - Shall be chrome plated brass piping and fittings and chrome plated standoff hangers.

2.02 VALVES

Valves shall be manufactured by VICTAULIC, STOCKHAM, JENKINS, HAMMOND, MILWAUKEE, CONBRACO INDUSTRIES, INC., APOLLO VALVES, FAIRBANKS, CRANE, WATTS, NIBCO or JOMAR. All valves shall be certified to be lead free in accordance with NSF/ANSI 61 section 8, which states that the wetted surfaces of all plumbing valves shall have a weighted-average lead content of no more than 0.25%.

- A. Ball valves 2 1/2" and smaller- These valves shall be sweated bronze full port, with chrome plated ball, have extended insulated handles (such as NIBCO'S Nib-seal or Apollo Valves Therma-seal) and rated at not less than 200-pound wog.
- B. Gate valves larger than 2 1/2" - Shall be flanged iron body OS & Y gate valve with stainless steel or bronze trim, ductile iron wedge and a minimum rating of 125 psi and 200-pound wog.
- C. Check valves 2 1/2" and smaller - Shall be sweated bronze, horizontal swing check valves with solid bronze discs and a minimum rating of 200-poundwog.
- D. Check valves larger than 2 1/2" - Shall be flanged ductile iron, horizontal swing check valves with stainless steel or cast iron disc and a minimum rating of 200-pound wog.
- E. Balancing valves – Valves shall be manufactured by CIRCUITSOLVER with integrated union assembly model CSUA. Thermostatic balancing valve assembly shall include union body and ball valves. CIRCUITSOLVER vales size 1/2" to 1", based on pipe size, shall be rated for the return system temperature (110°F, 120° F, 140°F). Acceptable manufacturers shall include HAYS FLUID CONTROLS.

2.03 PRESSURE REDUCING VALVES

Pressure reducing valves shall be as shown on drawings and shall be manufactured by MUELLER, WATTS or A.W. CASH.

2.04 STOP VALVES

- A. Stop valves shall be bronze and shall be manufactured by NIBCO, BRASS CRAFT, McGuire, APOLLO, T & S BRASS or as identified in Section 15450 or 15451. Stop valves shall be loose-key type under all wall hung fixtures and shall be 1/4 turn ball valves with chrome plated ball, under all countertop fixtures. Compression fittings are not acceptable.

2.05 TRAP PRIMER VALVES

- A. Trap primer valves shall be as shown on drawings and shall be manufactured by MIFAB, SMITH, JAY R JOSAM or ZURN. The prototype for trap primer valves is MIFAB model MR-500 (discharging ½ ounce of water each time a line pressure drop of 3 PSI is registered), with MIFAB model MI-DU distribution unit when multiple traps are supplied with a single primer valve.

PART 3 - EXECUTION

3.01 PIPING SUPPORTS

Piping supports in general shall be as called for in section 15050. The water piping in the plumbing chases shall be supported from the waste and vent pipes. The manufactured support system shall hold pipes secure to prevent vibration, to assure outlets are in proper position for fixture setting, and provide electrolytic isolation. Support of pipe, tubing and equipment shall be accomplished by means of engineered products, specific to each application. Makeshift, field devised methods shall not be allowed. The Supports shall be as manufactured by HOLDRITE, M-CO., ADJUSTO-SYSTEM, SUMMER SYSTEM, CARPENTER&PATTERSON, or BRACKET SYSTEM.

3.02 SHOCK ABSORBERS

Shock absorbers shall be installed on the branch pipe supply to all quick opening and closing fixtures (including flush valves). Shock absorbers shall be sized in accordance with Plumbing and Drainage Institute Standard PDI-WH201 and shall be located as recommended by that Standard so as to protect all flush valves on a branch pipe. Provide access panels for all shock absorbers located in concealed locations. Shock absorbers shall be constructed of a stainless steel shell with an elastomer bellows, stainless steel adaptor and male threaded plug. Shock absorbers shall be manufactured by JOSAM, JAY R. SMITH, or ZURN.

3.03 CLEANING/DISINFECTION OF PIPING SYSTEM

The entire piping system shall be flushed, disinfected and restored to operation in accordance with the provisions of the international plumbing code and the Health Department requirements. All new, repaired or extensions of existing piping systems shall be flushed and disinfected prior to utilization. Provide owner with a copy of the disinfection report. The report shall include as a minimum, chlorine solution concentration/duration method used, system pH level data including levels prior to commencement of work, levels during pre-flushing and levels during post flushing. System cleaning shall be witnessed by the owner.

3.04 VALVES

- A. Gate Valves/Ball Valves - Shall be installed at the service entrances, at the base of all risers and in the distribution system to isolate a group of three or more fixtures as well as at each shock absorber location.

- B. Stop Valves - Shall be installed at each fixture.
- C. Pressure Reducing Valves - Shall be installed at the service entrance when the water pressure exceeds 60 psi. Renewal projects shall have existing pressure reducing valves replaced. All valves shall have pressure gauges.
- D. Check Valves- Shall be installed in water supply lines to all Mop Basins, Laundry Trays and kitchen 3 compartment sink.

3.05 PIPE INSULATION

Pipe insulation shall be as called for in section 15250.

3.06 WATER SERVICE PIPING

Water service piping shall be installed below the recorded frost line but not less than three feet below the finished grade.

3.07 MECHANICALLY FORMED OUTLETS

- A. Mechanically formed outlets shall have a collar height not less than three times the thickness of the branch tube wall. The branch shall be notched to conform to the inner curve of the run and shall be dimpled or otherwise impeded from penetrating the run pipe/tube. The branch tube shall also be dimpled to indicate the location of the notches with respect to the run. Such marking shall be at a sufficient distance from the face of the joint to allow for a visual point of inspection after the joint is brazed. All joints constructed using this method shall be brazed. Note: soft soldered joints will not be permitted.

3.08 GROOVED PIPING

- A. Pipe ends shall be clean and free from indentations, projections and roll marks in the area from pipe end to groove for the proper gasket sealing.
- B. Gasket style and material shall be verified as suitable for the intended service.
- C. Grooved end fittings, couplings, flange adapters, and valves shall be sized to copper tube dimensions. Flaring of pipe ends to IPS dimensions is not allowed.
- D. All grooved components shall be of one manufacturer.
- E. Grooved connections shall not be installed in inaccessible concealed locations.
- F. Grooved joints shall be installed in accordance with the manufacturer's latest published installation instructions.
- G. Gaskets shall be molded and produced by the coupling manufacturer, and shall be verified as suitable for the intended service.

END OF SECTION

SECTION 15405

SOIL, WASTE, AND VENT SYSTEM

PART 1 - GENERAL

1.01 GENERAL

The Bidding and Contract Requirements, Division 1 - General Requirements, Section 15010 - General Provisions, and Section 15050 - Basic Materials and Methods, shall apply to this section.

1.02 SCOPE

The work covered under this section shall include a complete soil, waste and vent system.

1.03 QUALITY ASSURANCE

The entire system shall be tested and approved as required by the plumbing code and local requirements before the system is covered up.

1.04 SUBMITTALS

Provide shop drawings on all piping and fittings as described in Section 15010 - 1.04.

PART 2 - PIPE AND FITTINGS

2.01 PIPE AND FITTINGS

A. Materials

1. Cast Iron Soil Pipe and Fittings- Hubless Cast Iron pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and listed by NSF International. Hubless Couplings shall conform to CISPI Standard 310 and be certified by NSF International. Heavy Duty couplings shall conform to ASTM C 1540 and shall be used if indicated. Gaskets shall conform to ASTM C 564. All pipe and fittings to be produced by a single manufacturer and are to be installed in accordance with manufacturer's recommendations and applicable code requirements. Couplings shall be installed in accordance with the manufacturer's band tightening sequence and torque recommendations. Hub and Spigot Cast Iron pipe and fittings shall be manufactured from grey cast iron and shall conform to ASTM A 74. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and listed by NSF International. Manufacturers shall be one of the following:

- a. AB & I Foundry
- b. Charlotte Pipe and Foundry

c. Tyler Pipe

2. PVC Schedule 40 Pipe and Fittings- shall be manufactured from PVC compound with a cell class of 11432 per ASTM D 4396 for pipe and 12454 per ASTM D 1784 for fittings and conform with National Sanitation Foundation (NSF) Standard 14. Pipe shall be iron pipe size (IPS) conforming to ASTM D 2665. Injection molded fittings shall conform to ASTM D 2665. Fabricated fittings shall conform to ASTM F 1866. All pipe and fittings to be produced by a single manufacturer and be installed in accordance with manufacturer's recommendations and local code requirements.

B. Pipe Schedule

1. Soil and Waste Pipe and Fittings Below Grade: Shall be service weight cast iron bell-and-spigot pipe and fittings or schedule 40 PVC plastic pipe and PVC-DWV fittings.
2. Soil, Waste and Vent Pipe and Fittings Above Grade: Shall be service weight cast iron bell-and-spigot pipe and fittings, schedule 40 galvanized steel pipe with screwed cast iron drainage pattern fittings, cast iron no-hub piping and fitting or schedule 40 PVC plastic pipe and PVC-DWV fittings except as noted in paragraph '3'. PVC plastic piping shall not be used in plenum spaces. DWV copper tubing and copper drainage pattern fittings shall be used for piping at the 3-compartment sink. All piping between the science prep room sinks and the acid neutralization basin shall be acid resistant polypropylene pipe and fittings.
3. Soil, Waste and Vent Stacks - shall be cast iron bell and spigot pipe and fittings or cast iron no-hub.

2.02 VENT FLASHINGS

Vent flashings shall be 3 lb. per square foot lead flashings or 2 1/2 lb. per square foot for prefabricated flashings, except on roofs where the manufacturer of the roof requires a special flashing to tie in his roofing system.

PART 3 - EXECUTION

3.01 PIPE AND FITTINGS

- A. All soil and waste piping shall be run at a minimum grade of 1/4" per foot unless otherwise noted on the drawings. The contractor shall field check all proposed soil and waste piping to verify that the piping system can be installed at the required grade before any soil and waste piping is installed.
- B. When the Building Sewer piping is installed using non-metallic piping, an insulated tracer wire, 18 AWG minimum in size and suitable for direct burial shall be installed

in the same trench as the sewer within 12 inches of the pipe, this tracer wire shall terminate at the cleanout access cover.

- C. Buried PVC schedule 40 pipe shall be installed in accordance with ASTM D 2321. Solvent cement joints shall be made in a two-step process with primer manufactured for thermoplastic piping systems and solvent cement conforming to ASTM F 656 and ASTM D 2564.
- D. Solvent cement PVC joints shall be protected from chemical agents, fire-stopping materials, thread sealant, plasticized-vinyl products or other aggressive chemical agents not compatible with PVC compounds. The system shall be hydrostatically tested after installation.
- E. All openings in the piping system during construction shall be securely capped to prevent foreign matter from entering the piping system.
- F. Piping to cleanouts shall be as shown on the drawings and as required by the local plumbing code.
- G. The minimum depth of the building sewer shall be no less than two feet below finished grade.
- H. Double sanitary tee fittings shall not be allowed for piping receiving the discharge from fixtures or appliances.
- I. PVC flanges shall not be allowed for water closets or urinals.
- J. Copper pipe and fittings shall not be used on waste piping for urinals.

3.02 VENTS AND VENT FLASHINGS

- A. Vent pipes shall extend 12" above the roof unless otherwise required. The minimum size vent through roof shall be 2".
- B. The lead vent flashings shall be turned down on the inside of the vent. On roofing systems where the roofing manufacturer requires a special flashing, the contractor shall install flashing as required.
- C. Vent piping shall not terminate within ten feet of outside air intake.

END OF SECTION

SECTION 15406

ROOF DRAINAGE SYSTEM

PART 1 - GENERAL

1.01 GENERAL

The Bidding and Contract Requirements, Division 1 - General Requirements, Section 15010 - General Provisions, and Section 15050 - Basic Materials and Methods shall apply to this section.

1.02 SCOPE

The work covered under this section shall include a complete roof drainage system.

1.03 QUALITY ASSURANCE

The roof drainage system shall be tested for leaks before the insulation is applied and before the piping is covered up. The test shall be filling the system with water.

1.04 SUBMITTALS

Provide shop drawings on all piping and fittings as described in Section 15010 - 1.04.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS

A. Materials

1. Cast Soil Pipe and Fittings- Hubless Cast Iron pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and listed by NSF International. Hubless Couplings shall conform to CISPI Standard 310 and be certified by NSF International. Heavy Duty couplings shall conform to ASTM C 1540 and shall be used if indicated. Gaskets shall conform to ASTM C 564. All pipe and fittings to be produced by a single manufacturer and are to be installed in accordance with the manufacturer's recommendations and applicable code requirements. Couplings shall be installed in accordance with the manufacturer's band tightening sequence and torque recommendations. Tighten bands with a properly calibrated torque limiting device. Hub and Spigot Cast Iron pipe and fittings shall be manufactured from grey cast iron and shall conform to ASTM A 74. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and listed by NSF International. Manufacturers shall be one of the following.

- a. AB&I Foundry
- b. Charlotte Pipe and Foundry

- c. Tyler Piper
 2. PVC Schedule 40 Pipe and Fittings- shall be manufactured from PVC compound with a cell class of 11432 per ASTM D 4396 for pipe and 12454 per ASTM D1784 for fittings and conform with National Sanitation Foundation (NSF) Standard 14. Pipe shall be iron pipe size (IPS) conforming to ASTM D2665. Injection molded fittings shall conform to ASTM D 2265. Fabricated fittings shall conform to ASTM F 1866. All pipe and fittings to be produced by a single manufacturer and to be installed in accordance with manufacturer's recommendations and local code requirements.
- B. Pipe Schedule
1. Storm Water Piping Below Grade: Shall be service weight cast iron bell-and-spigot pipe and fittings or schedule 40 PVC plastic pipe and PVC-DWV fittings.
 2. Storm Water Piping Above Grade: Shall be service weight cast iron bell-and-spigot pipe and fittings, cast iron no-hub piping and fittings, schedule 40 galvanized steel pipe with screwed cast iron drainage pattern fittings, or schedule 40 PVC plastic pipe and PVC fittings. PVC plastic piping shall not be used in plenum spaces.
 3. Storm water piping below grade from 5 feet outside of the building to the storm water structure may be reinforced concrete bell-and-spigot pipe with precast matching fittings.

2.02 ROOF DRAINS AND CLEANOUTS

Roof drains and cleanouts shall be as listed under section 15420.

PART 3 - EXECUTION

3.01 PIPE AND FITTINGS

- A. All piping shall be run at a minimum grade of 1/4" per foot unless otherwise noted on the drawings. The contractor shall field check all proposed storm water piping to verify that the piping system can be installed at the required grade before any piping is installed.
- B. When the Building Sewer piping is installed using non-metallic piping, an insulated tracer wire, 18 AWG minimum in size and suitable for direct burial shall be installed in the same trench as the sewer within 12 inches of the pipe, this tracer wire shall terminate at the cleanout access cover.
- C. Buried PVC schedule 40 pipe shall be installed in accordance with ASTM D 2321. Solvent cement joints shall be made in a two-step process with primer manufactured for thermoplastic piping systems and solvent cement conforming to ASTM F 656 and ASTM D 2564.

- D. Solvent cement PVC joints shall be protected from chemical agents, fire stopping materials, thread sealant, plasticized-vinyl products or other aggressive chemical agents not compatible with PVC compounds. The system shall be hydrostatically tested after installation.
- E. All openings in the piping system during construction shall be securely capped to prevent foreign matter from entering the piping system.
- F. Piping to cleanouts shall be as shown on the drawings and as required by the local plumbing code.
- G. The piping to the roof drains shall have a minimum of 5 feet offset between the vertical rain leader and the riser to the drain for expansion unless otherwise noted.
- H. The minimum depth of the building storm sewer shall be no less than two feet below finished grade.

3.02 PIPE INSULATION

The horizontal section of the rain leaders, riser to and including the interior part of the roof drain, shall be insulated to prevent condensation. Pipe insulation shall be as listed under section 15250.

3.03 ROOF DRAINS

The roof drains and accessories shall be installed to meet the requirements of the roofing system. The roof drains shall be flashed with a 4-foot square sheet of 4-lb. lead. On roofing systems where the roofing manufacturing requires a special flashing, the contractor shall install the flashing as required.

END OF SECTION

SECTION 15420
PLUMBING EQUIPMENT

PART 1 - GENERAL

1.01 GENERAL

The Bidding and Contract requirements, Division 1 - General Requirements, Section 15010 - General Provisions, and Section 15050 - Basic Materials and Methods shall apply to this section.

1.02 SCOPE

The work covered under this section shall include furnishing and installing the plumbing equipment and making the final connections of equipment furnished by others.

1.03 SUBMITTALS

Provide shop drawings on all equipment as described in Section 15010 - 1.04. Shop drawings shall include uses of all items.

PART 2 - PRODUCTS

2.01 The following equipment shall be as manufactured by J. R. SMITH. Equipment fully equal to the item specified manufactured by CONBRACO INDUSTRIES, INC., APOLLO VALVE, JOSAM MANUFACTURING, WADE, WATTS, MIFAB or ZURN shall be acceptable.

- A. Cleanouts (CO) - J.R. SMITH 4031L inside, provide carpet marker(-Y) when necessary, 4293L outside, stack cleanout 4510 tapped bronze plug to accept screw for 4710 round stainless steel access cover and 4111L-U for cleanouts located in sidewalks with 4915-CO frame and access cover. Cleanouts at the Building Drain/Building Sewer junction shall have a 18"x18"x6" concrete pad with 4915-CO frame and access cover.
- B. Roof Drains (RD) - J.R. SMITH 1010 Y-C-R-AD-U, non-adjustable, aluminum dome, vandal proof, with deck clamp and drain receiver.
- C. Wall Hydrants (WH) - Shall be J.R. SMITH 5519-WC Series automatic draining, non-freeze wall hydrant with vacuum breaker and wall box with chrome finish; provide wall clamp.
- D. Mixing Type Wall Hydrants (WH-1) - Shall be J.R. SMITH 5560QTseries, automatic draining, non-freeze, hot and cold water mixing type wall hydrant with vacuum breaker; provide wall clamp; provide shutoff valve and check valve in both of the supplies to the hydrant.

- E. Floor Drains (FD) toilet rooms & kitchen - J.R. SMITH 2005-A5NB-U-B vandal proof, sediment bucket, round bronze top and adjustable strainer. Provide SureSeal model SS3009V inline floor drain trap seal barrier.
- F. Floor Drains (FD-1) mechanical rooms and sprinkler rooms - J.R. SMITH 2220L – PB-P050 with sediment bucket and round bronze top. Provide SureSeal model SS3009V inline floor drain trap seal barrier.
- G. Floor sink (FS) - J.R. SMITH 3200-12.
- H. Shock Absorbers - J.R. SMITH 5000 SERIES.
- I. Traps for art room sinks in middle and high schools - J.R. SMITH 8730; provide slip fittings.
- J. Grease Interceptors - * J.R. SMITH 8200 with extended top for in-floor installations and 8000/81000 for on-floor installations, see drawings for type used; provide flow control fitting and hub adapters.
- K. Check valve (condensate drains) – WATTS CV series, bronze, straight pattern swing check.
- L. Open site drain with backwater valve - J.R. SMITH 2005L-F37NB-V with ball float valve. Provide SureSeal model SS3009V inline floor drain trap seal barrier on all drains connected to the sanitary sewer.
- M. Hose Bibb (HB)- Woodford model 21 wall faucet with vacuum breaker. Hose bibs in occupied rooms shall be chrome plated with a loose tee key. Hose bibs in mechanical rooms and unoccupied spaces shall be brass finish with wheel handle.
- N. Downspout Boot (DS Boot)-JAY R. SMITH1786 series.
- O. Downspout Scupper Nozzle (DSN)-JAY R. SMITH 1770-BS cast bronze nozzle and flange with bird screen.
- P. Floor Drains (Existing to Remain) – Raise or lower floor drain to the new floor elevation. Provide new floor drain strainer and sediment bucket to fit existing drain. Provide SureSeal model SS3009V inline floor drain trap seal barrier. It is the intent of this requirement that the existing floor drains is to finish flush with new floor surfaces.
- Q. Area Drain (AD)- JAY R. SMITH 2253C-U-G large capacity drain with vandal proof grate and galvanized parts. Set drain in 24"x24"x 6" concrete pad.

2.02 BACKFLOW PREVENTERS

- A. Refrigerators with ice makers or ice machines – CONBRACO INDUSTRIES, INC., APOLLO VALVE Model DUCLF4N series. Backflow preventers fully equal to the

items specified as manufactured by WATTS shall be acceptable.

- B. Backflow preventers for cold water make-up –CONBRACO INDUSTRIES INC. APOLLO VALVES 4ALF-200 series, reduced pressure, with captured spring cartridges and domestic ball valve shutoffs with stainless steel handles and trim, with air gap and drain line extended to floor drain. Products fully equal to the item specified as manufactured by WATTS or WILKINS shall be acceptable.
- C. Backflow preventers for irrigation systems – CONBRACO INDUSTRIES INC. APOLLO VALVES 4ALF-200 series. Product fully equal to the item specified as manufactured by WATTS or WILKINS shall be acceptable.

2.03 TEMPERING VALVES

- A. Tempering Valves – LEONARD LF-370 manifold, ASSE 1070 approved, with unions, balls valves, and thermometers, and TM-356-W/HA for whirlpools. Tempering valves fully equal to the item specified as manufactured by CONBRACO INDUSTRIES INC. APOLLO VALVES, POWERS, HONEYWELL, LAWLER or SYMMONS shall be acceptable.
- B. Tempering valves for locker room showers shall be CONBRACO model MVHL series, ASSE 1069 compliant with locking enclosure cabinet (no substitutions).
- C. Tempering valves for emergency showers LEONARD TM-800-STSTL-REC emergency water mixing valve mounted in a recessed stainless steel cabinet. Valve shall have an internal cold water bypass capable of 20GPM upon failure of hot water supply. Tempering valves fully equal to the items specified as manufactured by CONBRACO INDUSTRIES INC. APOLLO VALVES, POWERS, LAWLER or SYMMONS shall be acceptable.

2.04 ELEVATOR SUMP PUMP

STANCOR model SE-50 submersible effluent pump, 1/2 HP, 115 volts, 3600 RPM, 2" discharge connection. Pump control panel shall be STANCOR Oil Minder System, 115 volts, with built-in audible and visual alarms when pump does not run due to oil in pti or high liquid alarm. Provide silencing button for internal audible alarm. Panel shall have additional contact for remote alarm location. Junction box shall be provided with multi-pin connector and cord in lengths as required. Provide additional control panel for remote alarm in Building Engineer's Office or as shown on drawings.

2.05 KITCHEN EQUIPMENT FILTER (**ENGINEER TO SELECT**)

(normal use, engineer to edit)

Kitchen equipment filter- Alkalinity and pH control system filter for combi-steamer shall be manufactured by EVERPURE, Kleensteam model# EV9797-21 with model#7CB5 replacement cartridge and SS-10 cartridge model#EV9797-02 SR-X scale reducing feeder and deliming system. Provide with shutoff valve, pressure gauge and accessories

recommended by the manufacturer. Connect system filter to boiler side of combi steamer.

2.06 KITCHEN EQUIPMENT REVERSE OSMOSIS SYSTEM (single combi)

(to be used in hard water areas, engineer to edit)

Kitchen equipment - reverse osmosis system- Reverse osmosis/blended water system for combi-steamer shall be manufactured by EVERPURE, MRS-225CC System model# EV9970-09 with model #EV9607-41 carbon filter, model# EV9627-03 RO cartridge, model# EV9627-05 calcium cartridge, Pre-filter kit model# EV9795-81, model# EV9534-40 pre-filter cartridge and model# DEV3115-69 storage tank. Provide with shutoff valves, pressure gauges, interconnecting piping and accessories as recommended by the manufacturer. Connect system to boiler side of combi steamer.

2.07 KITCHEN EQUIPMENT REVERSE OSMOSIS SYSTEM (double combi)

(to be used in hard water areas, engineer to edit)

Kitchen equipment -reverse osmosis system- Reverse osmosis/blended water system for combi-steamer shall be manufactured by EVERPURE, MRS-350CC System model# EV9970-18 with model #EV9607-41 carbon filter, model# EV9627-07 RO cartridge, model#EV9627-05 calcium cartridge, Pre-filter kit model# EV9795-81, model# EV9534-40 pre-filter cartridge and model# DEV3115-70 storage tank. Provide with shutoff valves, pressure gauges, interconnecting piping and accessories as recommended by the manufacturer. Connect system to boiler side of combi steamer.

PART 3 - EXECUTION

3.01 EQUIPMENT INSTALLATION

- A. Floor drains shall be installed complete including trap primer if required by local authorities. Floor drains shall be flashed with a 3-foot diameter sheet of 4 pound lead when installed above ground. The size of the floor drains shall be as shown on the drawings.
- B. Cleanouts shall be installed in an accessible location. Install carpet markers, cleanout access covers or access panels where required for accessibility. The size of the cleanouts shall be as shown on the drawings. Cleanout plugs shall be installed with a non-hardening type pipe dope on threads to allow for easy removal of plugs.
- C. Roof drains shall be installed as listed in section 15406. The size of the roof drains shall be as shown on the drawings.
- D. Wall hydrants shall be installed with backflow preventer and a stop and waste valve in an accessible location. The hydrants shall be selected to match the wall thickness at the location to be installed. Provide Owner with separate 'T' handle key

for each wall hydrant.

- E. Shock absorbers shall be installed as listed in section 15401 and as required by local authority, in an accessible location.
- F. Interceptors shall be installed complete. The interceptor shall be installed as recommended by the manufacturer and local codes. Flow control devices shall be installed in the drain line from the 3-compartment sink.
- G. Air Gaps shall be installed as required by the local codes. Provide air gap fitting for all dishwashers in Home EC areas unless unit is provided with integral air gap.
- H. Neutralizing tanks shall be installed complete and as recommended by the manufacturer and local codes.
- I. Silver Recovery systems shall be owner provided and contractor installed complete as recommended by the manufacturer and local codes.
- J. Tempering valves shall be installed as recommended by the manufacturer and shall be mounted no higher than 66 inches above floor. After installation is complete, the contractor shall have the manufacturers authorized representative verify that the installation complies with the manufacturer's requirements. The representative shall take apart and clean valve, set-up and adjust the valve for proper operation at the end of project, but before final inspection. Provide the owner with a copy of the inspection and set-up report.
- K. Elevator sump pump shall be installed in elevator pit sump as recommended by the manufacturer and as detailed. The Division 15 contractor shall install all wiring between the sump pump and the pump control panel. The Division 16 contractor shall install all power wiring.
- L. Elevator sump pump remote alarm shall be installed as recommended by the manufacturer and by the local authority. The remote alarm panel shall be furnished under Division 15. The Division 15 contractor shall install the remote alarm panel, and all wiring between the pump control panel and the remote alarm panel.
- M. The kitchen equipment reverse osmosis system shall be rack or wall mounted in an accessible location or as shown on drawings. Interconnecting piping between the reverse osmosis system, storage tank and combi steamer shall be Type L copper.

3.02 BACKFLOW PREVENTERS

Backflow preventers shall be installed as shown on the drawings or as required by the local codes and shall be mounted no higher than 66 inches above finished floor. Air gap and drain line shall be piped to the nearest floor drain.

END OF SECTION

SECTION 15422

DOMESTIC RECIRCULATING PUMP

PART 1 - GENERAL

1.01 GENERAL

The Bidding and Contract Requirements, Division 1 - General Requirements, section 15010 - General Provisions, and section 15050 - Basic Materials and Methods shall apply to this section.

1.02 SCOPE

Provide and install the domestic recirculating pump as shown on the drawings and specified herein.

1.03 QUALITY ASSURANCE

- A. Pump shall be rated to a maximum of 145 PSI and 230 degrees Fahrenheit and bear the approval symbol of the required regulatory body (NSF/ANSI 61).
- B. Electrical assemblies (circuitry, wiring terminals and internal connections) of the circulating pumps shall be certified and registered to bear the emblem of UL, CSA or ETL as required. Electrical assembly shall meet codes and standards established by national bodies.
- C. All pumps shall be factory tested prior to shipment to the job site.

1.04 SUBMITTALS

Provide shop drawings on this equipment as described in Section 15010 - 1.04.

PART 2 - PRODUCTS

2.01 DOMESTIC RECIRCULATING PUMP

The domestic recirculating pump shall be of the centrifugal inline mounted type and of the size, capacity and voltage shown on the drawings. The pump shall be manufactured by BELL & GOSSETT. Pumps fully equal to the specified pump and manufactured by WILO or GRUNDFOS are acceptable.

- A. Circulating pumps shall be constructed with lead free, stainless steel, NSF-61 Annex G certified materials.
- B. Pump flanges shall be combination 1.25" - 2 bolt commercial oval type (rotated 90 degrees).
- C. Shafts shall be constructed of high quality stainless steel.

- D. Motor bearings shall be metal-impregnated carbon.
- E. Impellers with three-dimensional curved blades are constructed of Polyphenylene Sulfide (PPS) plastic, 40% glass filled.
- F. The circulating pumps shall have a high quality composite terminal box with NPT electrical connections and a secure, gasketed cover, Class 2 protection level. The face of the terminal box shall have an adjustment button and the display shall indicate; Operation status, Control mode, differential pressure or speed/setpoint, and fault and warning signals.
- G. Wet rotor, glandless inline circulating pumps shall include electronic variable speed control to operate at constant/variable differential pressure control without external sensors. Automatic night setback control shall be available as standard using "self taught, FUZZI" technology.
- H. Pumps shall include integrated synchronous motors using ECM technology with permanent rotors, special sensorless electronics and single phase electronic converters.
- I. Integrated overload motor protection shall protect the pump against over/under voltage, over temperature of motor and/or electronics, locked rotor and dry run (no load condition).
- J. Fault contact "FC" terminals shall be included in the terminal box and shall be potentially free, normally closed contacts that open on the event of a failure.

2.02 SPECIALTIES

Specialties shall be provided for all pumps, which shall include, but not be limited to, isolation valves, unions, thermometers, and check valves.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The pump shall be installed and serviced in accordance with the manufacturer's recommendations and as shown on the drawings.
- B. The pump shall be installed with the motor shaft in a horizontal plane with no exceptions. The electrical terminal box shall be installed either horizontally with the IR window to the left of the "red Button" (wiring connections to the right of the terminal box) or vertically with the IR window above the "Red Button" (wiring connections below the terminal Box).
- C. Coupling guards shall be installed per ANSI and OSHA standards.

END OF SECTION

SECTION 15423

DOMESTIC RECIRCULATING PUMP

PART 1 - GENERAL

1.01 GENERAL

The Bidding and Contract Requirements, Division 1 - General Requirements, section 15010 - General Provisions, and section 15050 - Basic Materials and Methods shall apply to this section.

1.02 SCOPE

Provide and install the domestic recirculating pump as shown on the drawings and specified herein.

1.03 QUALITY ASSURANCE

- A. Pump must be selected from published test curves showing actual brake horsepower. The selection point shall be confined to the left of center of the efficiency curve for the impeller being furnished.
- B. All pump motors shall meet NEMA Standards and shall be U/L listed.
- C. All pumps shall be factory tested prior to shipment to the job site.

1.04 SUBMITTALS

Provide shop drawings on this equipment as described in Section 15010 - 1.04.

PART 2 - PRODUCTS

2.01 DOMESTIC RECIRCULATING PUMP

The domestic recirculating pump shall be of the centrifugal inline mounted type and of the size, capacity and voltage shown on the drawings. The pump shall be manufactured by BELL & GOSSETT. Pumps fully equal to the specified pump and manufactured by ARMSTRONG, WEINMANN, or PATTERSON are acceptable.

- A. Pump - Shall be quiet operating, horizontal, oil lubricated, inline, single stage, vertical split case design, and shall be all-bronze construction for domestic water applications. The pump internals shall be capable of being serviced without disturbing piping connections. The pump shall have a dynamically balanced impeller keyed and locknuttetted to a ground and polished steel shaft with hardened integral thrust collar. Shaft shall be supported by oil lubricated bronze sleeve bearings. Water tight mechanical seal faces shall be carbon on cast iron or ceramic.

- B. Coupling - Shall be self aligning, flexible type connecting the pump and motor.
- C. Motor - Shall be open drip proof, journal bearing, resilient mounted, 1750 rpm, and shall be especially selected for quiet operation. The electrical characteristics of the motor shall be as shown on the drawings. The horsepower of the motor shall be of such a size as to insure non-overloading of the motor throughout the capacity range of the pump. The motor shall have sealed bearings.
- D. Testing - The pump shall be factory tested, thoroughly cleaned, and painted with one (1) coat of machinery enamel prior to shipment. A set of installation instructions shall be included with the pump at the time of shipment.
- E. Starter - Provide a manual starter for single phase units and magnetic across-the-line starter for three phase units. The starter shall have HAND-OFF-AUTOMATIC switch and red running light. See Section 15050 paragraph 2.07.

2.02 SPECIALTIES

Specialties shall be provided for all pumps, which shall include, but not be limited to, isolation valves, unions, thermometers, and check valves.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The pump shall be installed and serviced in accordance with the manufacturer's recommendations and as shown on the drawings.
- B. Coupling guards shall be installed per ANSI and OSHA standards.

END OF SECTION

SECTION 15424

DOMESTIC ELECTRIC WATER HEATERS

PART 1 - GENERAL

1.01 GENERAL

The Bidding and Contract Requirements, Division 1 - General Requirements, Section 15010 - General Provisions, and Section 15050 - Basic Materials and Methods shall apply to this section.

1.02 SCOPE

The work covered under this section shall include providing and installing complete electric water heaters.

1.03 QUALITY ASSURANCE

- A. The water heater shall meet the requirements of the current ASHRAE Standard 90.1, for energy conservation.
- B. The electric water heater shall be factory wired in accordance with the National Electrical Code, and the heater shall bear the UL label.
- C. The water heater shall be tested at a pressure of 300 psi and shall have a water working pressure of 150 psi.
- D. The water heater shall be installed as recommended by the manufacturer and local codes.
- E. The water heater installation shall include the start-up and check out procedures as recommended by the manufacturer. Provide the owner with a copy of the start-up record.

1.04 SUBMITTALS

Provide shop drawings on this equipment, including an installation diagram, as described in Section 15010, 1.04.

PART 2 - PRODUCTS

2.01 ELECTRIC WATER HEATERS

- A. The size, type and capacity of the water heaters are shown on the drawings along with the specified manufacturer. Water heaters fully equal to the water heater specified on the drawings and manufactured by RUUD (UNIVERSAL), A. O. SMITH,

STATE, HUBBELL, BOCK or LOCHINVAR are acceptable.

- B. Tank - The steel tank shall be glass lined with magnesium anode to resist corrosion, unless otherwise noted on the drawings. The tank shall be insulated to meet the current ASHRAE 90.1 requirements and shall be covered with baked enamel paint.
- C. Heating Element - The heating element shall be the low watt density and screw-in design. The voltage shall be as shown on the drawings and shall be stamped on the water heater.
- D. Controls
 - 1. The water heater shall have an adjustable thermostat for operating control. The adjustable thermostat shall maintain the correct water temperature as stated on the drawings or required by Code.
 - 2. The water heater shall have a high limit or over temperature control to cut off the power in excess temperature situations.

2.02 PRESSURE AND TEMPERATURE RELIEF VALVE

The combination pressure and temperature relief valve for water heater(s) shall be rated equal to or greater than the maximum hourly heat input rate of the water heater. Each relief valve shall be ASME listed, rated and stamped. Pressure relief setting shall be 150 psi or less and temperature relief of 210 degrees F, all bronze body with stainless steel spring, test level and mounted to monitor the temperature within 6" of the tank.

2.03 EXPANSION TANK

Shall be ASME labeled and size listed on the drawings. Provide the tank with the required tapings and a prime coat of paint. The expansion tank shall be BELL & GOSSETT, TACO, JOHN WOOD, WESSELS or ARMSTRONG.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The water heater shall be installed as shown on the drawings in an accessible location. Gate valves shall be installed on both the cold water supply pipe and the hot water pipe. A vacuum relief shall be installed on the cold water pipe between the gate valve and tank, and shall be located above the top of the tank. A thermometer shall be installed in the hot water pipe above the top of the heater. All valves shall be mounted so as to be accessible while standing on the floor.
- B. Where water heaters are mounted above the floor, provide and install a shelf to carry the water heater. The shelf shall have the capability of carrying the water

heater filled with water.

- C. A drip pan, where shown on the drawings or required by Code, shall be provided and installed. The drip pan shall be of a size to accommodate the water heater. The drip pan shall be fabricated with a minimum of 22 gauge galvanized steel. The drip pan shall be piped full size to a receptor.
- D. The relief valve shall be piped full size to a receptor.
- E. The thermostats in the water heater shall be adjusted to produce the water temperature called for on the drawings.
- F. The water heater instruction booklet shall be secured to the water heater.
- G. Provide a spare fuse for the water heater.
- H. Provide ASME rated expansion tank. Install as recommended by manufacturer.

END OF SECTION

SECTION 15451

PLUMBING FIXTURES AND TRIM

PART 1 - GENERAL

1.01 GENERAL

The Bidding and Contract Requirements, Division 1 - General Requirements, Section 15010 - General Provisions and Section 15050 - Basic Materials and Methods, shall apply to this section.

1.02 SCOPE

The work covered under this section shall include furnishing and installing the plumbing fixtures and trim and making all final connections of equipment furnished by others.

1.03 SUBMITTALS

Provide shop drawings on these fixtures and trim items as described in section 15010 - 1.04. Shop drawings shall include proposed uses of all fixtures and trim.

PART 2 - PRODUCTS

2.01 WATER CLOSETS AND URINALS

KOHLER COMPANY shall manufacture the following plumbing fixtures. Vitreous china plumbing fixtures fully equal to the item specified, manufactured by AMERICAN STANDARD, ZURN or SLOAN shall be acceptable. Flush valves fully equal to the item specified and manufactured by SLOAN, AMERICAN STANDARD, ZURN or MOEN shall also be acceptable. Toilet seats fully equal to the item specified and manufactured by KOHLER, BEMIS or CHURCH shall be acceptable.

- A. Water Closet (Handicapped) (WC-1) - Kohler K-4368 Highcliff Lite Toilet, elongated, water-guard, flush valve toilet, 17 1/2" high; 52048 bolt caps or AMERICAN STANDARD 3043.001 16-1/2" height WC Madera; BEMIS model 1955SSCT, black, extra heavy duty, open front toilet seat with self-sustaining check hinge; KOHLER K-10957 1.6 gpf flush valve with electronic infrared sensor with Tripoint technology, AMERICAN STANDARD 6065.161 DC 1.6gpf FV, ZURN- ZER6000 PL-CPM-WS1 sensor operated battery powered flush valve, MOEN 8310 sensor operated flush valve, 1.6 GPF, battery powered, mechanical manual override button, self-cleaning heavy duty piston or SLOAN Regal XL 111-1.6 SF5M, 1.6 gpf battery powered flush valve with electronic infrared sensor, 1" screwdriver stop and vandal proof cap.
- B. Water Closet (WC) - Kohler K-4350 Wellcomme Lite Toilet, elongated, water-guard, flush valve toilet; 52048 bolt caps or AMERICAN STANDARD 2234.001 Madera 15" height WC; BEMIS model 1955SSCT, black, extra heavy duty, open front toilet seat with self-sustaining check hinge; KOHLER K-10957 1.6 gpf flush valve with

electronic infrared sensor with Tripoint technology AMERICAN STANDARD 6065.161 DC 1.6gpf FV, ZURN- ZER6000 PL-CPM-WS1 sensor operated battery powered flush valve, MOEN 8310 sensor operated flush valve, 1.6 GPF, battery powered, mechanical manual override button, self-cleaning heavy duty piston or SLOAN Regal XL 111-1.6 SFMS, 1.6 gpf battery powered flush valve with electronic infrared sensor, 1" screwdriver stop and vandal proof cap.

- C. Water Closet (WC-2) (rear outlet, floor mounted) Kohler K-4386 Anglesey elongated siphon jet flush valve toilet; 52048 bolt caps or AMERICAN STANDARD 3690.001; BEMIS model 1955SSCT, black, extra heavy duty, open front toilet seat with self-sustaining check hinge; KOHLER K-10957 1.6 gpf flush valve with electronic infrared sensor with Tripoint technology, AMERICAN STANDARD 6065.161 DC 1.6gpf FV, or ZURN- ZER6000 PL-CPM-WS1 sensor operated battery powered flush valve, MOEN 8310 sensor operated flush valve, 1.6 GPF, battery powered, mechanical manual override button, self-cleaning heavy duty piston or SLOAN Regal XL 111-1.6 SFMS, 1.6 gpf battery powered flush valve with electronic infrared sensor, 1" screwdriver stop and vandal proof stop.
- D. High Efficient Urinal (HEUR & HEUR-1) KOHLER COMPANY shall manufacture the following plumbing fixtures. Vitreous china plumbing fixtures fully equal to the item specified manufactured by AMERICAN STANDARD, ZURN or SLOAN shall be acceptable. Flush valves fully equal to the item specified and manufactured by SLOAN, MOEN or ZURN shall be acceptable.

KOHLER K-4991-ET Bardon 1/8 gpf high efficiency urinal or AMERICAN STANDARD 6590.11 Washbrook Flowise urinal. K-10949 1/8 gpf touchless DC urinal flushometer with tripoint technology, polished chrome, screwdriver stop with vandal proof cap or AMERICAN STANDARD 6063.013 DC 0.125gpf FV; Carrier - JOSAM 17550-UR or JR Smith 0637, WATTS CA-321 or JAY R. SMITH 0637.

- E. High Efficient Water Closet (Handicapped) (HEWC-1) KOHLER K-4405 Highline 1.28 flushometer floor mounted bowl, white or AMERICAN STANDARD 3043.001 16-1/2 height WC, BEMIS model 1955SSCT, black, extra heavy duty, open front toilet seat with self-sustaining check hinge; KOHLER K-10956-CP 1.28gpf/4.85lpf touchless DC toilet flushometer with tripoint technology, or AMERICAN STANDARD 6065.121 DC 1.28gpf, or ZURN - ZER6000 PL-CPM-WS1 sensor operated battery powered flush valve, or SLOAN Regal XL 111-1.6 SFMS, 1.6 gpf battery powered flush valve with electronic infrared sensor, or MOEN 8310 sensor operated flush valve, 1.6 GPF, battery powered, mechanical manual override button, self-cleaning heavy duty piston, 1" screwdriver stop and vandal proof cap, Bolt caps - 52048.
- F. High Efficient Water Closet (HEWC) KOHLER K-96053-0-Wellcomme Ultra 1.28 flushometer bowl, elongated, white or AMERICAN STANDARD 2234.001 Madera Flowise WC; BEMIS model SSCT, black, extra heavy duty, open front toilet seat with self-sustaining check hinge; KOHLER K-10956 1.28 gpf/4.85lpf touchless DC toilet flushometer with tripoint technology, polished chrome or AMERICAN STANDARD 6065.121 DC 1.28gpf FV, or ZURN - ZER6000 PL-CPM-WS1 sensor operated battery powered flush valve, or SLOAN Regal XL 111-1.6 SFMS, 1.6 gpf battery

powered flush valve with electronic infrared sensor, or MOEN 8310 sensor operated flush valve, 1.6 GPF, battery powered, mechanical manual override button, self-cleaning heavy duty piston, 1" screwdriver stop and vandal proof cap, Bolt caps - 52048.

2.02 LAVATORIES

KOHLER COMPANY shall manufacture the following plumbing fixtures. Vitreous china plumbing fixtures fully equal to the item specified, manufactured by AMERICAN STANDARD, ZURN or SLOAN, shall be acceptable. Faucets fully equal to the item specified and manufactured by AMERICAN STANDARD, ZURN, SLOAN, MOEN and CHICAGO shall be acceptable. Trim items manufactured by KOHLER, AMERICAN STANDARD, NIBCO, ELKAY, McGUIRE BRASSCRAFT, T&S BRASS, or CHICAGO shall be acceptable. All trim items shall have heavy duty or extra duty components. All faucets shall be Certified Lead Free to NSF 372.

- A. Lavatory (L) - KOHLER K-1721, white, vitreous china, 20" X 18" Chesapeake with single hole faucet drilling or AMERICAN STANDARD 0356.421 single hole Lucerne, Supply faucet- T&S Brass EC-3142-ST-VF05 battery powered sensor faucet w/ T&S 5EF-0006 temp. mixing T or K-13461 CP KOHLER Sculpted Touchless lavatory faucet, or ZURN Z-6918-F-MT battery powered sensor faucet, or SLOAN 3335061, "EAF-350", Optima sensor activated lavatory faucet with .5 gpm aerator spray head, with (Bak-Chek) tee fitting, or CHICAGO FAUCET 116.606.AB.1 with 0.5 GPM VP aerator, 6V lithium battery and remotely adjustable sensor range/meter time with 242.165.00.1 mixing tee with integral check and filter; flexible stainless steel connections; or Moen 8553, Single mount battery powered above deck electronic sensor faucet, 0.5 GPM recessed aerator, 104424 mixing tee, slow closing solenoid; K-7715 drain with perforated strainer, 1 1/4" tailpiece; K-8995 1 1/4" X 1 1/2" chromium plated brass 'P' trap with cleanout plug; K-9016 1 1/2" X 6" chromium plated brass nipple with chromium plated brass escutcheon; K-7601 lavatory supplies complete with chromium plated brass angle loose key stops, and escutcheons; Carrier - JOSAM 17100-67, WATTS TCA-411 or JAY R. SMITH 0710-D.
- B. Lavatory (L-1) Adult Handicapped - KOHLER K-1721, white, vitreous china, 20" X 18" Chesapeake with single hole faucet drilling or AMERICAN STANDARD 0356.421 single hole Lucerne, Supply faucet T&S Brass EC-3142-VF05 battery powered sensor faucet or K-13460 CP Kohler Sculpted Touchless lavatory faucet, or Zurn Z-6919-ADM-F battery powered sensor faucet, or SLOAN 3335061, "EAF-350-ISM", Optima sensor activated lavatory faucet with .5 gpm aerator spray head, or CHICAGO FAUCET 116.222.AB.1 with 0.5 GPM VP aerator, user adjustable side mixing, 6V lithium battery and remotely adjustable sensor range/meter time; flexible stainless connections; Moen 8554, Single mount battery powered above deck electronic sensor faucet with above deck mixing, 0.5 GPM recessed aerator, slow closing solenoid; K-7715 1 1/4" drain with strainer or K-13385 offset drain and K-7622 offset tailpiece for fixtures without the built-in offset; P-Trap - K-8995 1 1/4" X 1 1/2" chromium plated cast brass with cleanout plug; Nipple - K-9016 1 1/2" X 6" chromium plated cast brass with escutcheon; Supplies - K-7601 with loose key

stops, chromium plated with escutcheons; Carrier - JOSAM 1710067, WATTS TCA-411 or JAY R. SMITH 0710-D. Provide TRUEBRO Model 102 white trap and supply covers. Covers as manufactured by PLUMBEREX (Pro Series) shall be acceptable.

- C. Lavatory (L-2) Student Handicapped – K-1721, white, vitreous china, 20" X 18" Chesapeake with single hole faucet drilling or AMERICAN STANDARD 0356.421 single hole Lucerne, Supply faucet- T&S Brass EC-3142-ST-VF05 battery powered sensor faucet w/ T&S 5EF-0006 temp. mixing T or K-13461 CP KOHLER Sculpted Touchless lavatory faucet, or ZURN Z-6918-F-MT battery powered sensor faucet, or SLOAN 3335061, "EAF-350", Optima sensor activated lavatory faucet with .5 gpm aerator spray head with (Bak-Chek) tee fitting, or CHICAGO FAUCET 116.606.AB.1 with 0.5 GPM VP aerator, 6V lithium battery and remotely adjustable sensor range/meter time with 242.165.00.1 mixing tee with integral check and filter; flexible stainless steel connections; or Moen 8553, Single mount battery powered above deck electronic sensor faucet, 0.5 GPM recessed aerator, 104424 mixing tee, slow closing solenoid; K-7715 1 1/4" drain with strainer or K-13385 offset drain and K-7622 offset tailpiece for fixtures without the built-in offset; K-8995 chromium plated brass 'P' trap with cleanout plug; K-9016 chromium plated brass nipple with chromium plated brass escutcheon; K-7601 supplies with chromium plated brass angle loose key stops, and escutcheons; Carrier - JOSAM 17100-67, WATTS TCA411 or JAY R. SMITH 0710-D. Provide TRUEBRO Model 102, white trap and supply covers. Covers as manufactured by PLUMBEREX (Pro Series) shall be acceptable.
- D. Lavatory (L-4) Kitchen – KOHLER K-1721, white vitreous china, 20" X 18" Chesapeake with single hole faucet drilling or AMERICAN STANDARD 0356.421 single hole Lucerne, Supply faucet -T&S Brass EC-3142-VF05 w/ B-0199-03-WS 1.5gpm aerator battery powered sensor or K-13460 CP Sculpted Touchless lavatory faucet with 1.5 GPM aerator, or ZURN Z-6918-XL-ADM-E battery powered faucet with a 1.5 GPM aerator, or SLOAN 3335061, "EAF-350-ISM" Optima sensor activated lavatory faucet with 1.5 gpm aerator spray head, or CHICAGO FAUCETS 116.222.AB.1 with E34VP 1.5 GPM VP aerator, user adjustable side mixing, 6V lithium battery and remotely adjustable sensor range/meter time; flexible stainless steel connections; or MOEN 8554, Single mount battery powered above deck electronic sensor faucet with above deck mixing, 1.5 GPM recessed aerator, slow closing solenoid; K-7715 drain with perforated strainer, 1 1/4" tailpiece; P-Trap - K-8995 1 1/4" X 1 1/2" chromium plated cast brass with cleanout plug; Nipple - K-9016 1 1/2" X 6" chromium plated cast brass with escutcheon; Supplies - K-7601 with loose key stops; Carrier - JOSAM 17100-67, WATTS TCA-411 or JAY R. SMITH 0710-D. Provide TRUEBRO Model 102, white trap supply covers. Covers as manufactured by PLUMBEREX (Pro Series) shall be acceptable.

2.03 SINKS

ELKAY shall manufacture the following plumbing fixtures. Stainless steel sinks fully equal to the item specified and manufactured by JUST MANUFACTURING shall be acceptable.

- A. Clinic Sink (S-1) – ELKAY Lustertone LR-2521, 5 1/2" sink depth 18 gauge, with 3 faucet holes; Supply faucet LK-232-S-BH-5 5" wrist blades with rigid connections

and gooseneck spout or CHICAGO FAUCET 786-GR8AE3V317AB or MOEN 8229 with S00R50, strainer LK-18B, P-Trap with cleanout plug and escutcheon; Supply valves shall be ¼ turn ball valve with chrome plated ball, sweated and have escutcheons. Compression fittings are not acceptable.

2.04 SHOWERS

LEONARD shall manufacture the following plumbing fixtures. Showers fully equal to the item specified and manufactured by KOHLER, AMERICAN STANDARD, SYMMONS, MOEN or POWERS shall be acceptable.

- A. Gang shower (Handicapped-Surface mounted) (SH) - LEONARD Surfashower SS-VO-BH-501P with single supply blade handle, hand shower mounted on slide bar. Provide SS-HC horizontal pipe cover with back plate. Exposed parts shall be vandal-resistant.
- B. Gang shower (Handicapped) (SH) - Leonard 476 volume control valve with blade handle, single supply 501P hand shower mounted on slide bar or Chicago faucet 770-317PLABCP with 151-777-037K. Exposed parts shall be vandal-resistant.
- C. Gang shower (SH-1-Surface mounted) (SH) - Leonard Surfashower SS-VO-300 with single supply, cross handle, H-06 shower head. Provide SS-HC horizontal pipe cover with back plate. Exposed parts shall be vandal-resistant.
- D. Gang shower (SH-1) - LEONARD 770 volume control valve with single supply, cross handle, H-06 showerhead or Chicago Faucet 770PLABCP with 621CP showerhead. Exposed parts shall be vandal-resistant.
- E. Shower (SH-2) (Handicapped) - Showerhead - KOHLER K-8520 hand held shower with slide bar; supply elbow - K-9664; shower valve K-304-KS pressure balanced mixing valve with integral stops and K-T6913-4 valve trim or MOEN T9346EP15, Posi-Temp pressure balancing valve shower system, hand held shower, 1-1/2" X 24" stainless steel ADA grab bar with MOEN 8371HD, Posi-Temp pressure balancing control valve with built in stops with T8370.

2.05 EXISTING TO REMAIN EQUIPMENT

- A. Existing to remain water closets - Provide and install BEMIS model 1955SSCT, black, extra heavy duty, open front, self-sustaining check hinge and elongated for all existing water closets. Replace closet flange, wax ring, bolts, bolt caps and spud gasket. See 2.01 for appropriate flush valve replacement.
- B. Existing to remain lavatories - See 2.02 for appropriate faucet replacement. Provide vandal proof aerator. Supply stops for each Kohler K-7601 chrome angle loose key, provide threaded tailpiece supply extensions. Replace waste outlet and provide chromium-plated p-trap with cleanout plug and nipple with escutcheon.
- C. Existing to remain shower (SH(E)) - Provide and install KOHLER K-7371 showerhead; shower arm K-7397; and shower valve K-6913-4 pressure balanced

mixing valve with integral stops.

- D. Trough Sink (TS) (Existing Fixture) – Provide and install three (3) sets of CHICAGO FAUCETS Model NO. 225-261 or T&S Brass B-0316-LN w/ 132X VR lever handle faucets for each trough sink. Plug unused former bubbler mount with chrome plug.
- E. Existing to remain hand sink in kitchen – See 2.02 D for appropriate faucet replacement. Provide K-7601 supplies with loose key stops. Provide threaded tailpiece supply extensions.
- F. Existing to remain service sinks and mop basins - Replace faucet with one of the following faucets respectively - Kohler K-8905 or K-8907 with wall bracket. T&S Brass B-0669-02 or 665-BSTR or Chicago faucet 305-VB-RCF or 897-RCF with wall bracket shall also be accepted. All with integral vacuum breakers.

2.06 ELECTRIC WATER COOLER

The following electric water coolers (and/or drinking fountains) shall be manufactured by ELKAY. Electric drinking fountains fully equal to the item specified, manufactured by HALSEY TAYLOR, OASIS, HAWS or SUNROC shall be acceptable. Fixtures with plastic bubbler components will not be acceptable.

- A. Electric Water Cooler (EWC) - Elkay EWCA-14 wall mounted compact cooler complete with flexi-guard bubbler and all standard accessories; finish by Architect. Carrier - JOSAM 17550-WC, WATTS TCA-411 or JAY R. SMITH 0830.
- B. Electric Water Cooler (EWC-1) - Elkay EZ-8 universal mount barrier free cooler complete with flexi-guard bubbler and all standard accessories; finish by Architect. Carrier - JOSAM 17550-WC, WATTS TCA-411 or JAY R. SMITH 0830.
- C. Electric Water Cooler (EWC-2) - ELKAY handicapped model # EZS8WSLK accessible water cooler with Bottle filling station, flexi-guard bubbler and all standard accessories. Finish by Architect. Carrier - JOSAM 17550-WC, WATTS TCA-411 or JAY R. SMITH 0830.
- D. Drinking fountain and cuspidor (DF) – Kohler Semi Recessed K-5293, vitreous china with 34902 condensation plate assembly, 35301 bubbler assembly, 79186 supply stop assembly, 35314 trap and 52054 wall screw access pack.

2.07 MOP BASIN/ LAUNDRY TRAY

FIAT shall manufacture the following plumbing fixtures. Mop basins and laundry trays fully equal to the item specified and manufactured by STERN WILLIAMS shall also be acceptable. Laundry Tray fully equal to the item specified and manufactured by JUST MANUFACTURING shall be acceptable.

- A. Mop Basin (MB-1) - FIAT Model TSB-700 with stainless steel caps on all curbs, 12" x 36" x 24"; Faucet, with integral vacuum breaker –T&S Brass 665-BSTR or FIAT

830-AA or CHICAGO FAUCETS 897-RCF or MOEN 8124 with internal vacuum breaker, integral check stops; Hose and hose bracket - 832-AA; Silicone sealant - 833-AA.

- B. Mop Basin (MB-2) - STERN WILLIAMS HL-2100 with 6" drop and stainless steel cap on threshold, 36" X 24" X 12"; Faucet, with integral vacuum breaker – T&S Brass 665-BSTR or 830-AA or CHICAGO FAUCET 897-RCF or MOEN 8124 with internal vacuum breaker, integral check stops; Hose and hose bracket - 832AA; Silicone sealant - 833-AA.
- C. Laundry Tray (LT) - ELKAY model RNSF8118LR, 16 gauge, type 304 stainless steel, floor mounted scullery sink with drainboards on both sides; Faucet shall be ELKAY model LK940AT10L2H with 2.2 GPM vandal resistant aerator, strainer LK-18B, P-Trap with cleanout plug and escutcheon; Supply valves shall be 1/4 turn sweated ball valves with chrome plated ball and escutcheons.

2.08 WASH BOX

- A. Wash Box – GUY GRAY MANUFACTURING CO., INC. Model NWFBED-200TS. Provide with ½" hot and cold water hose bibbs, a 20 amp, 120V duplex receptacle for washer, and a 30 amp, 220V, 4wire dryer receptacle.

2.09 OTHER FURNISHED EQUIPMENT

- A. The contractor shall make a complete waste, vent, hot and cold water rough in for all fixtures, equipment and food service equipment as indicated on the drawings. Furnish and install 1/4 turn shut off valves for all countertop fixtures and KOHLER K-7601 supplies for all wall hung fixtures; traps, tailpieces, sink strainers, supply pipes, air gaps, backflow preventers, escutcheons, and make all final connections for a complete installation.
- B. The contractor shall consult the architectural drawings and other sections of the specifications for equipment requiring roughing in and final connection under this section of the contract.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The water supply to each surface mounted fixture shall have angle, loose key stop valves. On fixtures without integral stops, install stop valves. Fixtures which are installed in case work or fixtures with plumbing components which are not visible from the occupied space shall have ¼ turn sweated ball valves with chrome plated ball and escutcheons. The water supply piping for fixtures located in casework shall be type L copper from the valve to the fixture, piping shall be run in such a manner as to allow the space below the fixture to utilized as storage.

- B. Wall hung fixtures such as urinals, lavatories, sinks, electric water coolers and drinking fountains, shall have carriers. Where the carrier is not specified with the fixture, the fixture carrier shall be a 1/8 inch steel plate embedded or anchored in the wall with all-thread rods bolted or welded to the plate and extending through the finished wall for the fixture hanger installation. The minimum size rod shall be 1/4". The fixture carrier shall be installed while the wall is being built.
- C. The plumbing fixtures shall be installed at the mounting heights required by Fairfax County Public Schools standards. Where mounting heights are not stated, the plumbing fixtures shall be roughed-in in accordance with the manufacturer's rough-in information.
- D. The contractor shall make all final connections to the equipment furnished by others.
- E. The contractor shall provide watertight seals at all joints formed where fixtures come in contact with walls or floors.
- F. Remove all existing to remain fixtures in toilet rooms to allow for re-tiling of walls and floors. Remount fixtures at existing heights, except fixtures that get remounted at handicapped heights, after tile work is completed.
- G. All exposed piping components for lavatory faucets shall be chrome plated or stainless steel if such components appear below the apron of the fixture. Faucets with exposed brass pigtails will not be acceptable.
- H. All sinks and lavatories that are indicated to be handicapped accessible shall have offset tailpieces.
- I. At the time of project closeout all battery powered urinal flush valves, battery powered water closet flush valves and battery powered faucets shall have the batteries removed and replaced with new batteries. Owner's representative shall verify battery replacement.
- J. Provide check valves on incoming water supply for all mop basins and laundry trays.

END OF SECTION

SECTION 15500

AUTOMATIC SPRINKLER SYSTEM

PART 1 - GENERAL

1.01 GENERAL

The Bidding and Contract Requirements, Division 1 - General Requirements, Section 15010 - General Provisions, and Section 15050 - Basic Materials and Methods shall apply to this section.

1.02 SCOPE

- A. An automatic sprinkler system shall be designed, installed, tested and approved for the entire building in accordance with Fairfax County School standards, NFPA standards, state codes, local jurisdiction's requirements and contract documents.
- B. In all renovation and addition projects the contractor shall provide temporary protection for all branch mains and bulk mains run through corridors where the ceiling has been removed. The contractor shall provide upright sprinklers (within 12" of the deck above) along the path of all water charged sprinkler branch mains and bulk mains in the corridor. When the ceilings are replaced the upright sprinklers shall be removed and the outlets they were connected to shall be capped. In projects where there is an existing sprinkler system, the existing sprinkler system shall be removed and replaced with a new sprinkler system. While work is being done in existing areas the existing sprinkler system may need to be removed and re-piped to allow for the installation of new equipment. When existing ceilings are removed for renovation, the existing sprinklers shall be removed and re-piped as upright sprinklers to provide sprinkler protection during phased construction.

1.03 QUALITY ASSURANCE

- A. The automatic sprinkler system shall be tested in accordance with NFPA No. 13, FM 1637, UL 2443 and be approved by the local jurisdiction.
- B. The sprinkler contractor shall be licensed by the local jurisdiction to install the sprinkler system as required.
- C. All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.
 - 1. All castings used for coupling housings, fittings, and valve bodies shall be date stamped for quality assurance and traceability.

1.04 SHOP DRAWINGS

This contractor shall prepare eight sets of shop drawings for the Architect to review. The local jurisdiction, the Architect and the Owner shall approve the shop drawings. The shop drawings shall include detailed working drawings at a scale no smaller than 1/8" per foot

and shall also include lighting fixtures, ductwork, ceiling diffusers, grilles, HVAC and plumbing piping and any other possible obstructions. An overall plan showing the sprinkler zones shall be included on the working drawings (See paragraph 2.05). Calculations, sprinkler heads, alarm check valve, flow switches and other equipment shall also be included on the shop drawings. No sprinkler piping shall be installed until shop drawings have been reviewed.

PART 2 - PRODUCTS

2.01 DESIGN

The entire building shall receive a sprinkler system, hydraulically designed and zoned. Zones shall not exceed fifty thousand square feet (50,000 sq. ft.). The sprinkler design shall be a wet-pipe system for the interior of the building. Attic spaces, crawlspaces and areas subject to freezing shall receive dry system. Loading docks, Walk-in freezer and unheated outdoor storage shall have dry heads. The sprinkler contractor shall obtain current hydrant flow test information from the local water authority prior to starting any design work.

2.02 SPRINKLER HEADS

The following sprinkler heads shall be manufactured by VICTAULIC. Sprinkler heads fully equal to the item as manufactured by VIKING, RELIABLE AUTOMATIC SPRINKLER CORPORATION of AMERICA or TYCO shall be acceptable. Sprinklers shall be glass bulb type, with hex-shaped wrench boss integrally cast into the sprinkler body to reduce the risk of damage during installation. Wrenches shall be provided by the sprinkler manufacturer that directly engage the wrench boss. Sprinklers with rubber O-Rings are not acceptable.

- A. Sprinkler heads, where there are ceilings, shall be recessed mounted with a polished chrome finish and escutcheon and shall be quick response type. Heads shall be as manufactured by Victaulic model "V2708". Sprinkler heads in locker rooms and shower rooms shall have a Victaulic VC-250 corrosion resistant coating.
- B. Sprinkler heads, upright or pendent, exposed, shall be factory brass and shall be quick response as manufactured by Victaulic model "V2704 (upright) and V2708 (pendant)".
- C. Sprinkler heads, dry sidewall, shall be glass bulb, quick response with white epoxy coating and escutcheon as manufactured by Victaulic model "V3610". In lieu of rigid connections to dry sprinkler heads, a Victaulic VicFlex™ dry sprinkler, Model VS1, may be used.
- D. Sprinkler heads, sidewall, shall be wall mounted with polished chrome finish and escutcheon and shall be extended coverage quick response as manufactured by Victaulic model "V3416".
- E. Sprinkler heads, dry pendant, shall be extended type glass bulb, quick response with VC-250 corrosion resistant coating and 304 stainless steel escutcheon as

manufactured by Victaulic model "V3606". Provide and install dry sprinkler boot to eliminate the air gap at the wall or ceiling. In lieu of rigid connections to dry sprinkler heads, a Victaulic VicFlex™ dry sprinkler, Model VS1, may be used. In cooler boxes and freezers a Victaulic AB6 dry pendent with VC-250 coating and stainless steel escutcheon may be used. The connection to the branch line shall be made with a flexible hose to accommodate expansion and contraction. No rubber boot/foam is required.

- F. Sprinkler heads in unoccupied spaces may be rough brass.
- G. Sprinkler heads, concealed, shall have factory finished white painted cover plate and shall be quick response as manufactured by Victaulic model "V3904". For ceilings painted black, custom black painted cover plate shall be provided.
- H. Provide sprinkler guards on all heads in the physical education rooms, gymnasiums, gym storage, walk-in coolers, loading docks, all storage rooms, gang toilets, locker rooms, boiler rooms and in mechanical rooms. Guards in occupied spaces shall be chrome plated. See 3.01.R for gang toilet and locker room exception.
- I. Escutcheons and guards shall be listed, supplied, and approved for use with the sprinkler by the sprinkler manufacturer.
- J. Sprinkler heads shall be of the same manufacturer for each type used.
- K. Escutcheon finishes shall match that of the sprinkler head they serve.
- L. Chrome plating is not an acceptable corrosion resistant coating.

2.03 FLOW SWITCHES

The flow switches shall be vane type. The flow switches shall be equipped with two sets of form 'C' contacts. Flow switches as manufactured by Potter Electric or Viking shall be acceptable.

2.04 CHROME FIRE DEPARTMENT CONNECTION (SIAMESE)

- A. Two-way projecting Siamese with cast brass, straight Y pattern, double inlet body, furnished with plugs and chains, and brass escutcheon plate lettered 'AUTO. SPKR.' Finish - polished brass chrome plated and shall be manufactured by Potter Roemer, No. 5750 with automatic ball drip. Provide low point drain for service. Siamese connections fully equal to the item specified, manufactured by ELKHART, GUARDIAN FIRE EQUIPMENT, CROKER CORPORATION or POWHATTAN shall be acceptable. Siamese connections with a rough brass finish are not allowed. Provide a minimum 24" x 24" keyed lockable, access door, key shall be compatible to the owners HL302 key, to service check valve, ball drip and low point drain. Provide one key for each location and store in sprinkler cabinet.
- B. At the low point near each fire department connection, install a 90-degree elbow with drain connection to allow for system drainage to prevent freezing. Basis of

Design: Victaulic #10-DR.

2.05 SPRINKLER ZONE GRAPHIC

- A. Provide two sets of small scale floor plans showing the sprinkler zone diagram graphic. The graphic shall show the outline of the entire school, all rooms and corridors with multiple floors shown separately. The sprinkler zones, as shown on the drawings shall be delineated with each zone shown in a different color. The number of each zone shall be shown in its respective area and the graphic shall be titled "Sprinkler Control Zones". The graphic shall show the Siamese connection, the locations of all control, zone, test and drain valves, all low point drains, bulk drains, fire department connection drain, hose valves and shall identify the zone the valve serves and its function. The graphic shall have minimum dimensions of 11"x17" for elementary, middle, high and secondary schools. Larger drawings shall be provided if the minimum dimensions are too small to convey the required information legibly. The graphic shall be laminated. The graphic shall be professionally produced; hand shading will not be accepted. Provide shop drawings on this graphic with sprinkler shop drawings.
- B. One zone diagram shall be wall mounted next to the sprinkler service entrance and shall be framed and covered by 1/8" clear plastic. The second zone diagram shall be turned over to the owner for sprinkler shop records.

2.06 VALVES

- A. Sprinkler system valves shall be as manufactured by STOCKHAM, MILWAUKEE, NIBCO, MUELLER, UNITED, VICTAULIC, KENNEDY or any manufacturers listed in section 2.02. Butterfly valves as manufactured by Central are not acceptable. The minimum working pressure for system components shall be 250 psi. All valves controlling the flow of water to sprinklers shall be listed indicating valves. The main system control valve shall be an O.S. & Y, equal to VICTAULIC SERIES 771H. type; other control valves may be with grooved ends or wafer type (butterfly), equal to VICTAULIC SERIES 705. Butterfly valves shall include a pressure responsive seat, and the stem shall be offset from the disc centerline to provide complete 360-degree circumferential seating. Auxiliary control valves, (elevator shaft, pit and machine room), shall be slow close ball valves, equal to VICTAULIC SERIES 728 (MILWAUKEE series BB-SCS). All control valves shall be provided with tamper switches. All valve actuators shall be weatherproof. Fire department connection check valves shall incorporate upstream and downstream pressure taps. The inspectors test/drain valve shall be as manufactured by G/J Innovations, Inc. Model Sure-Test, combination test and drain valve with integral sight glass and test orifice. Test and drain valves manufactured by VICTAULIC TestMaster II Style 720, UNITED BRASS, Globe or AGF shall also be acceptable.
- B. Backflow prevention valve shall be a U.L., listed double check valve assembly including ball type test cocks to protect the potable water supply against backflow from the automatic sprinkler system. Shutoff valves shall be U.L./FM listed, OS&Y type with tamper switches. The assembly shall comply with ASSE 1015 or AWWA

C510. The double check valve assembly shall be manufactured by CONBRACO INDUSTRIES, INC., APOLLO VALVES 4SG series. Backflow prevention valves equal to the item specified as manufactured by WATTS, AMES, FEBCO or WILKINS shall be acceptable.

- C. Service device valves shall be UL listed and FM approved, with a grooved end ductile iron body. The valves shall be rated for service of 225-psi (minimum). The valves shall be externally resettable, and all internal components shall be replaceable without removing the valve from the installed position. Basis of Design: VICTAULIC Series 751 (alarm valve), Series 769-NXT (preaction / deluge valve), and Series 768-NXT (dry valve, with required air pressure of 13-psi. Approved equal by VIKING will be acceptable.
- D. Sprinkler Specialty Control Valves: UL listed and FM approved, ductile-iron body with flanged or grooved ends, 175-psig minimum pressure rating. Riser Check Valves - UL 193, designed for horizontal or vertical installation. Basis of Design: Victaulic Series 717R. FCVA - Universal Manifold Check Valve shall be ductile iron construction, incorporating a control valve, check valve, flow switch, test and drain assembly, adjustable relief valve, and system gauges in one compact body/footprint. The test & drain assembly shall contain an adjustable relief valve, with a range of 175 to 310 psi. The UMC valve shall be rated for use at the maximum service pressure of 300 psi and shall be UL listed and FM approved. Universal manifold check valves shall be the Series UMC; a Globe brand manufactured by Victaulic.

2.07 PIPING

- A. All main and branch piping shall be schedule 40 or schedule 10 steel pipe. Schedule 10 piping shall only be allowed for piping larger than two inches. No piping less than schedule 10 shall be acceptable. Grooved end fittings shall be ductile iron, short-pattern, with flow equal to standard pattern fittings. Basis of Design: VICTAULIC FireLock, or approved equal.
- B. Grooved joint couplings shall consist of two ductile iron housing segments to ASTM A536, pressure responsive gasket to ASTM D2000, and zinc electroplated steel bolts and nuts to ASTM A449. Couplings shall comply with ASTM F1476 Standard Specification for the Performance of Gasketed Mechanical Couplings for Use In Piping Applications.
 - 1. Rigid Type: Coupling housings shall be cast with offsetting, angle-pattern bolt pads to provide joint rigidity and support and hanging in accordance with NFPA-13. Couplings shall be fully installed at visual pad-to-pad offset contact. Tongue-and-recess type couplings, or any coupling that requires exact gapping of bolt pads at required torque ratings, shall be installed in strict accordance with the manufacturer's published instructions. If tongue and recess couplings are utilized, a label - initialized by installer, shall be affixed to each coupling showing proper torque was applied to joint.

- a. Basis of Design: Victaulic Style 109, 009N and 107N, Installation-Ready, for direct stab installation without field disassembly, or standard rigid couplings Victaulic Style 005 "FireLock" and Style 07 "Zero-Flex".
 - b. In lieu of threaded steel piping systems, the Victaulic FireLock IGS System with "Installation-Ready™" fittings and couplings may be used for NPS 1 Schedule 10 and Schedule 40 carbon steel pipe in fire protection applications.
2. Flexible Type: For use in locations where vibration attenuation and stress relief are required, and for the elimination of flexible connectors. Basis of Design: Victaulic Installation-Ready Style 177N or Style 77.
- C. Spaces with suspended acoustical ceilings shall receive flexible sprinkler drops manufactured by FLEXHEAD INDUSTRIES or VICTAULIC. Union joints shall be provided for all flexible sprinkler drops. Areas without suspended acoustical ceilings shall be hard piped using return bends. Dry pipe systems shall have galvanized piping.
 - D. FlexHead industries- flexible sprinkler drops, hose assembly shall be stainless steel fully welded non-mechanical fittings, braided, leak tested with minimum one (1) inch true-bore internal corrugated hose diameter. The ceiling brackets shall be galvanized steel attachment type with integrated snap-on clip ends attached to the ceiling using tamper-resistant screws. The flexible hose attachment shall be removable hub type with set screw.
 - E. Victaulic- flexible sprinkler drops, the sprinkler drops shall be stainless steel, braided with union joints factory tested to 400 psi. The drop shall include a UL Listed and FM Approved Series AH2/AH2-CC braided hose with a bend radius to 2" to allow for proper installation. No O-rings will be allowed. The flexible drop shall be attached to the ceiling grid using a one-piece open gate stainless steel bracket. The drop system shall consist of a braided type 304 stainless steel flexible tube, zinc plated steel male threaded nipple or Victaulic FireLock IGS Groove Style 108 coupling for connection to branch line piping, a zinc plated steel reducer with a female thread for connection to the sprinkler head. The sprinkler heads installed in acoustical ceiling and concealed ceiling shall be factory pre-assembled to the flexible sprinkler drops. The drops shall include all required supports and bracing.

PART 3 - EXECUTION

3.01 INSTALLATION

The sprinkler system shall be installed and tested in accordance with NFPA NO. 13 and shall be approved by the local jurisdiction. Two copies of the test results approved by the jurisdiction shall be sent to the Architect.

- A. The sprinkler piping shall be installed concealed above the ceiling and be coordinated not to interfere with the ductwork, air devices, lighting fixtures HVAC

pipng, plumbing piping and other items. All mains shall run below the ductwork and all branches shall be as high as possible. Branch piping that is not installed as high as possible shall be removed and re-installed at the proper height at no additional cost to the owner. Piping shall be arranged to allow for the easy removal of acoustical ceiling tiles, piping shall be a minimum of 6" above ceiling grid.

- B. The sprinkler heads in ceilings shall be installed in the center (both longitudinally and laterally) of the ceiling tile in lobbies, corridors and large rooms such as cafeterias, media centers, libraries, lecture rooms, etc. Sprinkler heads installed in corridor ceilings shall be installed in the center of the corridor. The intent is that when the corridor width allows for a single row of sprinklers, the heads shall align with the centerline of the corridor. Sprinkler heads in tiles in other spaces shall be installed in the center of tiles in at least the lateral dimension (width). Flexible sprinkler drops shall be installed in the top or side of main or branch piping (see drawing detail) inverted attachment is not acceptable.
- C. All sprinkler heads installed within the same room or space, shall be set at a uniform elevation.
- D. Test or drain lines shall discharge to the exterior of the building and shall be kept away from any entrances and off of loading docks and sidewalks.
- E. Maintain a minimum clearance of 6" between sprinkler heads and any other obstruction such as lighting fixtures, clocks, etc.
- F. The fire service main shall be lined piping outside of the building and inside up to the OS & Y valve. If a spool piece is used between the fire line stub and the OS & Y valve then the spool piece shall be galvanized. If the OS & Y valve is rated by the American Water Works Association (AWWA) as suitable for a connection to a potable water system, then no galvanized pipe is required and the OS & Y valve may be attached directly to the fire line stub.
- G. The sprinkler system shall be zoned as shown on the sprinkler zone diagram on the drawings. Each zone shall have an inspector's test and drain valve located off the remote area of the zone.
- H. Provide high temperature sprinkler head(s) in the kitchen heat removal hood, Kiln room, near unit heaters and above gas water heaters. Heads installed within ten feet of gas clothes dryers shall be rated at 200° deg F. Heads located in the kitchen heat removal hood shall be located in the corner of the hood opposite the combi-steamer unit and rated at 360°F. Heads located in kiln hoods shall be rated at 286* deg F. Sprinklers in the heat removal hood and in the kiln room shall be white epoxy coated or stainless steel. Provide intermediate temperature, standard response sprinkler head (200°F), at the bottom of the elevator shaft and in the elevator machine room. Provide intermediate temperature, quick response sprinkler head (200°F), in the walk-in freezer.
- I. All zone valves, control valves, test valves, hose valves and drain valves shall have

laminated plastic labels attached to the valve to identify the zone the valve serves and the function of the valve (i.e. - "Control Valve - Zone 1", "Inspector's Test - Zone 1", "Drain valve – Zone 1", etc.). Laminated plastic shall be one eighth inch thick, red with white center core. Labels shall be a minimum of two inch by six inches with a minimum one quarter inch high block lettering. Peel off labels or permanent markers are not acceptable. Pre-manufactured labels with engraved information are acceptable. Where valves are located above ceilings, labels shall be screwed or riveted to the ceiling grid. In addition to the above, where valves are located in spaces which have doors, label with dimensions of 2" x10" shall be installed above the door on the occupied side of the door. Label shall read "Sprinkler control valve zone ___" etc. Labels attached directly to valves shall be attached by a non-ferrous metal chain.

- J. Piping shall be substantially supported from the building structure; the support shall be attached to the upper chord of the structure. Attachments shall be made either by welding or using top beam clamps. The supporting of piping from the supports of other disciplines is not acceptable.
- K. As phases of construction are completed, the sprinkler system shall be activated for any additions to the building that are turned over to the owner for occupancy. Active sprinkler mains that run through portions of the building without sprinkler protection shall be protected as required by the Fire Marshal or the Authority Having Jurisdiction. Sprinkler valve signs shall be installed in these areas. Sprinkler systems shall remain activated throughout normal school hours and any subsequent connections into active systems shall be made outside of these hours. Once construction for all phases is complete the entire sprinkler system shall be hydrostatically tested.
- L. All dry type sprinklers shall be of the same manufacturer and shall be insulated and sealed around the pipe penetration and shall have a corrosion resistant coating. Walk-in coolers/freezers shall have sprinklers located on opposite side of refrigeration equipment. All dry type sprinklers shall be 12" long unless special conditions require longer lengths.
- M. Sprinkler main and branch piping shall be flushed prior to installing any sprinkler heads. Flushing connections shall be provided on mains and shall be 2 1/2". Flushing connections shall consist of threaded nipples with hose valves and caps. Flushing connections shall remain after the flushing and testing has been completed for use as future drain valves. Two flushing connections shall be provided for each zone and shall be located within 50' of operable windows or exterior doors. Flushing connections shall be located on opposite ends of each zone. The flushing of each zone shall be witnessed and verified by the owner's representative.
- N. Check valves shall not be mounted higher than five feet above the finished floor.
- O. Fire department check valve upstream and downstream pressure taps shall have valves and be provided with capped hose end connections for future maintenance/inspection purposes.

- P. All control and zone valves located in the sprinkler room shall not be mounted higher than five feet above the finished floor.
- Q. All inspectors' test/drain valves shall be located in chases with keyed alike, lockable access doors, minimum size is 10"x10".. Key shall be compatible with owner's HL302 key. Provide one key for each location and store in sprinkler cabinet.
- R. Coordinate the spacing of heads with curtains and folding partitions.
- S. Backflow valves shall be tested by an approved testing agency after installation. In addition to the testing valves supplied with the backflow preventer, two 2 1/2 inch hose valves shall be provided in the bulk main, on the leaving side of the backflow preventer, for testing purposes.
- T. Provide concealed type sprinkler heads in all group toilets, locker rooms and shower rooms, for all middle, high and secondary schools. Provide concealed type sprinkler heads in bulkheads, and spaces where the ceiling height is 7 foot 6 inches or less. Provide concealed type sprinkler heads at folding partitions as to not interfere with the operation of the folding partition.
- U. Piping in exposed areas shall not be painted prior to the Fire Marshal approval of hydrostatic testing.
- V. The use of piping bushings is not acceptable.
- W. The shortest suitable length flexible braided sprinkler drop shall be used, however, avoid excessively sharp bends or stress at the takeoff from the branch line or main.
- X. The sprinkler bulb protector must remain in place until the sprinkler is completely installed and before the system is placed in service. Remove bulb protectors carefully by hand after installation. Do not use any tools to remove bulb protectors.
- Y. Do not install sprinklers that have been dropped, damaged, or show a visible loss of fluid. Never install sprinklers with cracked bulbs.
- Z. Grooved joints shall be installed in accordance with the manufacturer's written recommendations. Grooved ends shall be clean and free from indentations, projections, or roll marks. The gasket shall be molded and produced by the coupling manufacturer of an elastomer suitable for the intended service.
- AA. Provide a listed relief valve per NFPA 13.

3.02 SPARE PARTS

- A. Provide and install cabinet adjacent to sprinkler service with spare heads, escutcheons, and wrenches for each type of sprinkler used including, but not limited to, all dry type and concealed heads, in accordance with the following schedule:

<u>TOTAL NUMBER OF SPRINKLERS</u>	<u>NUMBER OF SPARE SPRINKLERS REQUIRED</u>
1-10	1
11-299	6
OVER 299	12

- B. All dry sprinklers shall be provided by the same manufacturer. Spare sprinklers shall be the same as those used on the project (temperature, color, length, etc.)
- C. Provide a spare sprinkler wrench for each type of sprinkler and provide PVC sleeves with screwed caps to house dry type sprinklers. Hang sleeves on wall adjacent to sprinkler cabinet(s). Provide allen keys for flow/tamper covers.
- D. Provide two spare flexible sprinkler drops for each length used. Provide bracket and hardware for each flexible sprinkler drop.
- E. Provide one set of Backflow Preventer repair kit.
- F. Spare wrench for recessed heads shall be socket type.

3.03 SPECIAL CONDITIONS

- A. The kitchen, all storage, mechanical, science rooms and science prep rooms shall be designed for Ordinary Hazard, Group One.
- B. Sprinkler heads needed for sprinkler system design but not specifically referenced under paragraph 2.02 will be considered on a case by case basis.
- C. Systems utilizing bulk mains, as shown on contract drawings, shall have zone valve assemblies located as shown on these drawings. The zone valve assembly shall consist of a control valve with tamper switch, a check valve and a flow switch.
- D. Inspector test valves for attic dry pipe systems equal to Victaulic Series UMC/UM shall be installed in the space below, with drum drip and keyed, access door.
- E. Pool areas shall use galvanized piping and sprinkler heads with corrosion resistant coatings.

END OF SECTION

SECTION 15702

HOT WATER, CHILLED WATER SUPPLY AND RETURN PIPING SYSTEM AND SPECIALTIES

PART 1 - GENERAL

1.01 GENERAL

The Bidding and Contract Requirements, Division 1 - General Requirements, Section 15010 - General Provisions, and Section 15050 - Basic Materials and Methods shall apply to this section.

1.02 SCOPE

The work covered under this section shall include the following:

- A. Complete chilled water piping systems.
- B. Complete hot water piping systems.
- C. Complete condenser water piping systems.

1.03 QUALITY ASSURANCE

The piping system shall be tested for leaks before the insulation is applied and before the piping system is covered up. The test shall be at least 100 psi of water pressure for a duration of 12 hours.

All grooved couplings, and fittings, valves and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

All castings used for coupling housings, fittings, valve bodies, etc., shall be date stamped for quality assurance and traceability.

1.04 SUBMITTALS

Provide shop drawings on this equipment as described in Section 15010, 1.04. Shop drawings shall include proposed uses of all items.

PART 2 - PRODUCTS

2.01 PIPING AND FITTINGS

- A. Hot water supply and return: Shall be schedule 40 black steel pipe with 125 psi cast iron screwed fittings or 150 psi steel weld fittings.

1. Type "L" copper tubing with copper fittings is acceptable for piping 2" and under.
- B. Chilled water supply and return: Shall be schedule 40 black steel pipe with 125 psi cast iron screwed fittings or 150 psi steel weld fittings.
1. Type "L" copper tubing with copper fittings is acceptable for piping 2" and under.
- C. Cold water make-up - Shall be type 'L' copper tubing with copper fittings.
- D. Grooved mechanical pipe couplings, fittings, valves and other grooved components may be used as an option to welding, threading or flanged methods. All grooved components shall be of one manufacturer and conform to local code approval. Grooved end product manufacturer to be ISO-9001 certified. Grooved couplings shall meet the requirements of ASTM F-1476. Grooved components shall be manufactured by VICTAULIC. Grooved components manufactured by GRINNELL or ANVIL INT. are acceptable providing all aspects of the specification are met. No substitutions.
1. Carbon steel piping shall be roll grooved in accordance with manufacturers current listed standard.
 2. Mechanical couplings for grooved piping shall be cast of ductile iron conforming to ASTM A-395, grade 65-45-15, and ASTM A-536, grade 65-45-12. Couplings shall be rigid style and be of the angle patterned bolt pad type, and shall provide system support and hanging requirements in accordance with ANSI B31.1, ANSI B31.4 and NFPA 13. Coupling bolts and nuts shall be zinc plated (ASTM B-633) heat treated carbon steel track head conforming to physical properties of ASTM A-183. Mechanical couplings shall be coated with an alkyd enamel finish.
 3. Gaskets for grooved pipe and fittings shall be grade "E" EPDM compound conforming to ASTM D-2000 designation 2CA615A25B24F17Z.
 4. Rigid Type: Coupling housings with offsetting, angle-pattern bolt pads shall be used to provide system rigidity and support and hanging in accordance with ANSI B31.1, B31.9, with Victaulic Style 107H/107N (Quick-Vic), Installation ready rigid coupling for direct stab installation without field disassembly. Gasket shall be Grade "EHP" EPDM designed for operating temperatures from -30 deg F to +250 deg F.
 5. Grooved fittings shall be cast of ductile iron conforming to ASTM A-395, grade 65-45-15, and ASTM A-536, grade 65-45-12, wrought steel to ASTM A234, Grade WPB; or factory-fabricated from ASTM A53 steel pipe. Grooved fittings shall be coated with an alkyd enamel finish. Grooved fittings shall be full flow.

- E. Condensate drain piping: Shall be type 'L' copper tubing and fittings.
- F. Runouts to terminal units with copper pipe connections: Type 'L' hard drawn copper tubing shall be used for runouts where required. A brass coupling shall be used between the steel pipe and copper tubing connection.
- G. Hot water supply and return under slab - Each piece of equipment shall have separate runouts and shall be type 'K' continuous copper pipe with no joints allowed below slab. All joints above slab shall be made with copper brazing rods. The entire underground pipe system shall be inside a minimum 6" round schedule 40 plastic pipe sleeve. Pipe shall be insulated; see section 15250.
- H. Condensing water supply and return piping - Shall be schedule 40 black steel pipe with 125 psi cast iron screwed fittings or 150 psi steel weld fittings inside of the building and schedule 80 PVC plastic pipe and fittings for outdoors.
- I. The use of running or close nipples is prohibited.

2.02 VALVES

Valves shall be manufactured by VICTAULIC, STOCKHAM, JENKINS, HAMMOND, JOMAR, MILWAUKEE, FAIRBANKS, CRANE, CONBRACO INDUSTRIES, INC., APOLLO VALVES, LUNKENHEIMER, WALWORTH, NIBCO, JAMESBURY or ROCKWELL unless otherwise noted. STOCKHAM catalog numbers are listed to identify quality and style. Valves shall be rated for the medium served.

- A. Gate valves 2 1/2" and smaller: Shall be cast bronze body, sweat type or screwed ends and solid wedge disc with rising stem, STOCKHAM #B108.
- B. Gate valves larger than 2 1/2" - Shall be iron body flanged ends and solid wedge disc with rising stem (O S & Y type), STOCKHAM #G623.
- C. Globe valves 2 1/2" and smaller: Shall be cast bronze body, sweat type or screwed ends and replaceable composition disc, STOCKHAM #B24T.
- D. Check valves 2 1/2" or smaller: Shall be cast bronze body swing check with either screwed ends or sweat type and with regrinding disc, STOCKHAM #B319 or B309.
- E. Check valves larger than 2 1/2" - Shall be flanged iron body with bronze disc and ring, STOCKHAM #G931.
- F. Non-Slam check valves - Shall be used for all vertical applications and on pump discharge piping and shall be flanged iron body with bronze disc, wafer check, NIBCO #F-910 for 2 1/2" and larger or W-910 for under 2" and smaller.
- G. Butterfly valves - 2" and larger may be used in lieu of gate or globe valves except at boiler supply and return pipe. These valves shall be rated at not less than 150

psi WOG Class and be suitable for use with 180°F water. Shall be lug type for pipe removal on either side of valve, shall have stainless steel shafts and shall have 4" extended stem lengths for all size valves. Stockham #LD611.

- H. Ball valves: 2" and smaller may be used in lieu of gate or globe valves. These valves shall be bronze, rated at not less than 150 psi WOG Class, full port, solid chrome plated ball design and stem, blow out proof stem. Be suitable for use with 180-degree water and provided with extended insulated handles. Stockham #S216. Extended insulated handles shall be APOLLO VALVES "Therma-Seal" or NIBCO "Nib-seal".
- I. Balancing valves: Valves manufactured by FLOWSET, GRISWOLD, GERAND, DANFOSS, FLOW-PAC, NUTECH, BARCO or PRESO with memory stop, positive shutoff, extended insulated handle and P/T type ports for balancing. Flowset model AS size 1/2" to 2" flow .25 GPM to 100 GPM. For all units with runouts 2" and smaller.
- J. Constant volume flow valves – VICTAULIC, GRISWOLD, AUTOFLOW or FLOWSET, automatic pressure-connecting spring and cartridge type valves with quick disconnect pressure taps. For all units with pipe size 2 1/2" and larger with GPM capacity shown.
- K. Valve Operating Chains: Valves installed six feet or more above finished floor in boiler rooms or mechanical rooms shall be chain operated. Provide chain and chain wheel with chain guide of size required, as manufactured by STOCKHAM.
- L. Balance valve for pump: Eccentric, combination shut-off and balancing with memory stop valve as manufactured by DEZURIK or ROCKWELL.
- M. Provide metering device in boiler room or in pump room for measuring pump flow rates, for systems piping a minimum of 20 feet (measured along pipe length) from pump discharge or just before pipe exits room, whichever is greater. Provide extended metering taps on metering devices. Flow metering devices and elements shall be as manufactured by FLOWSET, GERAND, GRISWOLD, PRESO or BARCO.
- N. Valves for flushing piping mains - Provide 1 1/2" full port ball valves on the supply and return mains of each piping system for the purpose of flushing debris and other foreign mater out of piping. Valves shall be rated at not less that 150 PSI WOG, shall be suitable for 180 degree water and provided with extended insulated handle. Provide adapter for valve to accept a fire hose and provide a removable cap. STOCKHAM # S207.

2.03 SPECIALTIES

- A. Pipe Hangers and Supports: See section 15050.

- B. Unions: Shall be provided for the assembly, dismantling or service to any portion of the piping system.
1. Unions 2" and Smaller: Shall be malleable iron ground joint unions with brass to iron seals. Stockham Fig. #694.
 2. Unions 2-1/2" and Larger: Shall be of the companion flange type with ring type gasket painted with graphite before installation. Stockham Fig. #799.
 3. Brass Couplings: Shall be used for connecting steel pipe to copper tubing.
- C. Thermometers: Shall be provided and installed in the supply and return piping of the system. Thermometers mounted at heights other than 5 feet from the floor shall be the adjustable angle type and located so they may be read from the floor.
- The body of the thermometer shall be brass or die-cast aluminum and at least 9" long. The thermometer shall be blue organic fill type with an appropriate scale for the medium being measured. The thermometer shall be mounted in the pipe in a separate well. Manufacturer – TRERICE BX 91406 or equivalent by WEKSLER, TAYLOR, or WEISS.
- D. Pressure Gauges: Shall be installed in the piping system at the pumps. Connect the gauge to the piping system with 1/4" iron pipe. Provide 1/4" rough brass cock between the gauge and piping system.
- The pressure gauge shall be of the liquid filled, bourdon-tube type with at least a 4" diameter dial with an appropriate scale. The gauge shall be the dust, corrosion and moisture resistance type with a cast aluminum case. Manufacturers – ASHCROFT, WEKSLER, TAYLOR, or TRERICE.
- E. Expansion Tank: Shall be ASME labeled and the size listed on the drawings. Provide the tank with the required tappings and a prime coat of paint. The expansion tank shall be BELL & GOSSETT, TACO, JOHN WOOD, WESSELS, or ARMSTRONG.
- F. Tank Fitting: Shall match the tank to maintain the proper amount of air. The tank fitting shall be BELL & GOSSETT or TACO.
- G. Air Separator: Shall be ASME labeled and the same size as connecting pipe. Provide separator with strainer. The air separator shall be BELL & GOSSETT, TACO, THRUSH, AMTROL, JOHN WOOD, or ARMSTRONG.
- H. Pressure Reducing Valve: Shall be set at 12 psi unless otherwise noted on drawings and shall be the size of the cold water make up piping. The pressure-

reducing valve shall be CONBRACO INDUSTRIES INC., APOLLO VALVES, WATTS, BELL & GOSSETT, or TACO.

- I. Flexible Connection: Flexible pipe connection shall be installed on all pipes connecting to equipment where indicated on the drawings. The isolated equipment shall be provided with flexible connections for all piping connections immediately adjacent to the equipment. The hose shall be flexible, braid-reinforced, seamless metal hose within the pressure and temperature range applicable. Hose lengths shall be a minimum of ten inches and as recommended by the manufacturer, whichever is greater. Short style will not be acceptable. Provide control rods for stabilization. Flexible connections shall be as manufactured by TWIN CITY HOSE, METRAFLEX, SSI, KEFLEX, or METRASPHERE.
- J. Air Vents: Provide at high points of systems, on trapped sections of piping with automatic air vents or other locations as required for air removal from the system. Manual air vents shall be used on piping above ceilings in all finished spaces. Each air vent shall be accessible. Provide Hoffman No. 77 manual air vents for unit heaters, fan coil units, unit ventilators, piping mains above ceilings, etc. Provide Hoffman No. 79 automatic air vents for all exposed piping mains, air handling units, etc. Air vents as manufactured by SPIROTHERM shall also be acceptable.
- K. Strainers: Shall be VICTAULIC, CONBRACO INDUSTRIES, INC., APOLLO VALVES, ARMSTRONG, TACO, or SARCO. Iron or brass body 'Y' pattern sediment strainers shall be installed. These strainers shall be provided with stainless steel or non-ferrous straining elements with heads for removal of the elements.
 1. Iron body 'Y' pattern sediment strainers shall be installed with steel pipe.
 2. Brass body 'Y' pattern sediment strainers shall be installed with copper or brass pipe.
 3. Area of strainer openings shall not be less than four (4) times the pipe area. All strainers shall have blow-off valves with hose ends.
 4. Strainer elements shall be No. 10 (ten), mesh screen or perforated stainless steel.
 5. Each strainer body shall be cast with the manufacturer's name, an arrow indicating the direction of flow, strainer size, and pressure classification.
 6. Each strainer shall be of the operating pressure, temperature and service rating of the respective systems.
- L. Check valves (condensate drains): See Section 15420.

- M. Condensate overflow protection. Provide float control safety switches in condensate drain pans (or secondary drain pans), for all equipment with cooling coils. Switches shall be as manufactured by BECKETT or LITTLE GIANT. Equipment located outside of plenum spaces may use safety switches as manufactured by EZ-TRAP (1-877-439-8727), where the switch is integral to a PVC trap.
- N. Low point drains shall be provided for sections of trapped piping. Low point drains shall be a $\frac{3}{4}$ ball valve with a hose end connection and cap.

2.04 WATER PIPING ELECTRICAL HEAT TRACING:

- A. Provide and install for all exterior piping Raychem Corporation, XL-Trace, U/L Listed, braided, self regulating heating cable with inherent temperature control and a 5 foot cold lead inside the building. Electrical characteristics 120/1/60. All piping shall have Model 5XL-CR heat tracing. Nominal watts per foot rating at 40 degree pipe temperature is 5.9 for Model 5XL-CR. Provide Models XLK-PC and XLK-SET components for power connection, tees, end seals kits and splices and GT-66 glass cloth adhesive tape. Heat tracing cable equal to the item specified as manufactured by THERMON shall be acceptable.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The piping systems shall be installed as described in section 15050 - Basic Materials and Methods.
- B. Heat tracing cable shall be installed linearly along the piping, not spiraled. Secure heat tracing to piping using glass cloth adhesive tape. Provide manufacturer's recommended pattern coverage for valves, flanges and pipe supports. Heat tracing shall be installed on all exterior piping to five feet inside the building beyond the pipe sleeve. Heat tracing shall be tested, after installation, per manufacturer's recommendations. Heat traced piping shall have manufacturers warning labels installed stating that the piping is electrically heat traced. This contractor shall install heat trace in such a manner that the termination points are coordinated with the electrical drawings.
- C. Float control safety switches shall be interlocked with the fan to turn off the unit when a high water level is detected.

3.02 PIPING SYSTEM CLEANING

- A. The piping systems shall be cleaned and flushed with chemicals in accordance with the following sequences:

1. Initial Flush - The initial flush shall be performed on the piping mains, with pumps running and before any branch piping or equipment has been connected. This initial flush is to remove debris and other foreign objects out of the piping systems. Flush systems until all matter has been removed from piping. After this flushing, the strainers shall be opened, screens removed and the entire unit cleaned and re-installed.
 2. Pre-Cleaning - After the initial flush, the piping mains shall then be pre-cleaned for a minimum of eight hours with the pumps running and before any branch piping or equipment has been connected with cleaning chemicals provided by the water treatment contractor. After the pre-cleaning, the strainers shall be opened, screens removed and the entire unit cleaned and re-installed.
 3. Cleaning - After equipment and branch piping has been installed, the entire piping systems shall then be cleaned out for a minimum of eight hours with the pumps running, all 3-way valves open to equipment coils and all valves open in the systems to allow complete circulation of cleaning chemicals. The water treatment contractor shall provide the cleaning chemicals required to perform this cleaning. After piping system cleaning, all strainers shall be opened, screens removed and the entire unit cleaned and re-installed.
 4. Flushing - After the piping systems cleaning, the systems shall then be re-filled with water and circulated for a minimum of two hours, followed by draining the entire systems. The hot water system shall be brought up to operating temperature for this procedure. After systems draining, the air control tank strainer shall be removed and cleaned.
 5. pH Balance and Treatment - After the two hour flush but before the water balance, the piping systems shall be flushed until the total alkalinity of the rinse water is equal to that of the make-up water. Once this has been completed, the systems shall be refilled with clean water and shall be treated per Section 15705. The treatment shall be performed by the water treatment contractor.
- B. The piping systems cleaning and flushing shall be witnessed and verified by the owners representative. The contractor shall verify in writing that the cleaning and flushing of the piping systems has been performed and shall have the signature of the owner's representative.
- C. The mechanical contractor shall provide the water treatment contractor the capacities of the systems so that proper dosages of products will be used.
- D. Valves for flushing piping mains shall be located at the low points in the mains. Mains shall be flushed before any branch piping or equipment is connected. Renewal projects, which must have piping mains installed in phases, shall have separate valves installed for each phase.

3.03 GROOVED PIPING

- A. Pipe Ends shall be clean and free from indentations, projections and roll marks in the area from the pipe end to groove for proper gasket sealing.
- B. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service.
- C. The use of bolted branch outlets is not permitted.
- D. Outlets for wells and gauges etc. shall be made using welded "thread-o-lets".
- E. All grooved components shall be of one manufacturer.
- F. Grooved connections shall not be installed in inaccessible concealed locations.
- G. Grooved joints shall be installed in accordance with the manufacturer's latest published installation instructions.

END OF SECTION

SECTION 15705
WATER TREATMENT

PART 1 - GENERAL

1.01 GENERAL

The Bidding and Contract Requirements, Division 1 - General Requirements, Section 15010 - General Provisions, and Section 15050 - Basic Materials and Methods shall apply to this section.

1.02 SCOPE

The work covered under this section shall include the furnishing of all labor, piping, valves, gauges, control panels, water meter wiring, chemicals and all other equipment required for a complete water treatment service as indicated on the drawings or herein specified.

1.03 QUALITY ASSURANCE

The water treatment chemical equipment and service supplier shall be a recognized specialist, active in the field of industrial water treatment for the last ten years, whose major business is in the field of water treatment and shall have regional water analysis laboratories, development facilities and service department, plus full time service personnel located within the trading area of the job site.

1.04 SUBMITTALS

Provide shop drawings on this equipment as described in Section 15010 - 1.04.

PART 2 - PRODUCTS

2.01 WATER TREATMENT SYSTEM

Provide, install and service a water treatment system for the water systems. The water treatment system shall be as manufactured by MOGUL CORPORATION. Other manufacturers fully equal to the specified manufacturer as manufactured by HYDAC, MORR, ARC, or AQUATOMIC are acceptable.

- A. Piping, valves, and accessories shall be furnished and installed as required by the water treatment manufacturer.
- B. Provide all chemicals required at system start-up and throughout the service period. Chemical formulations shall not exceed the allowable EPA or local effluent limits.
- C. The water treatment chemical and service supplier shall furnish basic water test equipment including carrying case and reagents for use with suppliers' products. This shall include apparatus for determination of pH, P and M alkalinity, treatment

residual, and conductivity. Where specialized or supplementary equipment is required, it shall be furnished as part of the contract.

- D. Condenser System Feeding and Control Equipment - Contractor shall install the following apparatus including all external piping and wiring for each condenser water system.
1. One MOGUL AUTO CHEM Model 16712 as manufactured by the MOGUL CORPORATION, for controlling Total Dissolved Solids (TDS), biological growth, inhibitor feed and chemical treatment in the cooling water system. Controller shall be U.L. Listed. Control panel shall be a single, NEMA 1 steel enclosure, primed and fully painted, and shall have the following basic features, fully pre-wired:
 - a. Internal wiring harnessed, color-coded, clearly identified, and brought to master terminal board.
 - b. Grounded AC receptacles for chemical treatment pump and utility use.
 - c. Main power switch and indicating lamps, with legend plate, for power, bleed control, biocide pump, inhibitor pump and system flow.
 - d. Line voltage safety switch - Interlock with door to shut off line voltage to control when adjustment or maintenance is required.
 - e. Manual-Off-Auto selector switches and indicating lamps for bleed off control, chemical feed and acid feed, with legend plates.
 - f. Manual-Off-Auto selector switch for inhibitor feed and a push button to simulate a water meter pulse in the makeup water supply line for test purposes.
 - g. A selector switch for control of chemical feed from metered makeup.
 - h. Conductivity controller accurate to 5% full scale with an analog-indicating meter.
 - i. Front panel fuses.
 - j. Dual biocide feed program modules to automatically alternate between two biocides with a seven-day timer.
 - k. A temperature compensated conductivity electrode and flow switch mounted on the side of the controller enclosure.
 - l. Bleed lock-out timer to prevent bleed function after a biocide feed.

Power and bleedoff status shall be displayed by indicating lights on the front panel. The controller shall be insensitive to phase angle shifts and be capable of operating with input line voltage of 95 to 130 volts AC without affecting accuracy. Conductivity level shall be recorded on an indicating meter. The chemical feed shall be controlled by a reset timer actuated by a make-up water meter with electric contractor. The chemical feed control module shall have a pump status indicating lamp, a Manual-Off-Auto switch and a 20 amp pump relay.

2. The chemical feed pumps shall be mounted in a NEMA 1 steel enclosure, primed and fully painted. They shall be pre-plumbed, pre-wired and include the following:
 - a. Sample stream piping assembly, including a conductivity flotee, sample cock, check valve and three chemical injection tees.
 - b. One Inhibitor feed pump, two biocide feed pumps of the positive displacement type, with ball type check valves, 120/1/60 fractional hp motor drive, discharge pressure relief valve, foot valve, suction tubing and discharge tubing. The feed rate shall be adjustable while the pump is running and the chemicals shall be pumped directly from the shipping container. Pump shall be U.L. Listed and shall be manufactured by PULSA FEEDER, LMI or CHEM-TECH.
 3. One sample stream injection assembly.
 4. One water meter, complete with electric contacting registers sized to meter the peak make-up rates.
 5. One bleedoff solenoid and throttling valve, sized for bleed off requirements of the system.
 6. One 50-gallon inhibitor tank and two 30-gallon biocide tanks. Tanks shall be polyethylene and shall include lids. Pump suction will be through the lid. Fittings in tanks are not allowed.
- E. Hot and Chilled Water Systems - Contractor shall install a One Shot Feeder for each system, minimum four quart capacity, designed to meet pressure requirements of the specific system.

PART 3 - EXECUTION

3.01 INSTALLATION

The water treatment system shall be installed as recommended by the manufacturer.

- A. Pre-Cleaning and Cleaning

1. Provide the chemicals used for the pre-cleaning and cleaning sequences listed in Section 15701. Chemicals shall be capable of removing deposits from construction, such as pipe dope, oils, most loose mill scale, and other extraneous materials. The products used shall inhibit corrosion of the various metals in the piping systems and shall be safe to handle and use. Effectiveness of the product shall be such that the water need only be at ambient temperatures. Add recommended dosages of products for corresponding system capacities.
- B. pH Balance and Treatment
1. Piping systems shall be drained and flushed until the total alkalinity of the rinse water is equal to the makeup water, as described in Section 15701. Refill with clean water, which shall be properly treated to prevent scale and corrosion during operation of the water systems (See paragraph 3.01.C). This contractor shall assist in performing the pH balance of the systems.
- C. Maintain the following conditions in each system:
1. Chilled

a. pH	7.0 to 9.0
b. Buffered Nitrite	500 PPM
 2. Hot

a. pH	7.0 to 9.0
b. Buffered Nitrite	1000 PPM to 180 Deg. F 2000 PPM above 180 Deg. F
 3. Condenser

a. pH	7.0 to 8.0
b. Organic Inhibitor	15 to 25 PPM
c. Cycles	7 Maximum
d. Organic Growths	None

3.02 SYSTEM SERVICE

- A. The water treatment service shall start after the initial cleaning, flushing, start-up and check out of the water systems and shall continue for a period of one year after the substantial completion date of the entire project.
- B. Prior to the substantial completion date and during the one year service period after this date, the water treatment contractor shall visit the site and thoroughly inspect the systems for proper operation, make necessary adjustments, test water and

chemical conditions, and complete a written report on conditions. Service frequency shall be as a minimum as follows:

1. Chiller/cooling tower condensers - every two weeks
 2. Closed loop hot and chilled water - once per month
- C. Prior to the substantial completion date and during the one year service period after this date, the water treatment contractor shall test water samples from cooling tower water for legionella pneumophila. Tests shall be made monthly when the cooling tower operates. The report shall give the result in bacteria per millimeter and include the result from the previous month.
- D. The water treatment contractor shall maintain complete records of the treatment program for each system and submit to the Owner three copies of each report distributed to:
1. System Site
 2. Project Manager, Office of Design and Construction Services, 8115 Gatehouse Road Falls Church VA 22042.
 3. Coordinator, Mechanical Maintenance Division, Maintenance Services, 5025 Sideburn Road, Fairfax Virginia 22032
- E. The initial fill of water treatment chemicals and water treatment service shall be witnessed and verified by the Owners representative. A signed service card must be obtained by the technician after each visit for service.

END OF SECTION

SECTION 16010

ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. It is the intent of this Specification that this Contractor furnish and install all material, labor, equipment, apparatus, tools, transportation, and other incidentals required to provide the following: electrical service(s); power distribution, branch circuit wiring; low voltage wiring; wiring devices; grounding; lighting (both interior and exterior); lighting control systems; fire detection and alarm system; security intrusion system; wireless master clock and program system; sound and intercommunications system and program system; classroom amplification systems; telecommunications system; cable television/broadband distribution system; and multi-media systems as shown on Drawings and as described in these Specifications.

1.02 REQUIREMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.
- B. Provisions of this Section apply to each and every Section of this Division.

1.03 SCOPE

- A. It is the intention of these Specifications and the Contract Drawings to call for finished work, tested and ready for operation.
- B. Any apparatus, appliances, materials, or work not indicated but mentioned in these 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 this Contractor at no additional expense to the Owner.
- C. Minor details not usually shown or specified, but necessary for the proper installation and operation shall be included the same as if herein specified or shown on the Drawings.
- D. With submission of bid, this Contractor shall give written notice to the Architect/Engineer of any materials or apparatus believed: inadequate or unsuitable; in violation of federal, state, and local laws, codes, and ordinances, including Fairfax County's electrical inspection rules or regulations; and any necessary items of the work which have been omitted. In the absence of such written notice, it shall be mutually agreed that the Contractor has included the

cost of all required items in the proposal and that the Contractor shall be responsible for the approved satisfactory functioning of the entire electrical system and low voltage electrical systems at no additional expense to the Owner.

1.04 APPLICABLE SPECIFICATIONS, CODES, STANDARDS, AND PERMITS

- A. Materials, equipment, and installation shall be in accordance with the requirements of the latest adopted editions of the National Electrical Code (NEC), the Virginia Uniform Statewide Building Code, and these Specifications.
- B. Unless otherwise specified herein the work and material shall conform to the applicable requirements of the (latest editions or currently adopted) following codes, standards, and regulations:
 - 1. American National Standards Institute (ANSI).
 - 2. Americans with Disabilities Act Code of Federal Regulation (ADA).
 - 3. Canadian Standards Association (CSA).
 - 4. Electronic Industries Association / Telecommunications Industry Association (EIA/TIA)
 - 5. Fairfax County Fire Marshal's Office.
 - 6. Illuminating Engineering Society (IES).
 - 7. International Building Code (IBC)
 - 8. International Code Council (ICC)
 - 9. National Electrical Code (NEC).
 - 10. National Electrical Contractor's Association (NECA).
 - 11. National Electrical Manufacturer's Association (NEMA).
 - 12. National Fire Protection Association (NFPA).
 - 13. Occupational Safety and Health Association (OSHA).
 - 14. Underwriters Laboratories, Inc. (UL).
 - 15. Virginia Occupational Safety and Health Program (VOSH).
 - 16. Virginia Uniform Statewide Building Code (VUSBC).

- C. All electrical materials and equipment shall be new, listed by UL, and bear the UL label. This applies to all equipment for which UL standards have been established and label service is regularly furnished.
- D. Equipment not UL (or other testing agencies recognized by VUSBC) labeled and equipment assembled in the field using UL components and not UL labeled as an "assembly", for which standards have not been promulgated, shall be accepted upon certification by A.B.M. ELECTRICAL POWER SOLUTIONS (MET ELECTRICAL TESTING), 4390 Parliament Place, Suite Q, Lanham, MD 20706 telephone: 240-487-1900 or ELECTRICAL TESTING CORPORATION, 1701 Edmondson Avenue, #201, Baltimore, Maryland, 21228, telephone 410-526-4700. Cost of such certification shall be included in the base bid and in each quoted cost for alternates and proposed change orders. Electrical equipment that requires certification shall be tested by this Contractor at no additional cost to the Owner.
- E. Workmanship shall conform to the "Standard of Installation" published by the NECA. This Contractor shall provide a minimum of one (1) valid licensed journeyman electrician (Foreman) to be present at all times while work is being performed. License shall be issued by the Commonwealth of Virginia. Such certification shall be provided to the Architect/Engineer upon request.
- F. This Contractor shall: give all necessary notices; obtain all permits (including a low voltage wiring permit); pay all government taxes, fees, and other costs including, but not limited to the Fairfax County Fire Marshals Office shop drawing review fees; file all necessary plans; prepare all documents; and obtain required certificates of inspection for work and deliver same to the Architect/Engineer before any request for acceptance and final payment for the work.
- G. This Contractor shall be responsible for purchasing equipment and appliances that bear the label of an agency as approved by the Fairfax County Department of Public Works and Environmental Services (DPWES). It shall be the responsibility of the Contractor to pay for any label testing of equipment or appliances that are installed without the label of a DPWES approved agency.

1.05 REVIEWS AND SHOP DRAWINGS

- A. The materials, workmanship, design, and arrangement of all work installed under this contract shall be subject to the review of the Architect/Engineer and Owner.
- B. Where any specified materials, process, or method of construction or manufactured article is specified by name, or by reference to the catalog number of a manufacturer, the specifications are to be used as a guide and are not intended to take precedence over the basic duty and performance specified or noted on the Drawings.
- C. In all cases, the Contractor shall verify the duty and available electric

characteristics with the specific characteristics of the equipment offered for review.

- D. All component parts of each item of equipment or device shall bear the manufacturer's name plate giving name of manufacturer, description, size, type, serial or model number, electrical characteristics, etc., in order to facilitate maintenance or replacement. The nameplate of a Contractor will not be acceptable.
- E. If materials or equipment are installed before they have been reviewed by the Architect/Engineer, the Contractor shall be liable for their removal and replacement at no additional expense to the Owner, if in the opinion of the Architect/ Engineer, material or equipment does not meet the intent of the Drawings and Specifications.
- F. This Contractor shall call to the attention of the Architect/Engineer by letter or on shop drawing submittals, any instance in which the shop drawings differ from the requirements of the Drawings and Specifications.
- G. Data and shop drawings shall be coordinated and included in a single submission in a bound format. Multiple submissions are not acceptable except where prior approval has been obtained from the Architect/Engineer. In such cases, a list of data to be submitted later shall be included with the first submission. No delays in construction occasioned by the Contractor's failure to submit material in accordance with the approval schedule will be excused.
- H. Catalogs, pamphlets, or other documents submitted to describe items on which review is being requested shall be specific and identifications in catalog, pamphlets, etc., of items submitted shall be clearly made in a contrasting ink. Data of a general nature shall not be acceptable.
- I. Submitted samples, drawings, specifications, catalogs, and the like shall be properly labeled and shall indicate: specified service for which the material or equipment is to be used; Section and Article number of Specifications governing; contractor's name; and name of the job.
- J. Data and shop drawings shall be identified in accordance with SECTION 01340. In addition, shop drawings shall be identified by the name of the item and system and the applicable Specification paragraph number. This Contractor shall submit the following components/systems described herein and as specified in other Sections of this Specification.
 - 1. Boxes including device, junction, outlet, and pull types.
 - 2. Cable hook (J-hook) support systems.
 - 3. Cable television/broadband distribution system.

4. Classroom Amplification Systems.
 5. Conduit and associated fittings.
 6. Disconnect /safety switches.
 7. Fire detection and alarm system.
 8. Fuses and spare fuse cabinet.
 9. Grounding system, including rods, connectors, and welds.
 10. Lighting fixtures including lamps, ballasts, and poles.
 11. Lighting occupancy sensors.
 12. Multi-media systems.
 13. Panelboards, including distribution and branch circuit.
 14. Security intrusion system.
 15. Sound and intercommunications and program system.
 16. Surface metal raceways and fittings.
 17. Surge protective devices.
 18. Telecommunications system including outlets, equipment racks, and cables.
 19. Wireless master clock system.
 20. Wires, cables, and connectors.
 21. Wiring devices.
- K. No item or system listed in the schedule above shall be delivered to the site or installed until successful completion of the review. After review of the proposed materials has been successfully completed, no substitution shall be permitted except where approved by the Architect/Engineer in writing. Should the Contractor fail to comply with the requirements of this paragraph, the Owner reserves the right to select any and all items and systems required by this Specification. Materials so selected shall be used in the work at no additional

expense to the Owner.

- L. The successful review rendered on shop drawings shall not be considered as a guarantee of building conditions. Where shop drawings have been successfully reviewed, said review does not mean that the drawings have been checked in detail and does not in any way relieve the Contractor from the responsibility, nor the necessity of furnishing the material or performing the work as required by the Drawings and Specifications.
- M. Failure to submit shop drawings that meet the requirements of the Drawings and Specifications in ample time for review shall not entitle the Contractor to an extension of contract time, and no claim for extension by reason of such default shall be allowed.
- N. All equipment and materials to be furnished under this Division of these Specifications shall be as manufactured by the manufacturer(s) listed on the Drawings or herein specified. All requests by any bidder to provide equipment and/or material manufactured by a manufacturer not listed on the Drawings or specified herein, including equipment identified as "OR EQUAL" to a listed manufacturer, must be submitted to the Architect/Engineer not less than ten (10) calendar days prior to the bid date. Any and all replies to said requests will be made in the form of an addendum which shall be made available to all bidders. Any equipment and/or materials installed by this Contractor not manufactured by a specified manufacturer or covered under an addendum shall be removed by this Contractor and the proper equipment or materials installed at no additional expense or delay to the Owner.
- O. This contractor shall furnish to the Owner, after approval of shop drawings, three (3) wiring sample boards. Each sample board shall be made of minimum space $\frac{1}{2}$ " thick plywood and sized as required to accommodate all wiring samples. Each board shall be painted white and shall have samples of fire alarm, all sound reinforcement systems (divided by system), multi-media, security, CATV, door access video entry, and telecommunications wiring. Each wiring sample shall be a minimum of 6 inches long with the manufacturer and model number clearly visible. Each wiring sample shall be properly labeled for its intended purpose using a labeling machine.

1.06 EQUIPMENT DEVIATIONS

- A. Where this Contractor proposes to use, and/or uses, an item of equipment other than that specified or detailed on the Drawings, which requires any redesign of any other part of the electrical, mechanical, or architectural layout, all such redesign and all new drawings and detailing required shall be prepared by this Contractor at no additional expense to the Owner and shall be reviewed by the Architect/Engineer.

- B. Where such approved deviation requires a different quantity and arrangement of duct work, piping, wiring, conduit, and equipment, this Contractor shall furnish and install any such duct work, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system at no additional expense to the Owner.

1.07 QUALIFICATIONS FOR BIDDERS

- A. This Contractor shall examine drawings and Specifications relating to the work of all trades and become fully informed as to the extent and character of work required and its relation to all other work in the project prior to submission of bid or prior to the start of any construction.
- B. Before submitting bid, this Contractor is encouraged to visit the site and examine all adjoining existing buildings, equipment, and space conditions including areas above accessible ceilings on which his work is in any way dependent, for the best workmanship and operation according to the intent of the Specifications and Drawings. This Contractor shall verify dimensions and become fully informed as to the nature and scope of the proposed work and also the conditions under which it is to be conducted. This Contractor shall report to the Architect/Engineer any conditions which, in their estimation, might preclude them from installing the equipment and work in the manner as intended and noted on the Drawings and in this Specification. Failure to take the above precaution shall in no way relieve this Contractor from his obligation to provide the material and work as indicated and as specified at no additional expense to the Owner within the stipulated completion time period.
- C. No consideration or allowance shall be granted for failure to visit the site, or for any alleged misunderstanding of materials to be furnished, or work to be done, it being agreed that tender of proposal carried with it agreement to items and conditions referred to herein or indicated in the Drawings.

1.08 TEMPORARY FACILITIES:

- A. Temporary facilities shall be as specified under SECTION 01510 TEMPORARY UTILITIES. Requirements therein are hereby made a part of this Section as if fully specified herein.
- B. Contractor shall coordinate with the construction phasing of the building in order for this contractor to provide power and systems cabling and devices for the temporary relocation of the existing administrative offices, media center and other essential school operational areas as directed by the Owner.

1.09 DRAWINGS

- A. The Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. Do not scale the drawings. Consult

the Drawings for the exact location of fixtures and equipment. Where same are not definitely located, this Contractor shall obtain this information from the Architect/Engineer.

- B. This Contractor shall follow the Drawings in laying out work and check the Drawings of other trades to verify spaces in which work is to be installed. This Contractor shall maintain maximum headroom and space conditions at all points. Where headroom or space conditions appear inadequate, this Contractor shall notify the Architect/Engineer before proceeding.
- C. This Contractor shall call to the attention of the Architect/Engineer of any conflicting information in the Contract Drawings and/or Specifications, by letter or Request for Information (RFI) process. Contractor shall not proceed in error. Conflicts must be resolved.
- D. If directed by the Architect/Engineer, this Contractor shall, at no additional expense to the Owner, make reasonable modifications in the layout as needed to prevent conflict with other trades for proper execution.
- E. When failure by this Contractor to comply with the work set forth in the above paragraphs results in a conflict, the work shall be modified by this Contractor as directed by the Architect/Engineer at no additional expense to the Owner.

1.10 CONTRACTOR'S WARRANTY

- A. This Contractor shall warrant the workmanship, materials, and equipment against defects and/or non-operation as described in SECTION 01740 WARRANTIES AND BONDS.

1.11 COOPERATION WITH OTHER TRADES

- A. This Contractor shall give full cooperation to other trades and shall furnish in writing to the Architect/Engineer any information necessary to permit the work of all trades to be installed satisfactorily with the least possible interference or delay.
- B. Where the work of this Contractor will be installed in close proximity to work of other trades, or where there is evidence that work shall interfere with the work of other trades, this Contractor shall assist in working out space conditions to make a satisfactory adjustment. This Contractor shall prepare composite working drawings at a scale not less than 1/4 inch equals 1'-0", clearly showing how the work is to be installed in relation to the work of the other trades. If this Contractor installs the work before coordinating with other trades or as to cause any interference with work of other trades, this Contractor shall make necessary changes to the work to correct the condition at no additional expense to the Owner.

- C. This Contractor shall furnish to other trades, all necessary templates, patterns, setting plans, and shop details for the proper installation of the work and for the purpose of coordinating adjacent work.

PART 2 - PRODUCTS

2.01 STANDARD PRODUCTS

- A. Unless otherwise shown on the Drawings or herein specified, each item of equipment furnished by this Contractor shall be essentially the standard product of the manufacturer. Where two (2) or more equipment items of the same kind or class or equipment are required, they shall be the product of a single manufacturer.
- B. For equipment consisting of an assembly of multiple components, such multiple components do not have to be the products of a single manufacturer.

2.02 PERFORMANCE DATA

- A. All performance data specified herein shall be considered actual performance of equipment as installed. If installation details are such that actual operating conditions unfavorably affect performance as compared to conditions under which the equipment was rated, suitable allowance shall be made by this Contractor.

2.03 QUIET OPERATION

- A. All equipment, including the emergency engine generator set, shall operate under all conditions of load without transmission of sound and/or vibration which is found to be objectionable in the opinion of the Architect/Engineer. In case of sound or vibration noticeable outside of the room or space in which it is installed, or annoyingly noticeable inside its' own room or space, it shall be considered objectionable. Sound or vibration eliminators as recommended to eliminate any objectionable sound or vibration shall be furnished and installed by this Contractor if deemed necessary by the Architect/Engineer.

2.04 ELECTRICAL WORK

- A. All electrical motors for plumbing and mechanical equipment shall be furnished and installed under Division 15.
- B. All starters and phase failure relays required for equipment shall be furnished under Division 15, and shall be installed and wired under this Division of these Specifications.

- C. All other electrical devices such as variable frequency drives (VFD), pushbutton stations, selector switches, flow switches, pilot lights, thermostats, etc., for the control or operation of mechanical and plumbing equipment shall be furnished and installed under Division 15. These items shall comply with all Sections of this Division of these Specifications.
- D. In all cases where VFD's or starters are actuated by automatic controls or other devices specified, all necessary components to actuate VFD's or starters shall be furnished and installed under Division 15.
- E. Wiring for automatic temperature control and boiler emergency shut-off shall be furnished and installed under Division 15. All other line voltage control wiring, including interlock wiring for equipment, shall be furnished and installed under this Division unless otherwise noted.
- F. Power supply wiring for all equipment shall be furnished and installed under this Division of these Specifications.
- G. This Contractor shall coordinate with Division 15 for wiring of approved equipment, and shall coordinate specified control functions.
- H. This Contractor shall install all starters furnished under Division 15, and provide all wiring from the power source, through the starter, to the motor. Starters shall not be located above ceilings or other concealed locations. If locations are not shown on the Drawings, this Contractor shall locate starters in utilitarian locations such as electrical rooms, janitor closets, etc., as approved by the Architect/Engineer.
- I. This Contractor shall provide all power wiring for VFD's from the power source, through the VFD, to the motor.
- J. This Contractor shall make final power connections to all items of equipment and electrical heat furnished under Division 15.

2.05 PLATES AND SLEEVES

- A. All electrical system conduit shall have sleeves for passing through slabs except concrete slabs in contact with grade. All conduit 1-1/2 inch and larger shall have sleeves where the conduit passes through masonry, concrete, tile, and gypsum wall construction. Conduit passing through concrete slabs on grade shall not require sleeves.
- B. This Contractor shall furnish and install sleeves in exterior walls below grade for conduits and, the space between the conduit and the sleeve shall be packed with silicon and made completely watertight.

- C. This Contractor shall fasten sleeves securely in floors and walls so that they will not become displaced when concrete is poured or when other construction is built around them. This Contractor shall take precautions to prevent concrete, plaster, or other materials from being forced into the space between the conduit and sleeve during construction.
1. This Contractor shall terminate sleeves flush with walls, partitions, and ceilings.
 2. In areas where conduits are concealed, this Contractor shall terminate sleeves flush with the floor.
 3. In finished areas, where conduits are exposed, this Contractor shall terminate sleeves below the floor and cap. In rooms having floor drains, this Contractor shall extend sleeves 3/4 inch above the floor.
- D. Escutcheon plates shall be furnished and installed by this Contractor for all exposed conduits passing through walls, floors, and ceilings. Plates shall be nickel-plated, of the split ring type, and of a size to match the conduit. Where plates are provided for conduits passing through sleeves that extend above the floor surface, this Contractor shall furnish and install deep recessed plates to conceal the sleeves.
- E. Sleeves shall be constructed of galvanized rigid steel conduit unless otherwise indicated on Drawings.

2.06 FOUNDATIONS FOR EQUIPMENT

- A. The Contractor shall construct reinforced concrete foundations for floor mounted equipment where indicated on the Drawings. Foundations generally shall be built up from structural floor slabs and shall be made of 3000 psi concrete four (4) inches thick unless otherwise indicated or specified. Top edges shall be beveled. All exposed surfaces shall be finished with cement mortar troweled smooth. Reinforcing shall be 6 x 6-10/10 welded wire mesh.
- B. This Contractor shall provide reinforced concrete pole base foundations of either the cast-in-place or precast type for the exterior site lighting poles. The poles bases shall be sized and made of 3000 psi, air entrained, concrete with reinforcing as detailed on the Drawings. The top edges of the bases shall be beveled (chamfered) by using the proper type mold, not by grinding the edge once the concrete has set. All exposed surfaces shall be finished smooth without leaving any of the forms imperfections.
1. Cast-in-place concrete pole base foundations shall require this Contractor to provide all excavation and forms.
- C. Equipment shall be secured to foundations by this Contractor with anchor bolts

embedded in the concrete of ample size and proper arrangements to suit equipment furnished.

PART 3 - EXECUTION

3.01 INSTALLATION OF WORK

- A. This Contractor shall examine the site and all Drawings before proceeding with the layout and installation of this work.
- B. This Contractor shall arrange the work essentially as shown on the Drawings, exact layout shall be made on the job to suit actual conditions. This Contractor shall confer and cooperate with other trades on the job so all work shall be installed in proper relationship. Precise location of parts to coordinate with other work shall be the responsibility of this Contractor.
- C. This Contractor shall arrange for required sleeves and openings. This Contractor shall be liable for cutting or patching made necessary by failure to make proper arrangements in this respect.
- D. This Contractor shall provide a full time Job Foreman who shall oversee and coordinate the work with other trades and make proper layout of the work to suit the job conditions and to satisfy the general requirements of the Contract.

3.02 DELIVERY AND STORAGE

- A. All materials and equipment shall be delivered in the manufacturer's original packages with seals unbroken and with manufacturer's name and contents legibly marked thereon. This Contractor shall store all materials off the ground, under cover, and protected from the weather and construction.

3.03 SCAFFOLDING, RIGGING, AND HOISTING

- A. Unless otherwise specified, this Contractor shall furnish all scaffolding, rigging, hoisting, shoring, and services necessary for the erection and delivery into the premises of any equipment and apparatus furnished and removal of same from premises when no longer required.

3.04 EXCAVATING AND BACKFILLING

- A. Mass excavation to approximate building level shall be carried out under DIVISION 1 of these Specifications. This Contractor shall do all trench and pit excavation and backfilling required for the electrical work inside and outside the building, including: repairing of finished surfaces; all required shoring, bracing, pumping; re-stripping; and all protection of safety of persons and property. The method of backfilling shall conform to the requirements of Fairfax County. In

addition, it shall be the responsibility of this Contractor to check the indicated elevations of utilities entering and leaving the building. If such elevations require excavations lower than the footing levels, the Architect/Engineer shall be notified of such conditions and redesign shall be made before excavations are commenced. It shall also be the responsibility of this Contractor to make the excavations at the minimum required depths in order not to undercut the footings.

- B. Conduits installed below the ground floor level shall have the bottom of the trench excavated to grade so that the conduit shall rest on a solid bed of undisturbed earth. If rock is encountered, the trench shall be excavated to not less than three (3) inches below required grade and filled to required grade with sand so as to provide a solid bed under the entire length of conduit.
- C. Where the trench is excavated below the required depth, the trench shall be filled with sand and fine gravel so that the entire length of conduit rests on solid bed of sand.
- D. Backfilling to one (1) foot above the top of the conduit pipe shall be done by hand, using clean dirt free of rocks or other debris. All backfill shall be properly compacted in accordance with DIVISION 2 of this Specification. Utility tracing tape shall be placed by this Contractor above underground electrical work approximately one (1) foot below finished grade for the entire length of the installation.

3.05 ACCESSIBILITY

- A. This Contractor shall be responsible for the sufficiency of the size of shafts and chases, the adequate thickness of partitions, and the adequate clearance in double partitions and hung ceilings for the proper installation of the work. This Contractor shall cooperate with all other trades whose work is in the same space, and shall advise each trade of their requirements. Such spaces and clearances shall, however, be kept to the minimum size required.
- B. This Contractor shall locate all equipment that must be serviced, operated, or maintained in fully accessible positions. This equipment shall include, but not be limited to, disconnect switches, panelboards, transformers, controllers, switchgear, motor control centers, generators, junction boxes and pullboxes, and the like. If required for better accessibility, this Contractor shall furnish access doors or panels for this purpose. Minor deviations from the Drawings may be made to allow for better accessibility, and all changes shall be approved by the Architect/Engineer.
- C. This Contractor shall furnish and install access panels as required for access to junction boxes, etc. The panels shall be twelve (12) inches square, unless otherwise required to be larger, with hinged metal door and metal frames. Door and frame shall be not lighter than sixteen (16) gauge sheet steel. Access panels

shall be the flush type with screwdriver latching device. The frame shall be constructed so that it can be secured to the building material. Access panels and their locations shall meet with the approval of the Architect/Engineer.

3.06 DEMOLITION

- A. This Contractor shall perform all demolition work as shown on the Drawings and specified herein.
- B. The procedures used for the accomplishment of demolition work shall provide for safe conduct of the work, careful removal and disposition of material specified to be salvaged, protection of property which is to remain undisturbed, coordination with other work in progress, and timely disconnection of utility services.
- C. Work shall be performed in sequence, locations, and time periods as agreed to by the Owner prior to commencement of work.
- D. The amount of dust resulting from demolition shall be controlled to avoid creation of a nuisance in the surrounding area. Masks shall be worn for protection against dust inhalation by all persons in the vicinity of work involving removal of masonry.
- E. Protection of existing work:
 - 1. Existing work and finishes to remain shall be protected from damage. Work damaged by this Contractor shall be repaired to match existing work at no additional expense to the Owner.
 - 2. This Contractor shall cover equipment as necessary to protect it from dust.
 - 3. Floors shall be protected by this Contractor from damage.
 - 4. At the end of each workday and during inclement weather, this Contractor shall close exterior openings with weatherproof covers.
 - 5. At the end of each workday this Contractor shall broom clean the entire project.
- F. This Contractor shall comply with all Federal and local regulations pertaining to environmental protection.
- G. Existing equipment and materials shall be dismantled and/or cut-up so as to be removable through existing access passages. No alterations to the building shall be made for the purpose of removing existing equipment and material.

- H. All equipment removed shall remain in the property of the Owner and shall be stored or disposed of as directed.
- I. Clean-up:
1. This Contractor shall remove debris and rubbish from the site. Do not allow to accumulate in building or on site.
 2. This Contractor shall remove and transport debris in a manner so as to prevent spillage on site or adjacent areas.
 3. Local regulations regarding hauling and disposal shall apply.
- J. Modifications to Existing Electrical Systems:
1. This Contractor shall ensure that all demolition and modifications to existing electrical systems and associated equipment shall be by a qualified electrician.
 2. This Contractor shall remove such existing work as called for on the Drawings and/or as required to clear the areas for new construction. Remove each item of equipment, devices including low voltage devices, luminaires (lighting fixtures), etc. and it's associated circuitry back to the source of power (switchboard, panelboard, controller, control panel, equipment rack, etc.). Associated circuitry includes conduit, conductors, boxes, wiring devices, coverplates, lamps, ballasts, wireways, switches, starters, etc. which are associated with the item being removed.
 3. Except as otherwise noted on the Drawings, all existing electrical work which will not be rendered obsolete and which may be disturbed due to any changes required under this Contract shall be restored to it's original operating condition. Contractor shall make all necessary provisions to maintain **ALL** electrical systems, including communications and other low voltage systems, by extending wiring, conduit, relocating equipment, installing new temporary equipment and/or wiring, etc.
 4. Electrical work or material rendered obsolete shall be abandoned where concealed in walls and floor slabs and removed where exposed, and/or where made exposed by the removal of walls and/or ceilings. Where a concealed conduit is abandoned and the terminated end is exposed above an accessible ceiling the end shall be capped or sealed in an approved manner. Where a concealed abandoned conduit is terminated in a finished space the conduit shall be removed to below the finished surface (minimum three inches for concrete floor slabs) and the void filled with non-shrinking grout and finished to match the surrounding surfaces.
 5. Unused flush device outlet boxes or junction boxes shall be provided with blank coverplates.

6. Where equipment is identified or required to be relocated its associated circuitry shall also be removed, as herein before described, along with its associated devices, etc. Provide all electrical connections to the relocated equipment to new or extended circuitry as indicated on the Drawings and/or required to make the equipment fully functional.
7. Power, communications and other low voltage systems that will be reconnected or extended permanently or temporarily shall be identified and marked above the ceiling during the demolition and phased construction periods.
8. Where existing electrical work interferes with new work, and where such installations are to remain in use, the installation shall be disconnected and/or reconnected to coordinate with the work indicated on the Drawings and as herein specified.
9. Except as otherwise indicated, panelboard cabinets shall not be used for other purposes than circuit protection and distribution points and shall not be used as junction or pullboxes.

3.07 CUTTING AND PATCHING

- A. All cutting and patching of existing construction required for work under this DIVISION of these Specifications shall be performed by this Contractor in accordance with SECTION 01045 CUTTING AND PATCHING.

3.08 PERSONNEL INSTRUCTION AND OPERATING INSTRUCTIONS

- A. This Contractor shall furnish to the Architect/Engineer for delivery to the Owner, four (4) bound and indexed copies of an approved operations and maintenance instruction booklet along with a copy of the submittal data for each item of equipment installed under this Contract. The submittal data shall include all low voltage "special systems" drawings and floor plans, updated to include any deviations to the system(s) and/or the building layout to properly reflect "as built" conditions.
- B. After all tests are conducted and approved as specified below, this Contractor shall furnish a competent operations engineer for a period of two (2) days to instruct and demonstrate to the Owner, or his authorized representative, the operation of each system. This Contractor shall notify the Architect/Engineer in writing of the person to whom this instruction was given and the date given. This Contractor shall provide at least one (1) week's notice to the Owner when conducting tests or demonstrations of equipment.
- C. This Contractor shall furnish to the Owner as part of the Owner's operating and personnel instruction package, one (1) bound set of marked up drawings

indicating any changes made during construction to the original contract drawings. The set shall be clearly labeled, "As Built Plans."

- D. This Contractor shall furnish complete Technical Service Manuals with component schematics and parts lists as indicated in appropriate section for each system.

3.09 EQUIPMENT SUPPLIERS INSPECTION

- A. The following equipment and systems shall not be placed in operation until a competent installation and service representative of the manufacturer has made an on the job inspection of the installation, has certified that the equipment is properly installed and lubricated, that preliminary operating instructions have been given, and that equipment is ready for operation.
 - 1. Cable television/broadband distribution system (CATV).
 - 2. Classroom amplification systems.
 - 3. Fire detection and alarm system.
 - 4. Multi-media systems.
 - 5. Security intrusion system.
 - 6. Sound, intercommunications and program systems.
 - 7. Telecommunications system including networking equipment.
 - 8. Wireless master clock system.

3.10 TESTS

- A. This Contractor shall, at his expense, conduct a capacity and general operating test on each system. The test shall demonstrate the specified capacities of the various pieces of equipment, and shall be conducted in the presence of the Architect/Engineer and the Owner. The general operating tests shall demonstrate that the entire equipment system is functioning in accordance with the Drawings and Specifications. This Contractor shall furnish all instructions, test equipment, and utilities.
- B. After all systems are completely tested, this Contractor shall submit four (4) copies of the test results to the Architect/Engineer for review. Final inspection shall not be made until test results have been reviewed by the Architect/Engineer.

3.11 CLEANING

- A. This Contractor shall thoroughly clean all electrical equipment installed under this DIVISION of these Specifications after the system has been completed or used for temporary service, but in any case prior to final inspection by the Owner's representatives.
- B. Cleaning shall include, but not be limited to, luminaires (lighting fixtures), wiring devices, cover plates, distribution equipment, and the like.

3.12 GUARANTEE

- A. This Contractor shall guarantee by acceptance of the contract that all work installed shall be free from any and all defects in workmanship and/or materials, and that all apparatus shall develop capacities and characteristics specified, and that if during the phased construction and warranty period such defects in workmanship, materials, or performance appear, this Contractor shall with no additional expense to the Owner, remedy such defects within a reasonable time. In default thereof, Owner may have such work done and charge the cost to this Contractor.

3.13 IDENTIFICATION

- A. This Contractor shall furnish an "As-Built" power systems riser diagram indicating service entrance switchboard, panelboards, emergency engine generator set, automatic transfer switch, dimming systems, and safety switches. Diagram shall indicate size of feeders and conduit, breakers, circuit, and fuses. The diagram shall be neatly drawn, using mechanical drafting methods, at least 24 inches x 36 inches, laminated, and hung from the wall adjacent to service entrance switchboard as directed by the Owner.
- B. This Contractor shall refer to the appropriate sections of these Specifications for identification requirements for junction boxes, branch and feeder conductors, underground wiring, low voltage special systems wiring and the like.

3.14 LOCK-OUT/TAG-OUT PROCEDURES

- A. This Contractor shall have an established lock-out/tag-out procedure which meets the requirements of VOSH Standard 29 CFR Part 1910, Subpart J, Subsection 147, entitled "Control of Hazardous Energy Sources". This Contractor shall coordinate with the Owner's representative to insure conformance with the Owner's lock-out/tag-out program requirements.

END OF SECTION

SECTION 16110

CONDUITS, RACEWAYS, FITTINGS AND CABLE TRAYS

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 SCOPE

- A. The work covered under this Section shall consist of furnishing and installing conduits, raceways, cable trays, and fittings for all systems as shown on the Drawings and herein specified.

1.03 QUALITY ASSURANCE

- A. All equipment, materials, and their installation shall conform to the requirements of the National Electrical Code (NEC), local code requirements, and these Specifications
- B. All equipment and materials shall be listed by Underwriters Laboratories, Inc. (UL) for their intended use and shall bear the UL label.
- C. Equipment shall be constructed in accordance with National Electrical Manufacturer's Association (NEMA) standards.
- D. Submittals are required in accordance with SECTION 16010 of these Specifications for conduits, raceways, fittings, wiring troughs, cable hooks, cable trays and associated support systems.
 - 1. Cable tray submittals shall include product data and drawings of cable tray and accessories including clamps, brackets, hanger rods, splice plate connectors, expansion joint assemblies and fittings showing accurately scaled components.
 - 2. Cable tray product data shall include, but not be limited to, types of materials, finishes, rung spacing, inside depths, and fitting radii. For side rails and rungs, submit cross sectional properties including Section Modulus (Sx) and Moment of Inertia (Ix).

PART 2 - PRODUCTS

2.01 CONDUITS

- A. Minimum conduit size shall be 1/2 inch. No more than six (6) No. 12 AWG conductors shall be pulled in 1/2 inch conduit. For conductors larger than No. 12 AWG or quantities of No. 12 greater than six (6) conductors, 3/4 inch conduit shall be the minimum size. Other sizes shall be as indicated on the plans, or as required by the NEC for number and size of conductors installed. Materials shall be new and full length. Crushed and/or deformed conduits shall not be used.
- B. The conduits for the fire alarm system shall be red in color.
- C. Rigid steel and intermediate metal (IMC) conduits shall be full weight threaded and galvanized steel pipe of standard pipe dimensions.
- D. Electrical metallic tubing (EMT) shall be threadless thin wall conduit, galvanized or zinc metallized.
- E. Flexible steel conduit shall be single-strip type, galvanized. Use for short connections where rigid type conduits are impractical, for expansion joint crossing, from outlet box to a recessed luminaire (lighting fixture) (minimum, 4 feet; maximum, 6 feet in length), for final connections to motor terminal boxes or other vibrating equipment. Use only steel connectors approved for flexible conduit. Provide an internal ground wire with proper fittings. Other uses on the project shall not be permitted.
- F. Flexible weatherproof conduit shall have polyvinyl sheathing similar to AMERICAN METAL HOSE "Sealtite" type "UA" and shall be used where exposed to the weather to connect all motors; all rooftop mounted equipment, and all other wet locations, where rigid type conduits connections are impractical. Weatherproof flexible conduit installations shall have maximum lengths of \pm twenty-four (24) inches. Use only steel connectors approved for flexible weatherproof conduit. Provide an internal ground wire with proper fittings. Other uses on the project shall not be permitted, except where indicated hereinafter in these specifications or as shown on the drawings.
- G. Plastic conduits shall be installed only underground or in a concrete slab on grade. Only heavywall (Schedule 40) plastic conduit shall be used. Where conduit turns out of a concrete slab or finished grade, inside or outside the building, provide a rigid steel conduit elbow and suitable adaptor between plastic and steel conduits. No plastic conduit shall be used inside the building or exposed outside the building, unless otherwise noted on the Drawings.
- H. This contractor can use for exterior, underground, pole mounted luminaire branch circuit wiring, schedule 40 high-density polyethylene (HDPE) piping. Where conduit turns out above finished grade, provide a rigid steel conduit elbow and suitable adaptor between plastic and steel conduits. No plastic conduit shall be used exposed outside the building, unless otherwise noted on the Drawings. A

HDPE pipe that meets this specification is DURA-LINE Cat. No. EPEC-40/SCH 40 (black) or approved equal.

2.02 FITTINGS

- A. Fittings, couplings, and accessories shall be compatible with the conduit material.
- B. Unions, couplings, and fittings for rigid and IMC conduits shall be of galvanized steel of conventional dimensions and shall be internally threaded at each end to fit the nontapered thread standard for the corresponding size conduit. Couplings and fittings for electrical metallic tubing shall be of steel and shall be of the compression or setscrew type. Cast pot metal and crimp types are not acceptable.
- C. Conduit bodies used with conduits 1 ½ inches and larger shall be galvanized cast iron “mogul conduit bodies” complete with a domed and angled cover, neoprene gasket, stainless steel screws, and rated for “wet locations”.

2.03 BUSHINGS AND LOCKNUTS

- A. Use OZ/GEDNEY type 'B' insulated or type 'BLG' bushing where necessary to bond conduit to ground connection. Bushings shall be as manufactured by OZ/GEDNEY, THOMAS & BETTS, or CROUSE-HINDS.
- B. Locknuts shall be used on both sides of conduit connections to a box or a panelboard in addition to the bushing. Where a larger size opening occurs than the size of the conduit, use reducing locknuts. Do not use reducing washers.

2.04 WIRING TROUGHS

- A. Wiring troughs complete with screwed covers shall be used where indicated and for mounting groups of switches and/or starters. Wiring troughs shall be the standard manufactured product of a company regularly producing wiring troughs and shall not be a local shop assembled unit. Wiring trough shall be UL listed and of sizes indicated or as required by NEC, if not indicated. The interior, including couplings shall be completely open without interference. Finish shall be ASA #49 medium light gray enamel over a rust inhibitor. Wiring troughs shall be UL listed "Suitable For Wet Locations" and so labeled where indicated "WP" on the Drawings.
- B. Wiring connection taps within wiring troughs shall be made using clear self-sealing, self-insulating, multi-tap connectors with transparent flexible insulating covers. The connectors shall be securely fastened. The multi-tap connector shall be manufactured by ILSCO, Series “PCT” ClearTap or approved equal.

2.05 CABLE TRAY

- A. Ladder type cable tray shall be used where indicated on the Drawings, for low voltage cabling systems. Low voltage cabling systems shall be as hereinafter specified in other sections of these specifications. Ladder type cable trays may also be used for Type MC Cable as hereinafter specified in other sections of these specifications.
- B. Cable tray systems shall be made of straight sections, fittings, and accessories as shown on the Drawings, described herein, and as defined in the latest NEMA standards publication VE-1. Cable tray shall be UL classified as an equipment-grounding conductor.
- C. Ladder type cable tray shall be metal (aluminum or pre-galvanized steel) of the types, classes and sizes indicated; with splice plates bolts, nuts and washers for connecting units. Construct units with rounded edges and smooth surfaces; in compliance with applicable standards and these specifications.
- D. Cable tray materials and finish shall be as follows:
1. Aluminum: Straight section and fitting side rails and rungs shall be extruded from Aluminum Association Alloy 6063. All fabricated parts shall be made from Aluminum Association Alloy 5052.
 2. Pre-Galvanized Steel: Straight sections, fitting side rails, and rungs shall be made from structural quality steel meeting the minimum mechanical properties and mill galvanized in accordance with ASTM A653 SS, Grade 33, Coating Designation G90.
- E. Ladder type cable tray shall consist of two (2) longitudinal members (side rails) with transverse members (rungs) welded to the side rails. Rungs shall be spaced six (6) inches on center. Rung spacing in radiused fittings shall be nine (9) inches and measured at the center of the tray's width. Rungs shall have a minimum cable bearing surface of 7/8 inches with radiused edges. No portion of the rungs shall protrude below the bottom plane of the side rails. Each rung must be capable of supporting the cable load, with a safety factor of 1.5, and a 200 lb. concentrated load when tested with NEMA VE 1, section 5.4.
- F. Ladder type cable tray shall have an overall side rail height of four (4) inches with a minimum loading depth of three (3) inches. Cable tray width shall be twelve (12) inches, eighteen (18) inches, or twenty-four (24) inches as shown on the Drawings. Straight section side rails shall be of "I-beam" design with a rung retaining weld bead. All straight sections shall be supplied in standard lengths of twelve (12) feet, except where shorter lengths are permitted to facilitate tray assembly lengths as shown on the Drawings. Fittings radius shall be twenty-four (24) inches. Side rails of straight sections and fittings shall be compatible so that standard splice plates can be used to join straight sections and fittings. Fittings shall have three (3) inch tangents beyond the curved section to accommodate the standard splice plates.

- G. Splice plates shall be the bolted type made as indicated below for each tray type. The resistance to fixed splice connections between an adjacent section of tray shall not exceed .00033 ohm. Splice plate construction shall be such that a splice may be located anywhere within the support span without diminishing rated loading capacity of the cable tray.
1. Aluminum Tray: Splice plates shall be made of 6063-T6 aluminum, using four square neck bolts and serrated flange locknuts. Hardware shall be zinc plated in accordance with ASTM B633, SC1.
 2. Pre-Galvanized Steel Tray: Splice plates shall be manufactured of high strength steel, meeting the minimum mechanical properties of ASTM A1011 HSLAS, Grade 50, Class 1. Each splice plate shall be attached with ribbed neck carriage bolts and serrated flange locknuts. Hardware shall be zinc plated in accordance with ASTM B633 SC1.

Splice plates shall be furnished with straight sections and fittings.

H. Cable Tray Supports

1. Supports shall be constructed from 12 gauge steel formed shape channel members 1 5/8 inch by 1 5/8 inch with necessary hardware such as trapeze support kits furnished by manufacturer of cable tray (or engineer approved equal). Cable trays installed adjacent to walls shall be supported on wall-mounted brackets furnished by manufacturer of cable tray (or engineer approved equal).
 2. Trapeze hanger supports shall be supported by ½ inch (minimum) diameter rods.
 3. Cable tray fitting supports shall be located such that they meet the strength requirements of straight sections. Install fitting supports per NEMA VE-2 guidelines, and in accordance with manufacturer's instructions.
- I. Accessories shall be furnished as required to protect, support, and install a cable tray system. Accessories shall consist of but not be limited to: section splice plates, expansion plates, blind-end plates, specially designed ladder dropouts, etc.
- J. Cable tray shall be capable of carrying a uniformly distributed load of 126 lbs./ft. for aluminum on a 12 ft. support span or 103 lbs./ft for pre-galvanized steel on a 12 ft. support span (NEMA Class 12C) with a safety factor of 1.5 when supported as a simple span and tested per NEMA VE 1, section 5.2. In addition to the uniformly distributed load, the cable tray shall support 200 lbs. concentrated load at mid-point of span. Load and safety factors specified are applicable to both the side rails and rung capacities. Cable tray shall be made to manufacturing

tolerances as specified by NEMA.

- K. Cable tray manufacturers shall be B-LINE SYSTEMS, INC. Series 24A for aluminum and 248 for pre-galvanized steel or equal as manufactured by CABLOFIL, CHALFANT CABLE TRAY, COPE CABLE TRAY, SQUARE D, or THOMAS & BETTS CORPORATION.

2.06 CABLE HOOK SUPPORT SYSTEMS

- A. Cable hooks (also known as "J" hooks) shall be provided for low voltage cable systems as hereinafter specified in other sections of these specifications.
- B. Cable hooks shall provide a flat bottom bearing surface of sufficient width to comply with required bend radii of high-performance cables.
- C. Cable hooks shall have flare edges to prevent damage while installing cables.
- D. Cable hooks shall be designed so the mounting hardware is recessed to prevent cable damage.
- E. Cable hooks sized 1 5/16 inches and larger shall have a stainless steel cable latch retainer to provide containment of cables within the hook. The retainer shall be removable and reusable and be suitable for use in air handling spaces.
- F. Cable hooks shall be factory assembled for direct attachment to walls, hanger rods, beam flanges, purlins, strut, floor posts, etc. to meet job conditions.
- G. Multi-tiered cable hook assemblies shall be used where required to provide separate cabling compartments, or where additional capacity is needed. Assemblies may be factory assembled or assembled from pre-packaged kits. Assemblies shall consist of a steel angled hanger bracket holding up to six (6) cable hooks.
- H. Cable hooks for non-corrosive areas shall be pre-galvanized steel, ASTM A653. Where additional strength is required, cable hooks shall be spring steel with a zinc-plated finish, ASTM B633, SC3. Cable hooks for corrosive areas shall be stainless steel, AISI Type 304.
- I. Cable hooks shall be capable of supporting a minimum of 30 pounds with a safety factor of 3. Spring steel cable hooks shall be capable of supporting a minimum of 100 pounds with a safety factor of 3 where extra strength is required.
- J. Cable hook manufacturer shall be B-LINE SYSTEMS, INC. Series BCH21, BCH32, BCH64, or equal as manufactured by ERICO CADDY.

2.07 PULL-LINES (CORDAGE)

- A. Pull-lines (rope and cordage) types and strengths must be selected and calculated by the Contractor. The selection must be based on the intended use and expected pulling load applications. Design Factor (DF) selections and Working Load Limits (WLL) must be calculated with consideration of exposures to risk and actual conditions of use for each application. Pull-lines shall be in compliance with the latest Cordage Institute Standards and Guidelines.
- B. The minimum pull-line tensile strength for insertion into conduits shall be 500 pounds and of the low-friction type.
- C. Each utility service entrance conduit (raceway) for power company, telephone company and/or cable television (CATV) company shall have a MULETAPE® pulling tape with numerical values having sequential footage (feet and inches) markings, without splices. The MULETAPE® shall have a minimum tensile strength of 2500 pounds and shall be of the low-friction type with prelubrication, high abrasion resistant yarns.
- D. Where minimum pull-line strengths are given, they do not negate the Contractor's responsibility for proper selections and calculations for higher strength pull-lines to suit the application.

2.08 ROOFTOP CONDUIT SUPPORT STRUT SYSTEM

- A. Provide rooftop conduit support strut systems that will absorb thermal expansion and contraction of conduits, thus preventing damage to the roof membrane. This Contractor must select the support strut system's load capacity necessary to carry the weights and sizes of conduits.
- B. The conduit support base shall have gently rounded edges to prevent damage to the roof and shall be UV resistant polycarbonate resin or 100% recycled rubber and polyurethane prepolymer, and all other metal parts made of hot-dip galvanized or stainless steel.
- C. Conduits shall rest on the strut system made of hot-dip galvanized or stainless steel. Provide fasteners sized for the conduit.
- D. Rooftop conduit support system manufacturers shall be MIRO INDUSTRIES, INC. or equal as manufactured by CABLOFIL (CABLO-PORT), COOPER B-LINE (DURA-BLOK™) or approved equal.

PART 3 - EXECUTION

3.01 CONDUITS

- A. Panelboard feeders shall be run in electrical metallic tubing (EMT), galvanized rigid steel conduit, intermediate grade metal conduit, or plastic conduit as described herein.

- B. Branch circuit raceways for motors twenty (20) horsepower (or tons) and larger, or a combination of motors totaling twenty (20) horsepower and larger requiring a single point connection shall be EMT, galvanized rigid steel conduit, intermediate grade metal conduit, or plastic conduit as described herein.
- C. Branch circuit raceways for motors served by variable frequency drives (VFD) shall be electrical metallic tubing (EMT), galvanized rigid steel conduit, or intermediate grade metal conduit from the load side of the VFD to the line side of the motor. Do not use plastic conduit.
- D. Feeders, branch circuits, fire alarm system wiring, and other low voltage systems wiring (required to be in conduit) installed indoors in dry locations shall be run in electrical metallic tubing (EMT), galvanized rigid steel conduit, or intermediate grade metal conduit above hung ceilings (accessible and non-accessible), in hollow block walls, in furred spaces, in vertical and horizontal pipe chases, and in exposed dry locations as describe herein and other sections of these specifications.
- E. Feeders, branch circuits, fire alarm system wiring, and other low voltage systems wiring installed underground, under slab on grade, in concrete, in crawl spaces, or in wet locations shall be run in galvanized rigid steel conduit, intermediate grade metal conduit, or plastic conduit as described herein.
- F. Low voltage systems plenum rated wiring or cables run indoors in dry locations shall be in electrical metallic tubing (EMT), galvanized rigid steel conduit, or intermediate grade metal conduit when run above non-accessible ceilings, in hollow block walls, and in exposed dry locations other than communications rooms or in a cable tray. Refer to the respective low voltage systems sections of the specifications for other conduit requirements.
- G. Conduits run exposed in boiler rooms, elevator machine rooms, mechanical rooms, pump rooms, fire sprinkler service room, and all other similar spaces, located between the floor and a height of 10'-0" above the finished floor, shall be galvanized rigid steel conduit, or intermediate grade metal conduit as described herein. Conduits above 10'-0" may be EMT, unless otherwise indicated on the Drawings, or required by codes.

3.02 RACEWAY SYSTEM

- A. Raceways shall be continuous from outlet to outlet; from outlet to cabinets, junction boxes, or pullboxes; and secured to all boxes so that each system is electrically continuous from service to outlets. Provide termination of raceways with double lock nuts and bushings.
- B. Raceways shall be securely and rigidly supported to the building structure in a neat and workmanlike manner, and wherever possible, parallel runs or horizontal conduit shall be grouped together on adjustable trapeze hangers. Raceways

shall be supported independently from other disciplines (i.e. mechanical, sprinkler, etc). Support shall be provided at appropriate intervals not exceeding ten (10) feet with straps, hangers, and brackets specifically designed for the application. Channels shall be 1 inch for 24-inch wide trapeze and 1-1/2 inch for larger than 24 inch. Perforated steel straphangers or tie-wire supports are not acceptable. Conduits installed along wall surfaces shall be supported with galvanized steel brackets specifically designed for conduits and sized for the conduit used. Conduit brackets shall be fastened to the wall using appropriate anchors and screws, the use of drive pins and/or other methods using compressed air or gases are not acceptable. Raceways and supports shall not terminate or be fastened directly to the roof decking. Raceways under roof decking shall not be less than 1½ inches from the nearest surface of the roof decking. Supports attached to structural steel joists shall only be attached within 3" of the top of the joist panel points. Supports attached at the bottom or beyond 3" of the joist panel points must be approved, in writing, by the Structural Engineer of record and the Owner before attaching.

- C. Run exposed raceways parallel with or at right angles to walls. In mechanical rooms and similar utilitarian spaces where exposed conduits are used, provide "condulets", and similar fittings in lieu of junction boxes. Exposed outlet boxes of adequate size, however, shall be used to contain wire junctions.
- D. No raceway shall be installed within three (3) inches of hot water pipes, or appliances, except at crossings where raceway shall be at least one (1) inch from pipe cover.
- E. Install raceway to prevent collection of trapped condensation and be devoid of traps. Slope underground raceways away from the building or provide weep holes when sloping away from the building is not possible.
- F. Do not terminate in, or fasten raceways to, motor foundations.
- G. Raceways installed outside underground shall have a minimum of twenty-four (24) inches top cover. Separate electric raceways from telephone (and other low voltage systems) raceways with a minimum of twelve (12) inches of well-tamped earth, or six (6) inches of concrete.
- H. Joints in raceways in concrete or underground shall be watertight. Steel conduits shall have ends cut square. Ream smooth and paint male threads with graphite-base pipe compound and draw up tight with conduit couplings. Do not paint female threads; where required, use Erickson, or equal, conduit fittings. Running threads shall not be permitted. Place caps in ends of conduits as soon as located to prevent entry of foreign material. Screwed on caps shall be used for threaded conduits. Unused (abandoned) conduits shall be capped. The use of tape, paper or rag wads in not acceptable for conduit caps.
- I. After conduit installation, clean and paint marred surfaces affecting galvanizing with asphaltum, galvanized-iron primer.

- J. Run conduit above suspended ceilings for outlets in suspended ceilings. Keep clear of planned ductwork where turning down from slab into suspended ceiling.
- K. Horizontal or cross runs in solid partitions and walls shall not be permitted.
- L. Conduits designated on the Drawings as empty conduits (EC) shall have a properly sized pull-line.
- M. Flexible metal conduit used for connection of luminaires (lighting fixtures), receptacles outlets, telepower poles, and as otherwise shown on the Drawings, shall be supported and bonded in accordance with NEC Article 348.
- N. Conduit runs in under concrete slabs shall be installed only where shown on the Drawings or approved by the owner and shall be limited to 3/4-inch conduit. Conduit shall be run in the gravel under the slab not in the slab.
- O. Where embedded conduits cross building expansion joints, the Contractor shall furnish and install an offset expansion joint or a sliding expansion joint. Sliding expansion joints shall be provided with bonding strap and clamp. Where conduits are exposed, provide expansion fittings or flexible conduit as required.
- P. In all wet and damp locations, boiler rooms, elevator machine rooms, kitchens, mechanical rooms, pump rooms, fire sprinkler service room, and all other similar spaces, all final electrical connections to any and all equipment, regardless of the type, shall consist of conductors run in polyvinyl sheathed flexible metal conduit ("Sealtite") with maximum lengths as hereinbefore specified.
- Q. Conduits/raceways shall not be permitted to be run exposed on top of finished floors or grade, unless specifically shown on the drawings or approved by the Owner in advance.
- R. Raceways or sleeves known to be subjected to different temperatures and where condensation is known to be a problem, as in cold storage areas of (or in) the building or where passing from the interior to the exterior of the building, the raceway or sleeve shall be filled with an approved material to prevent the circulation of warm air to a cold section of the raceway or sleeve, per NEC 300.7.

3.03 CABLE TRAY

- A. Installation shall be in accordance with equipment manufacturer's instructions and with recognized industry practices (NEMA VE 2), to ensure that cable tray equipment complies with requirements of the NEC and applicable portions of NFPA 70B.
- B. Cable tray shall be supported from the building structure. Supports attached to structural steel joists shall only be attached within 3" of the joist panel points, top or bottom. Supports attached beyond 3" of the joist panel points must be

approved, in writing, by the Structural Engineer of record and the Owner before attaching.

- C. Coordinate cable tray with other electrical work and other trades' work as necessary to properly integrate installation of cable tray work with other work.
- D. Provide sufficient space encompassing cable trays to permit access for installing and maintaining cables.
- E. Test cable trays to ensure electrical continuity of bonding and grounding connections and to demonstrate compliance with specified minimum grounding resistance. Refer to NFPA 70B, Chapter 18, for testing requirements and test methods.

3.04 CABLE HOOK SUPPORT SYSTEM

- A. Installation and configurations shall conform to the requirements of the current revision levels of ANSI/EIA/TIA Standards 568 & 569, NEC, the manufacturer's installation instructions and other sections of these project specifications.
- B. Cable hook assemblies shall be supported from the building structure. Where fastened to walls use appropriate anchors and screws, the use of drive pins and/or other methods using compressed air or gases are not acceptable. Supports shall not terminate or be fastened directly to the roof decking. Cables installed under roof decking shall not be less than 1½ inches from the nearest surface of the roof. Cable hook supports attached to structural steel joists shall only be attached within 3" of the top of the joist panel points. Supports attached at the bottom or beyond 3" of the joist panel points must be approved, in writing, by the Structural Engineer of record and the Owner before attaching.
- C. Install cables using techniques, practices, and methods that are consistent with Category 5 cables or higher requirements and that support Category 5 or higher performance of completed and linked signal paths, end to end.
- D. Install cables without damaging conductors, shield, or jacket.
- E. Do not bend cables, in handling or in installing, to smaller radii than minimums recommended by cable manufacturers.
- F. Do not exceed load ratings and allowable fill capacity specified by the cable hook manufacturer.
- G. Install cable hooks to maintain a minimum three (3) inch clear or higher vertical space above the accessible ceiling tiles for the horizontal cabling and pathway.

3.05 CUTTING AND HOLES

- A. Locate holes in advance where they are proposed in structural sections such as

ribs or beams. Prior to drilling through any structural section or member, obtain the written approval of the Architect/Structural Engineer of Record and the Owner.

- B. Cut holes through concrete and masonry structures with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted in advance by the Architect/Engineer and Owner, do to limited working space.
- C. Openings in floor slabs or fire-rated walls or partitions for raceways and other electrical equipment shall, after installation of the raceway, be fire stopped using a product similar to THOMAS & BETTS "Flame-Safe" fire retardant.

3.06 ROOFTOP CONDUIT SUPPORT STRUT SYSTEM

- A. Rooftop conduit support struts shall be installed in accordance with manufacturer's instructions and recommendations.
- B. Determine that the structure, roof insulation, and roof membrane are structurally adequate to support weight of conduits (with conductors), supports and hangers.
- C. Install supports at maximum spacing of 10 feet, unless closer spacing is required due to weight of conduits or as shown on the Drawings. Do not exceed manufacturer's recommended load limits.
- D. Support pads: Remove rock or gravel from area to be covered by pad, apply on clean area, and center bases on top of support pads.
- E. Set conduit in support without dropping or causing undue impact. Install properly sized clamps to suit conduit sizes.
- F. Always consult roofing manufacturer for roof membrane compression capacities. If necessary, a compatible sheet of roofing material (rubber pad) may be installed under rooftop support to disperse concentrated loads and add further membrane protection.
- G. Contractor shall adjust conductor sizes in raceways in accordance with the National Electrical Code section 310.15(B)(2)(c) based on an average ambient temperature of 84°F.

END OF SECTION

SECTION 16115
SURFACE METAL RACEWAYS

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 SCOPE

- A. The work covered under this Section shall include furnishing and installing surface mounted metal raceways complete for all electrical systems as shown on the Drawings and herein specified. Surface raceway systems shall consist of raceway bases, covers, appropriate fittings, dividers, and device mounting plates necessary for a complete installation.

1.03 QUALITY ASSURANCE

- A. All equipment, materials, and their installation shall conform to the requirements of the National Electrical Code (NEC), local code requirements, and these Specifications.
- B. All equipment and materials shall be listed by Underwriters Laboratories, Inc. (UL) for their intended use and shall bear the UL label.
- C. Equipment shall be constructed in accordance with National Electrical Manufacturer's Association (NEMA) standards.
- D. Submittals are required in accordance with SECTION 16010 of these Specifications.

1.04 USES PERMITTED

- A. Surface mounted metal raceway shall be used primarily where new wiring is required on existing walls and on new walls as noted on the Drawings.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver raceway systems in factory labeled packages.
- B. Store and handle in strict compliance with manufacturer's written instructions and recommendations.

- C. Protect from damage due to weather, excessive temperature, and construction operations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Surface metal raceways shall be as manufactured by THE WIREMOLD COMPANY or equal product as manufactured by HUBBELL INCORPORATED, as described herein as the basis of design.
- B. All components and fittings shall be of the same manufacturer, or UL listed as an assembly.

2.02 MATERIALS AND COMPONENTS

- A. All surface metal raceways shall be galvanized steel, unless otherwise indicated. Finish shall be ivory in color (unless otherwise indicated) having a scratch-resistant surface (a polyester topcoat over ivory base) and shall be suitable for field repainting to match surroundings.
- B. A full complement of fittings must be available including but not limited to mounting clips and straps, couplings, flat, internal and external elbows, cover clips, tees, entrance fittings, wire clips, support clips, c-hangers, end caps, conduit connectors, bushings, and take-off fittings to adapt to flush wall boxes. The covers shall be painted with an enamel finish, ivory in color to match the raceway. They shall overlap the raceway to hide uneven cuts. All fittings shall be supplied with a base where applicable to eliminate mitering. Transition fittings shall be available to adapt to other raceways manufactured by The Wiremold Company. This Contractor shall provide all fittings, etc. for a complete installation.
- C. Device Boxes shall be suitable for the type of raceways provided and for mounting standard devices and faceplates. Devices boxes shall be provided in single- and multiple-gang configurations, up to six-gang. Single-gang boxes shall allow for snap-on and fastener applications. They shall range in depth from 0.94" to 2.75". Extension boxes shall be provided to adapt to existing standard flush switch and receptacle boxes.
- D. The raceway manufacturer shall provide a complete line of connectivity outlets and modular inserts for UTP/STP, Fiber Optic, Coaxial and other cabling types with face plates and bezels to facilitate mounting. A complete line of preprinted station and port identification labels, snap-in icon buttons as well as write-on station identification labels shall be available. Provide as needed for a complete installation.
- E. Raceways used for communications cabling shall have a complete line of full

capacity corner elbows and tee fittings, and used where required or shown on the Drawings, to maintain a controlled 2" cable bend radius which meets the specifications for Fiber Optic and UTP/STP cabling and exceeds the TIA 569 requirements for communications pathways.

2.03 SURFACE METAL RACEWAYS

- A. **WIREMOLD Series V500 or V700** raceway shall be one-piece design with a base and cover factory assembled. The total width shall be 3/4" x 17/32" high with a capacity of 1.19 square inches for V500 or 3/4" x 21/32" with a capacity of 0.26 square inches for V700. The raceway base and cover shall be a minimum thickness of 0.040". The raceway shall be available in five (5) foot and ten (10) foot lengths.
- B. **WIREMOLD Series V2400** raceway shall be a single-channel two-piece design with a metal base and snap-on metal cover. The assembled base and cover shall be 1 7/8" wide x 7/8" high with a capacity of 1.39 square inches. The raceway base and cover shall be a minimum thickness of 0.040". The raceway base shall be available in ten (10) foot lengths and the cover shall be available in five (5) foot lengths.
- C. **WIREMOLD Series V3000** raceway shall be a single-channel two-piece design with a metal base and snap-on metal cover. The assembled base and cover shall be 2 3/4" wide x 1 17/32" high with a capacity of 3.70 square inches. The raceway base and cover shall be a minimum thickness of 0.040". The raceway base shall be available in ten (10) foot lengths and the cover shall be available in five (5) foot lengths.
1. Device brackets shall be provided for mounting standard single or two-gang devices within the raceway.
- D. **WIREMOLD Series V4000** raceway shall be a single-or dual-channel two-piece design with a metal base and snap-on metal cover. Base shall be dividable by means of a removable barrier section into two equal compartments. The assembled base and cover shall be 4 3/4" wide x 1 3/4" high with a capacity of 7.20 square inches for undivided raceway and a capacity of 3.10 square inches for each compartment of the divided raceway. The raceway base shall be a minimum thickness of 0.050 inches and the cover with a minimum thickness of 0.040". The raceway base shall be available in ten (10) foot lengths and the cover shall be available in five (5) foot lengths.
1. Plastic device mounting bracket and trim plates shall be provided to install devices horizontally within the raceway. Trim plate shall overlap the cover-eliminating seam. Faceplates shall accept a variety of power and data/communication devices. Plastic must be compatible with UL 94 for Plastic Materials. Device brackets and trim plates shall be colored to match the raceway.

- E. **WIREMOLD Series S4000** raceway shall be a dual-channel two-piece design with a Type 302 stainless steel base and snap-on cover having a Number 4 brushed finish. Base shall be dividable by means of a removable barrier section into two equal compartments. The assembled base and cover shall be 4 ¾" wide x 1 ¾" high with a capacity of 7.20 square inches for each compartment of the divided raceway. The raceway base shall be a minimum thickness of 0.050 inches and the cover with a minimum thickness of 0.040". The raceway base shall be available in ten (10) foot lengths and the cover shall be available in five (5) foot lengths.
1. Plastic device mounting bracket and trim plates shall be provided to install devices horizontally within the raceway. Trim plate shall overlap the cover-eliminating seam. Faceplates shall accept a variety of power and data/communication devices. Plastic must be compatible with UL 94 for Plastic Materials. Device brackets and trim plates shall be colored to match the raceway.
- F. **WIREMOLD Series V6000** raceway shall be a single-or dual-channel two-piece design with a metal base and snap-on metal cover. Base shall be dividable by means of a removable barrier section into two equal compartments. The assembled base and cover shall be 4 ¾" wide x 3 9/16" high with a capacity of 16.00 square inches for undivided raceway and a capacity of 7.20 square inches for each compartment of the divided raceway. The raceway base shall be a minimum thickness of 0.050 inches and the cover with a minimum thickness of 0.040". The raceway base shall be available in ten (10) foot lengths and the cover shall be available in five (5) foot lengths.
1. Plastic device mounting bracket and trim plates shall be provided to install devices horizontally within the raceway. Trim plate shall overlap the cover-eliminating seam. Faceplates shall be available to accept a variety of power and data/communication devices. Plastic must be compatible with UL 94 for Plastic Materials. Device brackets and trim plates shall be colored to match the raceway.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine conditions under which surface raceways, boxes, distribution systems, accessories, and fittings are to be installed and substrate that will support raceways. Notify the Architect/Engineer and Owner of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Surface raceways shall be installed in strict compliance with the manufacturer's installation instructions and recommendations and approved shop drawings. Coordinate installation with adjacent work to ensure proper clearances and to prevent electrical hazards.
- B. Surface raceways shall be installed parallel with or at right angles to building structure and at the mounting heights noted on Drawings.
- C. Surface raceway systems shall be mechanically continuous and connected to all electrical outlets, boxes, device mounting brackets, and cabinets, in accordance with manufacturer's installation sheets.
- D. Metal raceways shall be electrically continuous and bonded in accordance with the National Electrical Code for proper grounding.
- E. Surface raceway shall be supported at intervals not exceeding five (5) feet or in accordance with manufacturer's installation sheets using appropriate anchors and screws. The use of drive pins and/or other methods using compressed air or gases are not acceptable.
 - 1. V500 and V700 shall be supported using two (2) hole straps specifically designed for the application secured with plastic anchors and No. 6 screws.
- F. Provide accessories as required for a complete installation, including insulated bushings and inserts where required by the manufacturer.
- G. Close all unused raceway openings using manufacturer's recommended accessories.
- H. All surface raceway connections to outlet and/or junction boxes shall be made using adjustable offset connectors or combination connectors as detailed on the Drawings. The connectors shall be furnished by the manufacturer of the surface raceway.
- I. Field cutting of surface raceways base and covers shall be accomplished by the use of the manufacturer's raceway cutters specifically designed for this purpose.

3.03 CLEANING AND PROTECTION

- A. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer.
- B. Protect raceways and boxes until final acceptance by the Owner.
- C. Repaint marred and scratched surfaces with touch-up paint to match original

finish.

END OF SECTION

SECTION 16120

WIRE, CABLE, AND CONNECTORS

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 SCOPE

- A. The work covered under this Section shall include furnishing and installing wire, metal-clad cable, two hour fire rated conduit cable, and connectors for all power wiring systems as shown on the Drawings and herein specified.
- B. Wiring for data, communication, electronic, fire alarm, or other low voltage and special systems shall be provided as specified in the appropriate specialty Section of these Specifications.

1.03 QUALITY ASSURANCE

- A. All equipment, materials, and their installation shall conform to the requirements of the National Electrical Code (NEC), local code requirements, and these Specifications.
- B. All equipment and materials shall be listed by Underwriters Laboratories, Inc. (UL) for their intended use and shall bear the UL label.
- C. Equipment shall be constructed in accordance with National Electrical Manufacturer's Association (NEMA) standards.
- D. Submittals are required in accordance with SECTION 16010 of these Specifications.
 - 1. Submittals shall include a preliminary schedule to perform the infrared scans described in Part 3 of this specification. The schedule shall be based on the contractual substantial completion date for this project.

PART 2 - PRODUCTS

2.01 MATERIALS AND COMPONENTS

- A. All conductors shall be new soft drawn high conductivity copper and shall be delivered to the site in their original unbroken packages plainly marked as follows:

1. UL Label.
 2. Size, type and insulation rating of the wire marked every four (4) feet along the length.
 3. Name of the manufacturing company and the trade name of the wire.
- B. All conductors shall have 600 volt insulation, unless specified otherwise. The minimum operating temperature of the conductor's insulation shall be 75° C.
 - C. Where conductors are installed in a raceway, in dry and damp locations, conductor insulation shall be rated 75° C. Type THWN or dual rated THWN/THHN.
 - D. Where conductors are installed in a raceway, exposed to excessive temperatures, conductor insulation shall be rated 90° C. Type THHN, THWN/THHN (dual rated), XHHW or XHHW-2.
 - E. Where conductors are installed in a raceway, in wet locations, conductor insulation shall be rated 75° C. Type XHHW (wet locations), or XHHW-2 rated 90° C. (dry and wet locations) as appropriate.
 - F. Conductors on the secondary side of variable frequency drives (VFD) shall be Type XHHW or XHHW-2 as appropriate.
 - G. The minimum conductor size shall be No. 12 AWG, except for control wiring (minimum size shall be No. 14 AWG), and as stated in other Sections of these Specifications, or as shown on the Drawings. Conductors for 120/277 volt control signals shall not be considered as control wiring.
 - H. Branch circuits for emergency lighting, including illuminated exit signs, shall be a minimum of No. 10 AWG.
 - I. Conductors smaller than No. 8 shall be solid; No. 8 and larger shall be stranded.
 - J. All conductors throughout the project shall be color coded to identify phases, neutral, and ground. Color-coding shall be as follows:

<u>CONDUCTORS</u>	<u>SYSTEM VOLTAGE</u>	
	<u>120/208</u>	<u>277/480</u>
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Gray

Ground

Green

Green

- K. Insulated conductors size No. 6 A.W.G. and smaller shall have the insulation color-code identification factory applied for the entire length of the conductor. On larger sizes, provide color-coded phasing tape at each box and connection. White or gray colored insulation shall only be used for grounded (neutral) conductors. For multiple neutrals run in the same conduit, provide separate neutral conductors with a continuous, factory applied tracer stripe matching the color of the respective phase conductor. Green colored insulation shall only be used for equipment grounding conductors.
- L. Where conductor size is not indicated, its current carrying capacity shall be equal to or greater than the rating of its overcurrent protective device.
- M. Where conductor sizes are increased for voltage drop or other reasons the equipment grounding conductor (when provided) shall be increased in size proportionately.
- N. Where conductor sizes are increased for voltage drop they may be reduced in size within ten feet of the termination in order to fit under the lugs available on the overcurrent protective device but not less than the ampacity of the frame size of the overcurrent protective device.

2.02 METAL-CLAD CABLE

- A. The Contractor shall furnish and install where shown on the Drawings or specified herein, metal-clad cable, type "MC", of the size and number of conductors noted on the Drawings. The metal-clad cable shall be a factory assembly of one or more conductors, including a green insulated ground wire enclosed in a galvanized steel interlocked metallic sheath. Metal-clad cable with an aluminum sheath will not be acceptable.
- B. Conductors shall be copper with a minimum size of No. 18 A.W.G., solid (through No. 10 A.W.G.) or stranded (No. 8 and larger), Type THHN/THWN (90° C.), and 600 volt. Color-coding of conductors shall be as hereinbefore described.
- C. Fittings for metal-clad cable shall be all steel, approved for use with metal-clad cable. Cast pot metal types are not acceptable.
- D. Metal-clad cable shall be UL listed and marked in accordance with NEC Article 310.120. Manufacturer's standard color-coding on the exterior sheath may be used. Metal-clad cable shall be as manufactured by AFC CABLE SYSTEMS or CM & ELKINS (CME) WIRE AND CABLE or SOUTHWIRE COMPANY.

PART 3 - EXECUTION

3.01 IDENTIFICATION OF CONDUCTORS

- A. All branch circuits, including grounded (neutral) conductors, shall be tagged in the panelboards, in all gutters, and in all junction boxes where circuits terminate for the purpose of identifying the various circuits.
- B. Feeders and mains shall be tagged in the distribution switchboards, panelboards, and within junction and pull boxes.
- C. The method of tagging shall be with an adhesive type of marker. Tagging shall clearly distinguish between 120/208 volt and 277/480 volt conductors.
- D. Tags shall be applied after wire is installed in conduit.
- E. Where it is impractical to use printed markers on certain wires or cables, use blank type with identification marked thereon in indelible pencil.

3.02 INSTALLATION

- A. Conduit/raceway system shall be complete prior to pulling in wires.
- B. Any run of conduit/raceway which does not permit conductors to be pulled in readily shall be condemned and replaced to the satisfaction of the Architect/Engineer and Owner.
- C. Conductors shall be continuous between outlets or junction boxes and no splices shall be made except in outlet boxes, junction boxes, and handholes.
- D. Do not combine systems of various voltages or circuits from separate sources in the same raceway or conduit system, regardless of the voltage rating of the conductors, unless otherwise shown on the Drawings.
- E. All joints, splices and taps for conductor sizes No. 10 and smaller (including luminaire pigtails) shall be connected with approved type crimp connectors, or spring type screw-on connectors (wire-nuts) with insulating skirts; No. 8 and larger shall be connected with solderless THOMAS & BETTS high pressure connectors with heat shrink insulation that possess equivalent or better mechanical strength and insulation ratings than that of the unspliced conductor. Refer to Specification Section 16110 for splices and taps within wiring troughs. The use of pressure connectors is not acceptable.
- F. Oil, grease or silicon, which could damage the insulation of the conductors or cables, shall not be used when pulling conductors. Use only UL approved cable lubricants approved for the purpose.

- G. Train conductors neatly in panelboards, cabinets, and other electrical equipment. Installed conductors shall allow for a minimum of one (1) future re-termination.
- H. Tighten pressure type lugs on switchboards, panelboards, motors and other equipment to the manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and 486B.
- I. Conductors in vertical conduit runs shall be supported with split-wedge type fittings that clamp each conductor and tighten under the weight of the conductors at intervals required by the NEC.
- J. All wiring within the building structure, crawlspaces, and slabs shall be installed in conduit unless indicated or specified otherwise.
- K. Homeruns longer than seventy five (75) feet from a 120/208 volt panelboard or one hundred seventy five (175) feet from a 277/480 volt panelboard shall be not less than No. 10 AWG, copper.
- L. No more than three (3) current carrying phase conductors shall be installed in any one conduit, unless explicitly shown on the drawings.
- M. Connect circuits and feeders as shown on the Drawings. Drawings are diagrammatic and do not show every detail required in the wiring system.
- N. Install wiring so conductors are not in tension in completed systems.
- O. All conductors making up parallel feeders shall be the same size, same type, same insulation and all cut the same length. Bond each group of conductors making up a phase or neutral at both ends in an approved manner. Parallel conductors shall not be run in the same raceway.
- P. Provide a separate neutral and grounding conductor (or conduit ground) for all GFI circuits or GFI devices to ensure an adequate ground-fault path.
- Q. Branch circuits requiring a neutral conductor shall have one neutral conductor per phase conductor when installed in a common raceway, unless specifically shown otherwise on the Drawings.
- R. Conductors or cables installed in conduit or tubing exposed to direct sunlight on rooftops require temperature adjustment factors in accordance with the values in NEC 2008 Table 310.15(B)(2)(c).

3.03 METAL-CLAD CABLE

- A. Metal-clad cable may be used in dry locations for connections in casework, for "fished" applications in existing partitions or walls, above accessible ceilings in

classrooms, offices and similar locations and within newly installed drywall partitions. Metal-clad cable may also be used as a “whip” connection from an outlet box (secured to the building structure) to a recessed luminaire (lighting fixture) (minimum, 4 feet; maximum, 6 feet in length) above accessible ceilings in lieu of flexible metal conduit as stated in Section 16110.

- B. Metal-clad cable may not be used for feeders, homeruns or within corridors, except for recessed luminaire (lighting fixture) connections as described above. Metal-clad cable shall not be used in areas without a ceiling, in areas without an accessible ceiling or from corridors into adjacent rooms.
- C. Metal-clad cable shall be installed and supported in accordance with NEC Article 330.30 and these specifications. Supports shall be zinc-coated or equivalent corrosion protection. Individual hangers, straps or similar fittings shall be used and installed at intervals so as not to damage the cable. Where fastened to walls use appropriate anchors and screws, the use of drive pins and/or other methods using compressed air or gases are not acceptable. Supports shall not terminate or be fastened directly to the roof decking. MC Cable under roof decking shall not be less than 1½ inches from the nearest surface of the roof decking. Supports attached to structural steel joists shall only be attached within 3” of the top of the joist panel points. Supports attached at the bottom or beyond 3” of the top of the joist panel points must be approved, in writing, by the Structural Engineer of record and the Owner before attaching. Staples are not permitted to be used for supports.
- D. Bending radius for the metal-clad cable shall be in accordance with NEC Article 330.24.
- E. Fittings used for connecting the metal-clad cable to boxes, cabinets, or other equipment shall be all steel UL listed and identified for such use.
- F. Metal-clad cable shall be installed parallel or perpendicular to walls. No diagonal runs shall be permitted.
- G. Metal-clad cable shall not be installed within three (3) inches of hot water pipes, or appliances, except at crossings where metal-clad cable shall be a least one (1) inch from pipe cover.
- H. Metal-clad cable shall not interfere with accessible ceiling tiles. Access to electrical or other equipment shall not be denied by runs of MC cable that prevents removal of panels, including suspended ceiling panels.
- I. Flattened, dented, deformed, or open armor is not permitted. If damaged during installation, damaged cables shall be replaced with new undamaged material.
- J. Horizontal or cross runs in solid masonry partitions or walls shall not be permitted.

- K. All horizontal penetrations through new or existing walls shall be sleeved. No other type of wiring systems shall occupy the same penetration sleeve with the MC cable. Sleeve penetrations through fire-rated walls, after installation of MC cables, shall be fire stopped using a product similar to THOMAS & BETTS "Flame-Safe" fire retardant.

3.04 FIELD QUALITY CONTROL

- A. After installing conductors and cables and before electrical circuitry has been energized, perform the following visual and mechanical inspections:
 - 1. Verify cables and conductors comply with the contract documents.
 - 2. Verify cables and conductors are braced for short circuit stresses where specified.
 - 3. Verify cables and conductors are correctly identified at each termination, splice and tap where applicable.
 - 4. Verify correct phase rotation is maintained throughout project.
 - 5. Verify color coding and identification complies with specifications and the National Electrical Code.
 - 6. Inspect all exposed sections of cables and conductors for physical damage and correct connection.
 - 7. Inspect all bolted and compression connections.
- B. Verify phase identification is A, B, C, left to right, front to back and top to bottom. If corrections are required change feeder and branch circuit identification at each end of circuit so that correct phase identification is maintained throughout the project. If incorrect identification is noted on existing systems notify the Architect/Engineer and Owner for action to be taken.
- C. Infrared Scanning: After Substantial Completion, but not more than sixty (60) days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger and a complete infrared scan of each panel board, switchboard, and lug terminations of each chiller and motor terminations 20 HP and larger. Remove box and equipment covers so splices and lugs are accessible to portable scanner.
 - 1. Perform a follow-up infrared scan for all splices and terminations previously described approximately eleven (11) months after date of Substantial Completion, but must be during normal school (business)

- operating hours.
2. Contractor shall submit to the Architect/Engineer and Owner, at time of final inspection, a schedule to perform the infrared scans during normal school (business) operating hours while the building is in full operation, under load. Re-terminations requiring any power shut-downs must be coordinated with the Owner and performed during non-school (business) hours.
 3. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 4. Record of Infrared Scanning: Prepare a certified report that identifies equipment and splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken and observations after remedial action.
- D. Remove and replace malfunctioning units then verify, inspect and retest as specified above.

END OF SECTION

SECTION 16130

WIRING DEVICES

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 SCOPE

- A. The work covered under this Section shall include furnishing and installing wiring devices, for all electrical systems as shown on the Drawings and herein specified.

1.03 QUALITY ASSURANCE

- A. All equipment, materials, and their installation shall conform to the requirements of the National Electrical Code (NEC), local code requirements and these Specifications.
- B. All equipment and materials shall be listed by Underwriters Laboratories, Inc. (UL) for their intended use and shall bear the UL Label.
- C. All 125 volt and 250 volt, 15 amp and 20 amp receptacles (NEMA 5-15R, 5-20R, 6-15R, 6-20R, L5-15R, and L5-20R) shall be FSUL WC-596-G compliant and bear the FSUL label.
- D. All non-locking 125 volt and 250 volt, 15 amp and 20 amp receptacles (NEMA 5-15R, 5-20R, 6-15R and 6-20R) located in damp or wet locations shall be UL Listed as "weather resistant".
- E. All lighting switches shall be FSUL WS-896 compliant and bear the FSUL label.
- F. Equipment shall be constructed in accordance with National Electrical Manufacturer's Association (NEMA) standards.
- G. Submittals are required in accordance with SECTION 16010 of these Specifications.
 - 1. Certain wiring devices and other equipment listed hereinafter may not be part of this project. This Contractor shall select from the listed devices the equipment necessary to be compliant with the Contract Documents and include in the submittals only the devices and equipment specific for this project.

PART 2 - PRODUCTS

2.01 LIGHTING SWITCHES

- A. Lighting switches shall be manufactured by PASS & SEYMOUR (P&S) as listed below or the equivalent as manufactured by COOPER (ARROW HART), HUBBELL, or LEVITON.
- B. Lighting switches shall be totally enclosed, 20 amp, 120-277 volt with screw-type wire terminals to accept No. 14 through No. 10 AWG solid copper conductors, ivory thermoplastic toggle, and grounding terminal, or Plug Tail Type. All locking type switches shall be keyed alike. Lighting switches shall be as follows:
- | | | |
|-----|---|------------------------|
| 1. | Single pole | P&S Cat. No. PS20AC1I |
| 2. | Single Pole (PlugTail Type) | PT20AC1I |
| 3. | Single pole, locking type | P&S Cat. No. PS20AC1IL |
| 4. | Single pole, double throw-
Two circuit, center off | P&S Cat. No. 1221I |
| 5. | Three –way | P&S Cat. No. PS20AC3I |
| 6. | Three-way (PlugTail Type) | PT20AC3I |
| 7. | Three-way, locking type | P&S Cat. No. PS20AC3IL |
| 8. | Four-way | P&S Cat. No. PS20AC4I |
| 9. | Four-way, locking type | P&S Cat. No. PS20AC4IL |
| 10. | Momentary contact | P&S Cat. No. 1251I |
| 11. | Momentary contact,
locking type | P&S Cat. No. 1251L |
- C. All PlugTail lighting switches shall come complete minimum six (6) inch solid THHN Connector. Stranded connectors shall not be acceptable.
- D. Pilot lighting switches shall be totally enclosed, 20 amp, 120 volt and 277 volt with screw type wire terminals to accept No. 14 through No. 10 AWG solid copper conductors, red “lighted when ON” lighted toggle, and grounding terminal. Pilot lighted switches shall be as follows:
- | | | |
|----|--------------------|-------------------------|
| 1. | Single pole (120V) | P&S Cat. No. PS20AC1RPL |
|----|--------------------|-------------------------|

2. Single pole (277V) P&S Cat. No. PS20AC1RPL7
 3. Three-way (120V) P&S Cat. No. PS20AC3RPL
 4. Three-way (277V) P&S Cat. No. PS20AC3RPL7
- E. Digital lighting control switches required under Specification SECTION 16500 shall be part of the lighting control system.
- F. Wall switch occupancy sensors are specified under Specification SECTION 16506.

2.02 MOTOR SWITCHES

- A. Motor switches shall be totally enclosed, 30 amp, 600 volt with screw-type wire terminals to accept solid copper conductors and a grounding terminal. Motor switches shall be as follows:
1. Single phase, Double pole P&S Cat. No. 7802MD
 2. Three phase, Three pole P&S Cat. No. 7803MD
- B. Motor switches shall include a red pilot light with the switch or on a separate mounting strap in a two gang outlet box and suitable coverplate. Pilot light shall glow red when switch is ON. Pilot lights shall be suitable for the voltage supplied to the motor switch. Pilot light on a separate mounting strap shall be P&S Cat. No. 2151RED or approved equal.
- C. Mechanical door limit switches shall be Mars Corporation Part No. 99-014 – 250 volt, 1 phase, 20 amp, 1 HP max or approved equal.

2.03 WALL DIMMER SWITCHES

- A. Wall dimmer switches shall be with ivory faceplate 0 to 10 Volt, of the voltage indicated LUTRON “Nova” Type or PASS & SEYMOUR Cat. No. CD4FBL3PI.
- B. Wall dimmer switches for Tubular Daylighting Device shall be 0 to 10 Volt, of the voltage indicated; LUTRON “Diva” Cat. No. DVSTV-453PH-WH or equal by PASS & SEYMOUR.

2.04 RECEPTACLES

- A. Receptacles shall be manufactured by PASS & SEYMOUR (P&S) as listed below or the equivalent as manufactured by COOPER (ARROW HART), HUBBELL, or LEVITON.
- B. All straight blade 15A and 20A receptacles in elementary schools only, shall be

tamper-resistant type, except clock outlet receptacles.

- C. Receptacles shall be of the types listed below, complete with an impact resistant nylon face, screw type wire terminals to accept copper conductors, high strength thermoplastic back body, and grounding terminal, or Plug Tail Type.
1. Duplex 2P, 3W, 20A, 125V, NEMA 5-20R:
P&S Cat. No. 5362-AI
 2. Duplex (PlugTail Type), 2P, 3W, 20A, 125V, NEMA 5-20R:
P&S Cat. No. PT5362-AI
 3. Controlled Receptacle, Duplex 2P, 3W, 20A, 125V, NEMA 5-20R:
P&S Cat. No. 5362-AGRY
 4. Controlled Receptacle (PlugTail Type), Duplex 2P, 3W, 20A, 125V,
NEMA 5-20R: P&S Cat. No. PT5362-AGRY
 5. Duplex 2P, 3W, 20A, 125V, NEMA 5-20R
Tamper-Resistant (safety) type with two
USB Charging Ports:
P&S Cat. No. TR5362USBI
 6. Duplex 2P, 3W, 20A, 125V, NEMA 5-20R
Weather-Resistant:
P&S Cat. No. WR5362I
 7. Duplex 2P, 3W, 20A, 125V, NEMA 5-20R
Ground Fault Circuit Interrupter type with Safe Lock:
P&S Cat. No. 2097I
 8. Duplex (Plugtail Type) 2P, 3W, 20A, 125V, NEMA 5-20R
Ground Fault Circuit Interrupter type with Safe Lock:
P&S Cat. No. PT2095I
 9. Duplex 2P, 3W, 20A, 125V, NEMA 5-20R
Connected to an emergency circuit:
P&S Cat. No. 5362-ARED
 10. Duplex (Plugtail Type) 2P, 3W, 20A, 125V, NEMA 5-20R
Connected to an emergency circuit:
P&S Cat. No. PT5362-ARED
 11. Duplex 2P, 3W, 20A, 125V, NEMA 5-20R
Tamper-Resistant (safety) type:
P&S Cat. No. TR63I

12. Duplex (PlugTail Type), 2P, 3W, 20A, 125V, NEMA 5-20R
Tamper-Resistant (safety) type:
P&S Cat. No. PTTR63I
13. Controlled Receptacle, Duplex 2P, 3W, 20A, 125V, NEMA 5-20R
Tamper-Resistant (safety) type:
P&S Cat. No. TR63GRY
14. Controlled Receptacle Duplex (PlugTail Type), 2P, 3W, 20A, 125V,
NEMA 5-20R, Tamper-Resistant (safety) type:
P&S Cat. No. PTTR63I
15. Duplex 2P, 3W, 20A, 125V, NEMA 5-20R
Tamper-Resistant (safety), Ground Fault Circuit Interrupter type with
Safe Lock:
P&S Cat. No. 2097TRI
16. Duplex 2P, 3W, 20A, 125V, NEMA 5-20R
Tamper-Resistant (safety), Ground Fault Circuit Interrupter type with
Safe Lock:
P&S Cat. No. PT2097TRI
17. Duplex 2P, 3W, 20A, 125V, NEMA 5-20R
Weather-Resistant and Tamper-Resistant, Ground Fault Circuit
Interrupter type with Safe Lock:
P&S Cat. No. 2097TRWRI
18. Single 2P, 3W, 20A, 125V, NEMA 5-20R connector:
P&S Cat. No. 5369-X
19. Single 2P, 3W, 15A, 125V, NEMA L5-15R:
P&S Cat. No. 4710
20. Single 2P, 3W, 20A, 125V, NEMA L5-20R:
P&S Cat. No. L520R
21. Single 2P, 3W, 20A, 125V, NEMA L5-20R connector:
P&S Cat. No. L520C
22. Single 2P, 3W, 30A, 125V, NEMA 5-30R:
P&S Cat. No. 3802
23. Single 2P, 3W, 30A, 125V, NEMA L5-30R:
P&S Cat. No. L530R
24. Single 2P, 3W, 15A, 250V, NEMA 6-15R:

- P&S Cat. No. 5662AI
25. Single 2P, 3W, 20A, 250V, NEMA 6-20R:
P&S Cat. No. 5862AI
 26. Single 2P, 3W, 30A, 250V, NEMA 6-30R:
P&S Cat. No. 3801
 27. Single 2P, 3W, 50A, 250V, NEMA 6-50R:
P&S Cat. No. 3804
 28. Single 3P, 4W, 20A, 125/250V, NEMA 14-20R:
P&S Cat. No. 3820
 29. Single 3P, 4W, 30A, 125/250V, NEMA 14-30R:
P&S Cat. No. 3864
 30. Single 3P, 4W, 50A, 125/250V, NEMA 14-50R:
P&S Cat. No. 3894
 31. Single 3P, 4W, 60A, 125/250V, NEMA 14-60R:
Hubbell Cat. No. HBL 9460A
 32. Single 3P, 4W, 20A, 250V, NEMA 15-20R:
Hubbell Cat. No. HBL 8420
 33. Single 3P, 4W, 30A, 250V, NEMA 15-30R:
P&S Cat. No. 5740
 34. Single 3P, 4W, 50A, 250V, NEMA 15-50R:
P&S Cat. No. 5750
 35. Single 3P, 4W, 60A, 250V, NEMA 15-60R:
P&S Cat. No. 5760
 36. Single 3P, 4W, 50A, 125/250V P&S Cat. No. CS6369.
 37. Single 2P, 3W, 15A, 125V, NEMA 5-15R
Wireless Clock Outlet with stainless steel cover plate:
P&S Cat. No. S3733-SS
- D. Outdoor Charging Station shall be LEGRAND Part No. XCSP3GRUU-BZ. Complete with one (1) 20A weather resistant GCFI receptacle and two (2) 4-port, 4.2A USB receptacles.
- E. Wiring devices mounted in WIREMOLD V4000 surface metal raceways shall be ivory or light almond in color to match the raceway in lieu of the colors indicated

above, except red wiring devices shall not change.

- F. All PlugTail receptacles shall come complete minimum six (6) inch solid THHN Connector. Stranded connectors shall not be acceptable.

2.05 COVER PLATES

- A. A cover plate shall be furnished and installed over each wiring device. Plates shall be PASS & SEYMOUR Type 302 (non-magnetic) stainless steel with satin finish, 0.032" nominal thickness or the equivalent as manufactured by COOPER (ARROW HART), HUBBELL, LEVITON or MULBERRY for all the wiring devices including low voltage devices. All cover plates shall be UL listed.
 - 1. Wall switch occupancy sensors shall have stainless steel cover plates, not the plastic cover plates that may be included in the switch packaging.
- B. Cover plates shall be of a configuration to match the type of wiring device to be covered. Where more than one flush outlet (switch, receptacle, etc.) is indicated in the same location and at the same mounting height, all (except dimmer switches) shall be ganged in a single multi-gang outlet box under a common cover plate.
- C. Wiring devices located in wet or damp locations, or noted "WP" on the Drawings shall be complete with a die-cast weatherproof metallic cover plate. Receptacles in damp locations only, may use this type of weatherproof cover plate. All weatherproof cover plates shall be UL listed.
- D. All 15 amp and 20 amp receptacle type wiring devices located in wet locations, or noted "WP" on the Drawings, shall have hinged weatherproof "while-in-use" covers. Other receptacle type wiring devices located in wet and damp locations where equipment is intended to be plugged into it and not attended while in use shall also have hinged weatherproof "while-in-use" covers. Provide these types of weatherproof covers at other locations identified on the Drawings. Covers, body and plates shall be gray die-cast aluminum, fully gasketed and suitable for mounting horizontally and vertically. Mounting screws shall be 302 stainless steel. Cover assembly shall be UL listed.
- E. All receptacles on an emergency circuit shall have a coverplate, PASS & SEYMOUR Type 302 (non-magnetic), labeled with 1/8" high engraved and filled lettering "EMERGENCY".
- F. Cover plates for receptacles shall be labeled with the circuit number including panelboard designations. Labeling shall be done with a BROTHER® Model No. PT-1400 (P-touch) professional label maker, or approved equal, using a laminated type extra strength adhesive tape, Letters/numerals shall be black with a white background, minimum 3/16" high.

- G. Cover plates for lighting control digital switches shall be labeled with the lighting control panel designation and room number designation or as shown on the Drawings. Labeling shall be done with a BROTHER® Model No. PT-1400 (P-touch) professional label maker, or approved equal, using a laminated type extra strength adhesive tape, Letters/numerals shall be black with a white background, minimum 3/16" high.

2.06 POWER OUTLET PANELS

- A. Power Outlet Panels shall have one duplex 2P, 3W, 20A, 125V, NEMA 5-20R weather-resistant and tamper-resistant, Ground Fault Circuit Interrupter (GFCI) type receptacle; P&S Cat. No. 2095TRWR or equal.
- B. Enclosure shall be rainproof NEMA 3R and fabricated from G90 galvanized steel with welded flange construction and a gray powder coat finish. The door cover shall swing up and able to be held in the open position and closed with plugs and cords inserted into the receptacle while maintaining the NEMA 3R rating. The door shall have rolled edges to protect cords from damage and with padlock provisions. The deadfront cover shall be angled with the receptacle to facilitate easier plug and cord attachments and shall be removable without interfering with factory wiring.
- C. All components shall be factory wired and have field termination lugs, including ground lug.
- D. Power Outlet Panels shall be MIDWEST ELECTRIC PRODUCTS, INC. Catalog No. U010SEP or approved equal.

2.07 CORD REELS

- A. Cord reels designated on the Drawings as 'CR' shall be WOODHEAD Cat. No. 990-3000, having an open housing, a minimum 18 inch primary power cord and a NEMA 5-15P plug cap, a shock-absorbing ball stop, adjustable tension, built in ratchet locks, a swivel/pivot base (Cat. No. 9507), and a forty-five (45) foot secondary power cord (rated 11 amps, minimum) with an attached non-conductive rubber and plastic power outlet box having two (2) 2P, 3W, 15A duplex receptacles (NEMA 5-15R). The power cords shall be 'SJTOW' type with three (3) conductor, No. 14 AWG.
 - 1. This Contractor shall furnish and install a NEMA 5-15R single receptacle in/on the ceiling as shown on the Drawings for plugging in the cord reels primary cord.
 - 2. Contractor shall activate ratchet if not set by the factory.
- B. Cord reels designated on the Drawings, as 'CRL' shall be WOODHEAD Cat. No. 980A-83, having an open housing with an automatic 'on/off' power switch located

inside the reel, a minimum 18 inch primary power cord and a NEMA 5-15P plug cap, a shock-absorbing ball stop, adjustable tension, built in ratchet locks, a swivel/pivot base (Cat. No, 9507), and a fifty (50) foot secondary power cord with an attached 13 watt fluorescent hand lamp having vinyl coated guard and rubber handle without a receptacle in the handle suitable for use in minor repair garages classified as a non-hazardous location per NEC Article 511.3(D)(1). The power cords shall be 'SJTOW" type with three (3) conductor, No. 16 AWG.

1. This Contractor shall furnish and install a NEMA 5-15R single receptacle in/on the ceiling as shown on the Drawings for plugging in the cord reels primary cord.
2. Contractor shall activate ratchet if not set by the factory.

2.08 DOORBELL SYSTEM

- A. This Contractor shall furnish and install where shown on the Drawings, a complete doorbell signaling system as specified herein:
 1. Bell: Edwards Signaling Cat. No. 340-6G5 Adaptable. Bell shall be six (6) inches in diameter, 24 volts AC, having a sound level of 92 dB measured at 10 feet.
 2. Class 2 Signaling Transformer: Edwards Signaling Cat. No. 592. Transformer shall have primary voltage of 120 volts AC and secondary voltage of 24 volts AC and 20 VA.
 3. Pushbutton Station: Trine Access Technology Cat. No. 65P. Pushbutton shall be weatherproof, surface mount, and solid brass construction. The pushbutton shall have normally open momentary contacts, rated at 24 volts, 4 amps AC, 2 amps DC, a neoprene diaphragm to protect the internal phosphor bronze contact springs, and a bakelite back plate threaded for ½ inch conduit.

2.09 FIRE EVACUATION STAGING AREA (FESA) VISUAL NOTIFICATION SYSTEM

- A. This Contractor shall furnish and install where shown on the Drawings, a complete FESA visual notification system as specified herein:
 1. Signal Beacon: Federal Signal Corporation Model No. FB2PST-120R exterior red strobe light rated at 120VAC, 0.25 amps, flash rate/minute of 90, candela ratings of 1,000,000 (peak) and 300 ECP (effective candela) suitable for mounting on ½" NPT pipe.
 2. Wall Mounting Bracket Kit: Federal Signal Corporation Model No. LWMB2 wall mounting bracket for mounting the FESA exterior strobe light

signal beacon. The wall bracket shall be wall mounted on a suitable outlet box and shall allow wiring to be run concealed within the wall bracket to the strobe light.

3. Activation Station (on/off): STI Model No. SS-2231-ZA-EN with custom two (2) line label to read "FESA" (line 1), "SIGNAL BEACON" (line 2) and a STI Model No. SUB-102722 Spacer (color to match shell). Mount over flush outlet box or surface mounted on Wiremold V5744S outlet box where indicated on the Drawings or required to be surface mounted.
4. Transformer: Provide a transformer, when required to step down the voltage from 277 volts to 120 volts. Transformer shall be equal to ACME ELECTRIC Catalog No. TB81301 rated at 50 VA, 277 volts primary to 120 volts secondary complete with a primary fuse block, Part No, PL112700 and 0.6 amp time delay class CC fuses. Mount transformer and fuse block in a metal NEMA 1 vented enclosure with a latching hinged cover, HOFFMAN Catalog No. A8N66/A8N6P with HOFFMAN Catalog No. AVK23 louver vents field installed on two (2) side walls of enclosure. Mount enclosure above the ceiling or as shown on the Drawings.

2.10 S.O.L TESTING PORTABLE POWER DISTRIBUTION BOX **[middle and high schools only]**

- A. S.O.L. testing portable power distribution boxes shall contain a minimum of six (6) NEMA 5-20R duplex receptacles, one (1) NEMA L5-30R single receptacle, one (1) 50A 125/250V locking inlet (CS6375) and one (1) 50A 125/250V locking outlet (CS6369). A circuit breaker panel box with a hinged door cover shall be provided. Each NEMA 5-20R duplex receptacle shall be protected by one (1) single pole, 20A circuit breaker and each NEMA L5-30R single receptacle shall be protected by one (1) 2 pole, 30A circuit breaker. The power distribution box shall have individual GFCI modules to protect the duplex receptacles against ground faults with manual GFCI reset configuration.
 1. The power distribution box shall be suitable for indoor or outdoor environments. Box shall have a reinforced steel housing and support legs and finished with a powder coat paint inside and out to prevent corrosion.
- B. Each portable power distribution box shall have one (1) factory assembled 50A, 125/250V, 50 ft. min. length cordset for connecting the unit from a CS6369 wall receptacle to the inlet (CS6375) of the power distribution box.
- C. An S.O.L. testing portable power distribution box that meets this specification is a COOPER (ARROW HART) Cat. No. RB300M with PC50A cordset or as equal by ERICSON, or HUBBELL. This contractor shall furnish one (1) unit for each S.O.L. 50A receptacle shown on the Drawings.

PART 3 - EXECUTION**3.01 WIRING DEVICES**

- A. This Contractor shall furnish and install all wiring devices, material, and hardware as indicated on the Drawings, as specified, or as required for a complete installation.
- B. Before installation, the exact type of wiring devices shall be coordinated with all associated trades.
- C. This Contractor shall check all wiring devices for damages during construction and replace where necessary. All devices shall be cleaned and left in a complete operable condition.
- D. This Contractor shall verify all door swings before installing lighting switches.
- E. Receptacles shall be installed only on clear wall spaces, not in tackboards, chalkboards, pipe chases, mechanical equipment, or built-in type furniture and cabinets. If receptacles are shown on the Drawings to be installed therein, this Contractor shall call it to the attention of the Architect/Engineer and obtain a new location.
- F. Dimmer switches shall not be ganged together with other types of lighting switches. Multiple dimmer switches shall be ganged together using the number of outlet boxes and/or outlet box gangs in accordance with the manufacturer's instructions.

3.02 POWER OUTLET PANELS

- A. This Contractor shall furnish and install power outlet panels, material, and hardware as indicated on the Drawings, as specified, and as required for a complete installation. Power outlet panels generally will be mounted on the roof with the free standing safety switch assembly as detailed on the Drawings or other locations shown on the Drawings.
- B. All mounting openings not used must be permanently sealed to keep rain, moisture, insects, etc. from entering the box housing. The use of stainless steel screws/nuts with rubber washers and silicone sealant may be used, or another approved method for a completely sealed box housing.

3.03 S.O.L 50A POWER RECEPTACLES

- A. S.O.L. 50A receptacles shown on the Drawings shall be complete with a spring loaded self-closing die-cast flip cover. Label each receptacle cover to read "S.O.L. TESTING". A flip cover that meets this specification shall be HUBBELL Cat. No. HBL7382 or equal.

3.04 CONNECTIONS

- A. Ground equipment according to Specification Section 16460 "Grounding" and the National Electrical Code.
- B. Connect wiring according to Specification Section 16120 "Wire, Cables and Connectors".
- C. Tighten electrical connections and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A/B.

3.05 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections:
 - 1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.
 - 2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.
- B. Remove malfunctioning units, replace with new units, and retest as hereinbefore specified.

END OF SECTION

SECTION 16140

DEVICE AND OUTLET BOXES

PART I - GENERAL

1.01 REQUIREMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 SCOPE

- A. The work covered under this Section shall include furnishing and installing device and outlet boxes, flush floor outlets (boxes) and Science Room multiplex service fittings complete for all electrical systems as shown on the Drawings and herein specified.

1.03 QUALITY ASSURANCE

- A. All equipment, materials, and their installation shall conform to the requirements of the National Electrical Code (NEC), local code requirements, and these Specifications.
- B. All equipment and materials shall be listed by Underwriters Laboratories, Inc. (UL) for their intended use and shall bear the UL label.
- C. Equipment shall be constructed in accordance with National Electrical Manufacturer's Association (NEMA) standards.
- D. Flush floor outlet boxes and/or poke-thru devices shall have been tested to meet UL514A and/or UL514C and bear the UL Listing Mark. Floor boxes/devices shall be classified for use in 2-hour rated unprotected reinforced concrete floors and concrete toppings (D900 Series Designs) or above grade concrete floors with suspended ceilings (fire resistive designs with suspended ceilings shall have provisions for accessibility in the ceiling below the floor boxes/devices). Floor boxes/devices shall also conform to the standards set in Section 300.21 of the National Electrical Code. Floor Boxes/devices shall meet UL scrub water requirements, but are not suitable for wet or damp locations, or other areas subject to saturation with water or other liquids such as commercial kitchens. Floor boxes/devices shall also have been evaluated by UL to meet the applicable U.S. safety standards for scrub water exclusion when used on tile, bare concrete, terrazzo, wood, and carpet covered floors. Above grade floor boxes/devices shall be suitable for use in air handling spacers in accordance with Section 300.22 (C) of the National Electrical Code.
- E. Submittals are required in accordance with SECTION 16010 of these

specifications.

PART 2 - PRODUCTS

2.01 MATERIALS AND COMPONENTS

- A. Boxes shall be steel, hot-dipped galvanized after fabrication, of the type and size for the intended use, and shall have only the holes necessary to accommodate the conduits at point of installation. Multi-gang boxes shall be used for multiple device locations utilizing a single multi-gang cover plate. Sectionalized boxes are not permitted. Boxes shall have barrier separations for conductors using different voltages within the same box.
- B. Outlet boxes for lighting switches and receptacles in finished walls shall be of a suitable size for the device to be mounted in the partitions in which they are installed. The boxes shall have covers with rectangular openings of appropriate size and shape. Provide covers with raised openings on all outlets in masonry walls with plaster or tile finishes. Wall switch outlets shall be located within eight (8) inches of the trim on the latch side of the door. Outlets shall be set flush with the wall.
- C. Single gang outlet boxes installed in concrete, masonry or gypsum wall board shall be a minimum four (4) inches square, 1-1/2 inches deep with appropriate tile ring, set flush with wall surface and provided with a single gang cover plate.
- D. Outlet boxes for exposed lighting switches and receptacles shall be of the cast "FS" type or "FD" type (when required for code required box volume).
- E. Outlet boxes for devices shown on the Drawings to be flush mounted in existing gypsum wallboard partitions shall be minimum three (3) inches by two (2) inches by 2-3/4 inches deep gangable switch box type complete with ears and conduit knockouts.

2.02 FLUSH FLOOR OUTLETS

- A. Flush floor outlets designated on the Drawings as "Type 1" shall consist of a WIREMOLD Model No. EFB6S-OG floor box manufactured from stamp steel approved for use with on-grade concrete floor applications. Boxes shall have the ability to accept a component (EFB610-CTR) that will allow the box to be installed flush in polished concrete or terrazzo floors. Boxes shall be painted with a fusion-bonded epoxy designed for use on metal reinforcement bar and related accessories before encapsulation in concrete, and be approved for use on-grade and above grade floors. Boxes shall be 15-1/8" L x 13-3/16" W x 4-1/16" H [384mm x 284mm x 103mm]. Provide boxes with six (6) independent wiring compartments that allow for up to six (6) duplex receptacles, communication and/or audio/video services. Boxes shall have removable and relocatable dividers to permit custom configuration of compartments as well as permit feed to

adjacent compartments. Boxes shall permit feed to compartments on the opposite side of the box through a tunnel. Each of the four (4) outer compartments shall have a minimum wiring capacity of 32-in³ [524ml]. Each of the two (2) center compartments shall have a minimum wiring capacity of 38.5-in³ [630ml]. Each of the six (6) compartments shall have a minimum depth of 3-7/8" [98mm] behind the plate. Provide boxes with removable compartments to facilitate installation. The compartments shall be removable from the top of the floor box. Provide boxes with two (2) cable guides to organize and maintain the cables egress out of the box. The box shall contain the following number of knockouts: 10 1" trade size, six (6) 1-1/4" trade size, and six (6) 3/4" trade size. Boxes shall be fully adjustable, accommodating a maximum 2-inch [51mm] pre-concrete pour and a maximum 1/2" [12.7mm] post-concrete pour adjustment. The box shall be able to accept 2-3/4" x 4-1/2" standard size wall plates. Include mounting brackets with the boxes that will accommodate 15 amp, 20 amp straight blade, 20 amp turn loc, 30 amp straight blade and 30 amp turn loc receptacles, Ortronics® workstation connectivity and modular adapters, a variety of audio/video devices from most manufacturers, and other open system devices.

1. This floor box shall contain three (3) two pole, three wire, 20 amp, 125 volt, NEMA 5-20R duplex receptacles as hereinbefore specified complete with coverplates; one (1) two (2) port modular jack kit complete with one (1) RJ-45 (568A) voice port and one (1) RJ-45 (568A) data port; and two (2) blank single gang coverplates.
 2. Floor boxes shall be complete with die-cast aluminum Activation Covers. Activation covers shall be surface mount (EFB610BTC) type and in tile floor areas shall be flush mount (EFB610BT) type. Provide covers with two (2) gaskets (one (1) for carpet and one (1) for tile) to go under the trim flange to maintain scrub watertightness. Covers shall be 16-15/16" x 12-1/2" x 3/16" [430mm x 318mm x 4mm]. Covers shall be provided with a carpet recess area in carpeted and tiled areas or a solid lid in non-carpeted/tiled areas. Secure the cover to the flange and enable cover to rotate greater than 180 degrees to reduce trip hazards and provide maximum amount of working space. Provide covers with spring-loaded self-closing slide egress doors to reduce egress opening when cables are exiting and reduce trip hazards. Each of the two (2) egress openings shall have a minimum of 4-in² [102mm²], or a minimum of 8-in² [203mm²] per cover assembly. Covers shall have a powder coat finish with one of the following colors to be selected by the architect: [black] [gray] [brass] [nickel] [bronze].
- B. Flush floor outlets designated on the Drawings as "Type 2" shall consist of a WIREMOLD Model No. EFB6S-OG floor box manufactured from stamp steel approved for use with on-grade concrete floor applications. Boxes shall have the ability to accept a component (EFB610-CTR) that will allow the box to be installed flush in polished concrete or terrazzo floors. Boxes shall be painted with a fusion-bonded epoxy designed for use on metal reinforcement bar and related

accessories before encapsulation in concrete, and be approved for use on-grade and above grade floors. Boxes shall be 15-1/8" L x 13-3/16" W x 4-1/16" H [384mm x 284mm x 103mm]. Provide boxes with six (6) independent wiring compartments that allow for up to six (6) duplex receptacles, communication and/or audio/video services. Boxes shall have removable and relocatable dividers to permit custom configuration of compartments as well as permit feed to adjacent compartments. Boxes shall permit feed to compartments on the opposite side of the box through a tunnel. Each of the four (4) outer compartments shall have a minimum wiring capacity of 32-in³ [524ml]. Each of the two (2) center compartments shall have a minimum wiring capacity of 38.5-in³ [630ml]. Each of the six (6) compartments shall have a minimum depth of 3-7/8" [98mm] behind the plate. Provide boxes with removable compartments to facilitate installation. The compartments shall be removable from the top of the floor box. Provide boxes with two (2) cable guides to organize and maintain the cables egress out of the box. The box shall contain the following number of knockouts: 10 1" trade size, six (6) 1-1/4" trade size, and six (6) 3/4" trade size. Boxes shall be fully adjustable, accommodating a maximum 2-inch [51mm] pre-concrete pour and a maximum 1/2" [12.7mm] post-concrete pour adjustment. The box shall be able to accept 2-3/4" x 4-1/2" standard size wall plates. Include mounting brackets with the boxes that will accommodate 15 amp, 20 amp straight blade, 20 amp turn loc, 30 amp straight blade and 30 amp turn loc receptacles, Ortronics® workstation connectivity and modular adapters, a variety of audio/video devices from most manufacturers, and other open system devices.

1. This floor box shall contain three (3) two pole, three wire, 20 amp, 125 volt, NEMA 5-20R duplex receptacles as hereinbefore specified complete with coverplates; and four (4) two port modular jack kits complete with two (2) RJ-45 (568A) ports in each, for a total of eight (8) ports.
 2. Floor boxes shall be complete with die-cast aluminum Activation Covers. Activation covers shall be surface mount (EFB610BTC) type and in tile floor areas shall be flush mount (EFB610BT) type. Provide covers with two (2) gaskets (one (1) for carpet and one (1) for tile) to go under the trim flange to maintain scrub watertightness. Covers shall be 16-15/16" x 12-1/2" x 3/16" [430mm x 318mm x 4mm]. Covers shall be provided with a carpet recess area in carpeted and tiled areas or a solid lid in non-carpeted/tiled areas. Secure the cover to the flange and enable cover to rotate greater than 180 degrees to reduce trip hazards and provide maximum amount of working space. Provide covers with spring-loaded self-closing slide egress doors to reduce egress opening when cables are exiting and reduce trip hazards. Each of the two (2) egress openings shall have a minimum of 4-in² [102mm²], or a minimum of 8-in² [203mm²] per cover assembly. Covers shall have a powder coat finish with one of the following colors to be selected by the architect: [black] [gray] [brass] [nickel] [bronze].
- C. Flush floor outlets designated on the Drawings as "Type 3" shall consist of a

WIREMOLD Model No. EFB8S-OG floor box manufactured from stamp steel approved for use with on-grade concrete floor applications. Boxes shall have the ability to accept a component (EFB610-CTR) that will allow the box to be installed in polished concrete or terrazzo floors. Boxes shall be painted with a fusion-bonded epoxy designed for use on metal reinforcement bar and related accessories before encapsulation in concrete, and be approved for use on-grade and above grade floors. Boxes shall be 15-1/8" L x 13-3/16" W x 6" H [384mm x 284mm x 152mm]. Provide boxes with six (6) independent wiring compartments that allow for up to six (6) duplex receptacles, communication and/or audio/video services. Boxes shall have removable and relocatable dividers to permit custom configuration of compartments as well as permit feed to adjacent compartments. Boxes shall permit feed to compartments on the opposite side of the box through a tunnel. Each of the four (4) outer compartments shall have a minimum wiring capacity of 32-in³ [524ml]. Each of the two (2) center compartments shall have a minimum wiring capacity of 38.5-in³ [630ml]. Each of the six (6) compartments shall have a minimum depth of 3-7/8" [98mm] behind the plate. Provide boxes with removable compartments to facilitate installation. The compartments shall be removable from the top of the floor box. Provide boxes with two (2) cable guides to organize and maintain the cables egress out of the box. The box shall contain the following number of knockouts: 10 1" trade size, six (6) 1-1/4" trade size, and six (6) 3/4" trade size. Boxes shall be fully adjustable, accommodating a maximum 2-inch [51mm] pre-concrete pour and a maximum 1/2" [12.7mm] post-concrete pour adjustment. The box shall be able to accept 2-3/4" x 4-1/2" standard size wall plates and 2 gang multi media devices. Include mounting brackets with the boxes that will accommodate 15 amp, 20 amp straight blade, 20 amp turn loc, 30 amp straight blade and 30 amp turn loc receptacles, Ortronics® workstation connectivity and modular adapters, a variety of audio/video devices from most manufacturers, and other open system devices.

1. This floor box shall contain with three (3) two pole, three wire, 20 amp, 125 volt, NEMA 5-20R duplex receptacles as hereinbefore specified complete with coverplates; one (1) three port modular jack kit complete with two (2) RJ-45 (568A) ports and one (1) F-Connector; and one (1) EXTRON Part No. XTP-T-UWP-202 multi-media system presentation system outlet consisting of a HD15, 3.5mm audio, HDMI connectors.
2. Floor boxes shall be complete with die-cast aluminum Activation Covers. Activation covers shall be surface mount (EFB610BTC) type and in tile floor areas shall be flush mount (EFB610BT) type. Provide covers with two (2) gaskets (one (1) for carpet and one (1) for tile) to go under the trim flange to maintain scrub watertightness. Covers shall be 16-15/16" x 12-1/2" x 3/16" [430mm x 318mm x 4mm]. Covers shall be provided with a carpet recess area in carpeted and tiled areas or a solid lid in non-carpeted/tiled areas. Secure the cover to the flange and enable cover to rotate greater than 180 degrees to reduce trip hazards and provide maximum amount of working space. Provide covers with spring-loaded self-closing slide egress doors to reduce egress opening when cables are

exiting and reduce trip hazards. Each of the two (2) egress openings shall have a minimum of 4-in² [102mm²], or a minimum of 8-in² [203mm²] per cover assembly. Covers shall have a powder coat finish with one of the following colors to be selected by the architect: [black] [gray] [brass] [nickel] [bronze].

- D. Flush floor outlets designated on the Drawings as Type “4” shall be THOMAS & BETTS (STEEL CITY) Cat. No. 643, 3-gang case iron floor box complete with three (3) separate wiring compartments; cast iron watertight body, one (1) P64DS duplex brass mop tight coverplate, two (2) P64-GFCI brass mop tight coverplates, one (1) OPODEC-XLRF-WH rectangular microphone jack adaptor, one (1) OPODEC3-WH device plate with three (3) keystone ports; one (1) ORTRONICS Cat. No. OR-KS35STST 3.5mm keystone adaptor insert and two (2) ORTRONICS Cat. No. OR-KS6A RJ-45, Cat. 6, 568A track jack adaptor inserts. The body shall be divided having one (1) NEMA 5-20R duplex receptacle as previously specified, one (1) microphone jack and one (1) 3.5mm jack for MP3 and two (2) RJ-45, Cat 6 data jacks. The trim, shall be completely flush with the finished floor.
- E. Flush floor outlets designated on the Drawings as “Type 5” shall be THOMAS & BETTS (STEEL CITY) Cat. No. 642, 2-gang cast iron floor box complete two (2) P64DS duplex brass mop tight coverplates, two (2) NEMA 5-20R duplex receptacles as previously specified. The trim, shall be completely flush with the finished floor. Each floor outlet shall be complete with carpet flange assembly in carpeted areas; and non-skid top in non-carpeted areas.
- F. Flush floor outlets designated on the Drawings as “Type 6” shall be WIREMOLD Cat. No. 8ATCP fire-rated Poke-Thru Assembly Unit, for use in existing concrete floors, or approved equal. This assembly consists of an insert and an activation cover. Overall poke-thru assembly length shall be 16 3/4”. The insert body shall recess the devices a minimum of 3-1/4” and have a polyester based backing enamel finished interior (ivory). There shall be necessary channels to provide complete separation of power and communication services. There shall be five (5) compartments that allow for up to three (3) duplex receptacles and/or twelve (12) communications ports and/or ten (10) of Extron® Electronics MAAP™ and/or two (2) AAP™ devices. The body shall consist of an intumescent fire stop material to maintain the fire rating of the floor slab. The intumescent material will be held securely in place in the insert body and shall not have to be adjusted to maintain fire rating of the unit and the floor slab. The insert shall have retaining feature that will hold the poke-thru device in the floor slab without additional fasteners. The poke-thru insert shall also consist of a 3/4” trade size conduit stub that is connected to the insert body and a 24.5 cubic inch stamped steel junction box for wire splices and connections. The stamped steel junction box shall also contain the necessary means to electrically ground the poke-thru device to the system ground. **Communication Modules Mounting Accessories:** The poke-thru manufacturer shall have available open modular inserts to facilitate mounting UTP (including Category 5, 5e, 6), STP, fiber optic, coaxial, and

data/communications devices. The activation shall have three (3) locations to mount communication connectors. Connectors shall be mounted using a mounting bracket. Where indicated, provide connectivity outlets and modular inserts by Ortronics or approved equal.

1. This floor box shall contain two (2) proprietary two pole, three wire, 20 amp, 125 volt, NEMA 5-20R duplex receptacles with mounting plates; one (1) '8TRAC' device mounting plate for use in the center compartment only, complete with one (1) RJ-45 (568A) TracJack voice device and one (1) RJ-45 (568A) TracJack data device; and three (3) blank TracJack inserts and two (2) 8B single gang blank device plates.
 2. Flush Floor Poke-Thru shall be complete with die-cast aluminum Activation Covers. Two gaskets (one for carpet and one for tile) shall be provided to go under the trim flange to maintain scrub water tightness. The activation cover shall be 9 1/4" in diameter. The activation covers shall be available in carpet and tile versions. The carpet covers shall be surface mounted (8CTC) and the tile covers shall be flush (8CT) with the finished floor coverings. The cover shall have spring loaded slides to allow cables to egress out of the unit and maintain as small an egress opening as possible. Covers shall have a powder coat finish with one of the following colors to be selected by the architect: [black] [gray] [brass] [nickel] [bronze].
- G. Flush floor outlets designated on the Drawings as "Type 7" shall be WIREMOLD Cat. No. 8ATCP fire-rated Poke-Thru Assembly Unit, for use in existing concrete floors, or approved equal. This assembly consists of an insert and an activation cover. Overall poke-thru assembly length shall be 16 3/4". The **INSERT** body shall recess the devices a minimum of 3-1/4" and have a polyester based backing enamel finished interior (ivory). There shall be necessary channels to provide complete separation of power and communication services. There shall be five (5) compartments that allow for up to five (5) duplex receptacles and/or twenty-two (22) communications ports and/or sixteen (16) of Extron® Electronics MAAP™ and/or four (4) AAP™ devices. The body shall consist of an intumescent fire stop material to maintain the fire rating of the floor slab. The intumescent material will be held securely in place in the insert body and shall not have to be adjusted to maintain fire rating of the unit and the floor slab. The insert shall have retaining feature that will hold the poke-thru device in the floor slab without additional fasteners. The poke-thru insert shall also consist of a 3/4" trade size conduit stub that is connected to the insert body and a 24.5 cubic inch stamped steel junction box for wire splices and connections. The stamped steel junction box shall also contain the necessary means to electrically ground the poke-thru device to the system ground. **Communication Modules Mounting Accessories:** The poke-thru manufacturer shall have available open modular inserts to facilitate mounting UTP (including Category 5, 5e, 6), STP, fiber optic, coaxial, and data/communications devices. Where indicated, provide connectivity outlets and modular inserts by Ortronics or approved equal.

- H.
1. This floor box shall contain two (2) proprietary two pole, three wire, 20 amp, 125 volt, NEMA 5-20R duplex receptacles with mounting plates; one (1) duplex mounting plate (8DP) with one (1) two pole, three wire, 20 amp, 125 volt, NEMA 5-20R duplex receptacle to be used in the center compartment; two '8TRAC' device mounting plates for use in the center compartment only, complete with eight (8) RJ-45 (568A) TracJack devices; and four (4) blank TracJack inserts.
 2. Flush Floor Poke-Thru shall be complete with die-cast aluminum Activation Covers. Two gaskets (one for carpet and one for tile) shall be provided to go under the trim flange to maintain scrub water tightness. The activation cover shall be 9 1/4" in diameter. The activation covers shall be available in carpet and tile versions. The carpet covers shall be surface mounted (8CTC) and the tile covers shall be flush (8CT) with the finished floor coverings. The cover shall have spring loaded slides to allow cables to egress out of the unit and maintain as small an egress opening as possible. Covers shall have a powder coat finish with one of the following colors to be selected by the architect: [black] [gray] [brass] [nickel] [bronze].
- I.
- Flush floor outlets designated on the Drawings as "Type 8" shall be WIREMOLD Cat. No. 8ATCP fire-rated Poke-Thru Assembly Unit, for use in existing or new concrete floors, or approved equal. This assembly consists of an insert and an activation cover. Overall poke-thru assembly length shall be 16 3/4". The **INSERT** body shall recess the devices a minimum of 3-1/4" and have a polyester based backing enamel finished interior (ivory). There shall be necessary channels to provide complete separation of power and communication services. There shall be five (5) compartments that allow for up to five (5) duplex receptacles and/or twenty-two (22) communications ports and/or sixteen (16) of Extron® Electronics MAAP™ and/or four (4) AAP™ devices. The body shall consist of an intumescent fire stop material to maintain the fire rating of the floor slab. The intumescent material will be held securely in place in the insert body and shall not have to be adjusted to maintain fire rating of the unit and the floor slab. The insert shall have retaining feature that will hold the poke-thru device in the floor slab without additional fasteners. The poke-thru insert shall also consist of a 3/4" trade size conduit stub that is connected to the insert body and a 24.5 cubic inch stamped steel junction box for wire splices and connections. The stamped steel junction box shall also contain the necessary means to electrically ground the poke-thru device to the system ground. **Communication Modules Mounting Accessories:** The poke-thru manufacturer shall have available open modular inserts to facilitate mounting UTP (including Category 5, 5e, 6), STP, fiber optic, coaxial, and data/communications devices. Where indicated, provide connectivity outlets and modular inserts by Ortronics or approved equal.

1. This floor box shall contain two (2) proprietary two pole, three wire, 20 amp, 125 volt, NEMA 5-20R duplex receptacles with mounting plates; one '8TRAC' device mounting plate for use in the center compartment only, complete with two (2) RJ-45 (568A)TracJack devices, one (1) "F" Connector TracJack device, and three (3) blank TracJack devices; and one (1) EXTRON Part No. XTP-T-UWP-202 multi-media presentation system 'decorator style' outlet consisting of a HD-15, 3.5mm audio and HDMI connectors.
2. Flush Floor Poke-Thru shall be complete with die-cast aluminum Activation Covers. Two gaskets (one for carpet and one for tile) shall be provided to go under the trim flange to maintain scrub water tightness. The activation cover shall be 9 1/4" in diameter. The activation covers shall be available in carpet and tile versions. The carpet covers shall be surface mounted (8CTC) and the tile covers shall be flush (8CT) with the finished floor coverings. The cover shall have spring loaded slides to allow cables to egress out of the unit and maintain as small an egress opening as possible. Covers shall have a powder coat finish with one of the following colors to be selected by the architect: [black] [gray] [brass] [nickel] [bronze].

2.03 MULTIPLEX SERVICE FITTINGS

- A. Multiplex service fittings designated on the Drawings as Type "1" shall consist of the following field assembled by this Contractor as detailed on the Drawings: one (1) WIREMOLD Cat. No. MP8 dual service fitting including housing, base, mounting frames, integral divider, and mounting hardware; one (1) WIREMOLD Cat. No. M-2DR dual duplex opening faceplate; two (2) NEMA 5-20R duplex receptacles as previously specified; one (1) WIREMOLD Cat. No. LTF48-ACT communications face plate; one (1) WIREMOLD Cat. No. 2A245-C5E dual-port, RJ-45 (568A) workstation insert; two (2) WIREMOLD Cat. No. 2A-BL blank inserts; and two (2) WIREMOLD Cat. No. LTF48-B blank face plates.
- B. Multiplex service fittings designated on the Drawings as Type "2" shall consist of the following field assembled by this Contractor as detailed on the Drawings: one (1) WIREMOLD Cat. No. MP4 single service fitting including housing, base, mounting frames, integral divider, and mounting hardware; one (1) WIREMOLD Cat. No. M-2DR dual duplex opening face plate; two (2) NEMA 5-20R duplex receptacles as previously specified; and one (1) WIREMOLD Cat. No. LTF48-B blank face plate.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Before locating outlet boxes, check all of the Drawings for the type of construction and to make sure that there is no conflict with other equipment. The

outlet boxes' location shall not interfere with other work or equipment and shall be accessible after completion.

- B. Outlet boxes shown on the Drawings to be flush mounted in existing gypsum wallboard partitions shall be installed using metal switch box supports similar to STEEL CITY Cat. No. 820-D.
- C. Outlet boxes for devices shown on the Drawings to be installed on opposite sides of the same wall shall be separated horizontally by not less than six (6) inches and if connected with each other, the ends of the raceway shall be filled with sound insulating material after wiring has been installed to fill the voids around the wire. For fire rated walls provide minimum 24" separation or use approved fire assembly.
- D. Provide only the conduit openings necessary to accommodate the conduits at the individual location. Plug any unused openings.
- E. Thoroughly coordinate casework and backsplash heights with mounting heights of boxes.
- F. Device and outlet boxes shall not be fastened in place with drive pins and/or other methods using compressed air or gases.
- G. Device and outlet boxes located under roof decking shall not be less than 1½ inches from the nearest surface of the roof decking.

3.02 FLUSH FLOOR OUTLET BOXES INSTALLATION

- A. Examine conditions under which boxes and fittings are to be installed. Notify the Architect/Engineer in writing of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions have been corrected.
- B. Strictly comply with manufacturer's installation instructions and recommendations. Coordinate installation with adjacent work to ensure proper clearances and to prevent electrical hazards.
- C. Floor boxes shall permit all wiring to be completed at floor level. The "FC" models, when used, shall be used as defined by the UL Fire Resistance Directory at a minimum spacing of 24 inches (610 mm) on center.

3.03 FLUSH FLOOR POKE-THRU ASSEMBLY UNITS

- A. Examine conditions under which boxes and fittings are to be installed. Notify the Architect/Engineer in writing of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions have been corrected. Flush floor poke-thru assemblies require the floor to be core drilled.

Coordinate exact locations with the building structure and other trades before core drilling and **obtain written approval from the Structural Engineer and Architect before core drilling.**

- B. Strictly comply with manufacturer's installation instructions and recommendations. Coordinate installation with adjacent work to ensure proper clearances and to prevent electrical hazards.
- C. Units shall permit all wiring to be completed at floor level. Use is defined by the UL Fire Resistance Directory as a minimum spacing of "2 ft. on center and not more than one device per each 65 sq. ft. of floor area in each span."
- D. Poke-thru assemblies installation shall be completed by pushing unit down into the cored hole. The unit shall contain a retainer for securing the device in the slab, as well as the necessary intumescent material to seal the cored hole under fire conditions.

END OF SECTION

SECTION 16150

JUNCTION AND PULL BOXES

PART I - GENERAL

1.01 REQUIREMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 SCOPE

- A. The work covered under this Section shall include furnishing and installing junction and pull boxes complete for all electrical systems as shown on the Drawings and herein specified.

1.03 QUALITY ASSURANCE

- A. All equipment, material, and their installation shall conform to the requirements of the National Electrical Code (NEC), local code requirements, and these Specifications.
- B. All equipment and materials shall be listed by Underwriters Laboratories, Inc. (UL) for their intended use and shall bear the UL label.
- C. Equipment shall be constructed in accordance with National Electrical Manufacturer's Association (NEMA) standards.
- D. Submittals are required in accordance with SECTION 16010 of these specifications.

PART 2 - PRODUCTS

2.01 MATERIALS AND COMPONENTS

- A. Junction and pull boxes shall be provided where indicated and required and shall be of the type and size for the installation of the electrical system. Junction or pull boxes not over one hundred (100) cubic inches in volume shall be constructed in accordance with the requirements of NEC. All junction boxes shall have removable screwed covers and be accessible after completion of the building. Removable covers shall not exceed three (3) feet in size in any direction and split covers shall be used for boxes larger than three (3) feet in any direction. Where several feeders pass through a common pull box, the feeders shall be tagged to indicate clearly their electrical characteristics and branch circuit numbers and panelboard designation. This same information shall be stenciled in paint on the cover of each box.

- B. Pull and junction boxes shall be made of code gauge galvanized sheet steel with removable screw covers. Minimum size shall be 4 inch x 4 inch x 2-1/8 inches deep.
- C. Cast metal pull boxes shall be provided in damp or wet locations, with a gasketed screwed cover, and drilled and tapped holes as required. Screws shall be brass or bronze.
- D. Pull boxes shall be provided in any conduit run which exceeds one hundred (100) feet in length, or any run having more than two hundred seventy (270) total degrees of bend.

2.02 UNDERGROUND BOXES AND ENCLOSURES

- A. Underground boxes, enclosures and covers shall conform to all test provisions of the most current ANSI/SCTE 77 "Specifications For Underground Enclosure Integrity" for Tier 15 applications. When multiple tiers are specified the boxes must physically accommodate and structurally support compatible covers while possessing the highest Tier rating. In no assembly can the cover design load exceed the design load of the box. All components in an assembly (box and cover) shall be manufactured using matched surface tooling. All covers are required to have a minimum coefficient of friction of 0.05 in accordance with ASTM C1028 and the corresponding Tier level embossed on the top surface. Assemblies not U.L. Listed shall have independent third party verification or test reports stamped by a registered Professional Engineer certifying that all test provisions of this specification have been met are required with each submittal.
- B. Underground boxes, enclosures and covers shall be as manufactured by QUAZITE or approved equal.
 - 1. Telephone Service inground enclosure box and cover shall be QUAZITE Cat. No. PG3048BA36 box with Cat. No. PG3048HS0043 cover.
 - 2. CATV Service inground enclosure box and cover shall be QUAZITE Cat. No. PG3048BA36 box with Cat. No. PG3048HS0010 cover.
 - 3. Sports Field Lighting Pole ground rod hand hole enclosure box and cover shall be QUAZITE Cat. No. PG1118BA18 box with Cat. No. PG1118CA0024 cover.
 - 4. Other applications requiring the use of exterior underground boxes or enclosures shall use QUATIZE "PG" Series enclosure boxes appropriately sized complete with the proper cover with logo designating the use of the box or enclosure.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Pull and junction boxes shall be installed where indicated on the Drawings or as herein specified. Boxes shall be located so as to be inaccessible to the general public.
- B. All boxes and conductors therein shall be marked as hereinbefore specified to indicate the voltage and circuit numbers.
- C. Boxes shall not be fastened in place with drive pins and/or other methods using compressed air or gases.
- D. Boxes located under roof decking shall not be less than 1½ inches from the nearest surface of the roof decking.
- E. Pull and junction boxes shall be concealed except in electrical and mechanical equipment rooms, spaces architecturally designed to have an open structure without ceilings or as otherwise indicated on the Drawings.
- F. All system pull and junction box covers shall be painted as follows:
 - 1. 120/208 Volt - Black
 - 2. 277/480 Volt - Orange
 - 3. Clocks and Program Clocks - Green
 - 4. Emergency - White
 - 5. Fire Alarm - Red
 - 6. Security System - Gray
 - 7. Sound - Blue
 - 8. Telecommunications - Yellow
 - 9. Cable Television/Broadband - Tan
 - 10. Cox Communications I-NET (fiber) - Purple

3.02 UNDERGROUND BOXES AND ENCLOSURES

- A. Exterior underground boxes and enclosures shall be installed per manufacturer's recommendations and the following minimum requirements:

1. After the proper location of the underground enclosure has been established and the conduits, underground cables or ground rods, etc. are installed or located, the hole for the enclosure shall be excavated and shall be at least six (6) to eight (8) inches deeper than the depth of the enclosure and shall have a minimum of six (6) inches of gravel in the bottom of the hole or as shown on the Drawings. The gravel base shall extend past the side walls of the enclosure by at least four (4) to six (6) inches. Once the enclosure is positioned on top of the gravel base and the elevation check, the enclosure shall be back-filled.
2. Back-filling shall have 95% compaction or greater.
3. Provide internal bracing during back-filling to ensure minimal box sidewall deflections. Bracing supports shall be 2x4's or similar material sized to hold the box at mid-depth.
4. Top of the box and cover shall be flush with the finished grade.

3.03 CONDUCTORS

- A. All conductors entering junction and pull boxes shall be of the same voltage. Do not mix voltages regardless of the conductors' voltage rating, unless specifically shown on the Drawings.
- B. Branch circuit conductors and feeder conductors shall not occupy the same junction or pull box. Maintain separate boxes for branch circuits and separate boxes for feeders, unless specifically shown otherwise on the drawings.

3.04 ARC-PROOFING

- A. All feeders entering a pull box containing more than one (1) feeder, or more than one (1) parallel feeder, shall be arc-proofed as follows. Conductors of the same feeder, including each set of a parallel feeder, shall be tightly grouped together and held in place with random wrapped 3M No. 33 Tape. Grouped cables shall be arc proofed using spirally wound one half-lapped layer of 3M No. 77 Fire and Arc-Proofed Tape which shall be held in place with random wrapped 3M No. 69 Glass Cloth Electrical Tape.

END OF SECTION

SECTION 16435

BRANCH CIRCUIT PANELBOARDS

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 SCOPE

- A. The work covered under this Section shall include furnishing and installing circuit breaker type branch circuit panelboards complete for all systems as shown on the Drawings and herein specified.

1.03 QUALITY ASSURANCE

- A. All equipment, materials, and their installation shall conform to the requirements of the National Electrical Code (NEC), local code requirements, and these Specifications.
- B. All equipment and materials shall be listed by Underwriter's Laboratories, Inc. (UL) for their intended use and shall bear the UL label.
- C. Equipment shall be constructed in accordance with National Electrical Manufacturer's Association (NEMA) standards.
- D. Submittals are required in accordance with SECTION 16010 of these Specifications. The manufacturer shall furnish, but not be limited to the following:
 - 1. Circuit breaker layout with dimensions and nameplate designation.
 - 2. Circuit breaker trip ratings and frame sizes.
 - 3. Component list.
 - 4. Conduit entry/exit locations.
 - 5. Assembly ratings, including short-circuit rating, voltage, and continuous current rating.
 - 6. Bus material, including ground bar.

7. Cable terminal sizes.
8. Product data for each type of panelboard.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver material and products in factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations.
- B. Each panelboard section shall be delivered in individual shipping cases and individually wrapped for protection.
- C. Store in a clean, dry space. Maintain factory protection and /or provide an additional heavy canvas or heavy plastic cover to protect panelboards from dirt, water, construction debris, and traffic. Where applicable, provide adequate heating within enclosures to prevent condensation.
- D. Handle in accordance with NEMA PB1.1 and manufacturer's written instructions. Handle carefully to avoid damage to panelboards internal components, enclosure and finish.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. The branch circuit panelboards shall be as manufactured by CUTLER-HAMMER, GENERAL ELECTRIC or SIEMENS.

2.02 PANELBOARDS

- A. This Contractor shall furnish and install where indicated on the Drawings, deadfront branch circuit panelboards incorporating switching and branch circuit protective devices of the number, ratings, and type noted herein or as shown on the Drawings. Branch circuit panelboards shall have NEMA 1 general purpose enclosures and shall be surface or flush mounted as noted. All branch circuit panelboards shall be rated for the intended voltage and shall be in accordance with UL's "Standard for Panelboards" and "Standard for Cabinets and Boxes" and shall be so labeled. Branch circuit panelboards shall also comply with NEMA "Standard PB1 for Panelboards" and the NEC.
- B. Ratings:
 1. Panelboards rated 240 Vac or less shall have short-circuit ratings as shown on the drawings, but not less than 10,000-amperes RMS symmetrical.
 2. Panelboards rated 480 Vac shall have short-circuit ratings as shown on

the drawings, but not less than 14,000-amperes RMS symmetrical.

- C. Interiors:
1. All interiors shall be completely factory assembled with switching and protective devices, wire connectors, etc. All conductor connectors, except screw terminals, shall be of the anti-turn solderless type and all shall be suitable for copper conductors of the sizes indicated on the Drawings.
 2. Interiors shall be designed so that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors and shall be so designed that circuits may be changed without matching, drilling, or tapping.
- D. Branch circuits shall be arranged using double row construction except where a narrow column width panelboard is required or noted on the Drawings. Branch circuits shall be numbered by the manufacturer.
- E. Furnish and install three (3), 3/4 inch and two (2), one inch empty conduits up through the wall and turned out above the ceiling; and three (3), 3/4 inch and two (2), one inch empty conduits down into the ceiling space below the floor for all flush mounted branch circuits panelboards. Where floor slab is on grade, provide only empty conduits to the ceiling.
- F. All surface mounted branch circuit panelboards shall be mounted on twelve (12) gauge formed steel channel having a cross section dimension at least 1-1/2 inches x 1-1/2 inches on walls. The channel and fittings shall have a hot dipped galvanized finish to resist rust formation. Channels shall be installed vertically and as detailed on the Drawings.
- G. Bus Bars:
1. Bus bars for the mains shall be of copper sized in accordance with UL 67 Standards for temperature rise to limit temperature rise on any current carrying part to a maximum of 65 degrees C above an ambient of 40 degrees C maximum. The bus bars shall be standard density rated for 1000 amperes per square inch copper. Bus bar taps for branch circuit panelboards with single pole branches shall be arranged for sequence phasing of the branch circuit devices. Busing shall be braced throughout to conform to industry standard practice governing short circuit stresses in panelboards. Phase busing shall be full height without reduction. Cross connectors shall be copper. A non-insulated copper ground bus shall be provided for each panelboard.
 2. Phase busing shall be manufactured to accept bolt-on circuit breakers

only.

3. Spaces for the addition of future switching and protective devices in branch circuit panelboards shall be bussed for the maximum number of devices possible complete with pre-drilled mounting holes and knockouts in the front cover.
4. A non-insulated copper ground bus shall be provided for each branch circuit panelboard.
5. Full size (100% rated) insulated neutral busing shall be included for panelboards shown with a neutral. Neutral busing shall have a suitable lug for each outgoing feeder or branch circuit requiring a neutral connection.
6. Lugs shall be rated for 75 degrees C terminations and shall bolt in place.

H. Backboxes:

1. Backboxes shall be made from unpainted galvanized code gauge steel having no knockouts.
2. Boxes shall have gutter and wiring space sized as required per NEC but not less than four (4) inches on all sides. Where feeder cables supplying the mains of a panelboard are carried through the box to supply other electrical equipment, the box shall be so sized as to include this wiring space. This wiring space shall be in addition to the minimum gutter space specified above and the limiting width may be increased accordingly.
3. Backboxes shall also have sufficient space to safely attach clamp-on or split-core current transformers to the feeders for future portable or permanent check metering.
4. Backboxes for multiple (two or more) sections shall be of the same dimensions.
5. Each backbox shall include at least four (4) interior mounting studs.
6. The branch circuit panelboard identification number shall be on the backbox.
7. Branch circuit panelboard backboxes shall be of one (1) piece construction.

I. Trim:

1. Hinged doors shall be the door-in-door type covering all switching device

handles and all live parts and shall be included in all branch circuit panelboard trims. The use of door in a hinged cover type panelboard is prohibited.

2. Doors in branch circuit panelboard trims shall conform to the following:
 - a. In making device handles accessible, inboard doors shall not uncover any live parts. Outboard doors shall allow hinged access to the interior panel wiring without removal of the panel door assembly.
 - b. Doors shall have a semi-flush type cylinder lock and catch. Door hinges shall be concealed. Two (2) keys shall be furnished for each panelboard door and all locks shall be keyed as requested by the Owner to match current standard. The outer door shall be keyed separately. Directory frame and card, having a transparent cover, shall be furnished on the inside of each door.
 - c. Directory cards shall be neatly typewritten indicating each branch circuit number and assignment. The assignment designation shall include the final room number(s) assigned by the Owner. Do not use the architectural room numbers shown on the Drawings. The director cards shall also include the source (switchboard, panelboard, etc. with circuit number) feeding the panel.
 3. The trims shall be fabricated from code gauge sheet steel.
 4. All of the panelboard's steel surfaces, exterior and interior shall be properly cleaned and finished with the manufacturer's standard paint over a rust-inhibiting phosphatized coating. The finish paint shall be of a type to which field applied paint will adhere.
 5. Trims for flush mounted branch circuit panelboards shall overlap the box by at least 3/4 inches on all sides. Surface trims shall be mountable by a screwdriver without the need for special tools.
- J. Conduit skirts shall be provided on surface mounted branch circuit panelboards, where shown on the drawings. Skirts shall be the same width and depth as the panelboard backbox. Screw on skirt covers shall be the same code gauge sheet steel as the panelboard trim and painted with the same finish and color as the panelboard. Skirts shall be from the top of the panelboard to the underside of the finished ceiling and/or from the bottom of the panelboard to the finished floor concealing all conduits.

2.03 CIRCUIT BREAKERS

- A. Electrical circuits shall be protected by molded case circuit breakers as indicated on the Drawings.
- B. The circuit breakers shall be operated by a toggle type handle and shall have a quick-make, quick-break over-center switching mechanism that shall be mechanically trip free from the handle so that the contacts cannot be held closed against short circuits and abnormal currents. Tripping due to overload or short circuit shall be clearly indicated by the handle automatically assuming a position midway between the manual "ON" and "OFF" positions. All latch surfaces shall be ground and polished. All poles of a multi-pole breaker shall be so constructed that they open, close, and trip simultaneously.
- C. The circuit breakers shall be completely enclosed in a molded case. Non-interchangeable trip breakers shall have their covers sealed; interchangeable trip breakers shall have the trip unit sealed to prevent tampering. Ampere ratings shall be clearly visible. Contacts shall be non-welding silver alloy. Arc extinction shall be accomplished by means of arc chutes consisting of metal grids mounted in an insulating support. Breakers shall be of the bolt-on type; plug-in, plug-on, blow-on, and clamp-on circuit breakers shall not be acceptable.
- D. Circuit breakers shall be 80% rated unless indicated on the Drawings to be 100% rated.
- E. Circuit breakers shall have a minimum symmetrical interrupting capacity as indicated on the Drawings. The interrupting ratings of the circuit breakers shall be at least equal to, or greater than, the available short circuit at the line terminals and not less than those values shown on the Drawings and specified in this specification section
- F. Circuit breakers shall be listed with UL, conform to the applicable requirements of the latest issue of NEMA Standards Publication No. AB1.
- G. Circuit breakers shall have thermal-magnetic trip units, with inverse time-current characteristics, unless otherwise noted on the Drawings and/or specified herein.
 - 1. Automatic operation of all circuit breakers shall be obtained by means of thermal-magnetic tripping devices located in each pole providing inverse time delay and instantaneous circuit protection. Instantaneous pick-up settings for each phase shall be adjustable on all frames 250A and above.
 - 2. Circuit breakers shall be ambient compensating in that, as the ambient temperature increases over 40° C, the circuit breaker automatically derates itself to better protect its associated conductor.
 - 3. Circuit breakers 250A and above shall have thermal magnetic interchangeable trip units,

- H. Circuit breaker frames 400 ampere and above shall have microprocessor-based RMS sensing trip units on 480 volt systems and on 208 volt systems where indicated on the Drawings.
1. Solid State sensing shall measure true RMS current with capability to measure through to the 21st harmonic. Automatic operation of all circuit breakers shall be obtained by means of solid state tripping elements providing inverse time delay and instantaneous and short-time circuit protection. Continuous current rating shall be adjustable from 20% to 100% of trip unit rating. Long-time delay and instantaneous trip ratings shall also be adjustable. The short time pick-up trip shall have adjustable pick-up settings at definite times and with I2t delay.
 2. Long time current adjustment shall be possible without the need for a rating plug.
 3. Main and feeder circuit breakers shall be provided with integral ground fault protection in 480 volt panels. Ground fault pick-up shall be adjustable from 20% to 70% of the breakers maximum continuous current rating, but in no case be greater than 1200A. Ground fault time delay shall be adjustable with three (3) I2t delay settings.
 4. Solid State circuit breakers shall have built-in test ports for testing the long-time delay, instantaneous, and ground fault functions (if equipped) of the breaker by means of a test set.
 5. Provide one test set capable of testing all circuit breakers with a built-in test port, unless previously provided under another section of these specifications.
- I. Where a circuit breaker is the disconnecting means for fire alarm equipment, a listed breaker locking device shall be installed.
- J. Circuit breaker accessories: Provide shunt trips, bell alarms and auxiliary switches, etc. as may be shown on the drawings. All accessories shall be UL Listed for field installation.
- K. Circuit breakers shall be manufactured by the same manufacturer as the panelboard and factory installed.

2.04 MULTIPLE SECTION PANELBOARDS

- A. Panelboards with two (2) or more panelboard sections, sub-feed lugs or thru-feed lugs shall be used in all but one (1) section of each panelboard, unless otherwise shown on the Drawings. Lugs shall have same capacity as incoming mains.

Cable interconnections shall be field installed.

2.05 NAMEPLATES

- A. Branch circuit panelboards shall have nameplates of 1/16 inch thick laminated plastic with 3/16 inch high white letters on a black background. Nameplates shall identify the branch circuit panelboard and shall be mounted on the front top of the enclosure.

2.06 SURGE PROTECTIVE DEVICE (SPD)

- A. Provide surge protective devices (SPD) as specified in Section 16418.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Before installing branch circuit panelboards, this Contractor shall check all of the Drawings for possible conflict of space and adjust the location of the branch circuit panelboard to prevent such conflict with other items. Panelboard locations in electrical rooms and other spaces shall closely follow the layouts shown on the Drawings, leaving sufficient space on walls for future installations of panelboards and/or other electrical equipment.
- B. Surface mounted branch circuit panelboards shall be securely mounted to steel framing channel at locations shown on Drawings. Construction shall be such that additional conduits can be added for future requirements.
- C. The cabinets and enclosures shall be mounted in accordance with the NEC. This Contractor shall furnish all materials necessary for mounting the branch circuit panelboards.
- D. Install units plumb, level and rigid without distortion to the branch circuit panelboard.
- E. Branch circuit panelboard interiors shall be factory assembled with circuit breakers, wire connectors, etc. Circuit breakers shall be sequence numbered to correspond with the panelboard directory.
- F. Connect the SPD to the appropriate circuit breaker.
- G. Contractor shall install required safety labels.
- H. The mounting of junction boxes, wire troughs, and auxiliary gutters to the top, bottom or sides of a branch circuit panelboard is prohibited unless approved by the FCPS technical inspection staff on a case by case basis.

3.02 FIELD TESTS

- A. Check tightness of all accessible mechanical and electrical connections to assure they are torqued to the minimum acceptable manufacturer's recommendations.
- B. Check all panelboards for proper grounding, fastening and alignment.

3.03 FIELD ADJUSTMENTS

- A. This Contractor shall perform field adjustments of the protective devices as required to place the equipment in final operating condition. Necessary field settings of devices and adjustments and minor modifications to equipment shall be carried out by this Contractor at no additional cost to the Owner.

3.04 CLEANING

- A. Remove debris from panelboards and wipe dust and dirt from all components.
- B. Repaint marred and scratched surfaces with touch-up paint to match original finish.

3.05 EXISTING BRANCH CIRCUIT PANELBOARDS

- A. This Contractor shall clean, adjust, and tighten all feeder and branch circuit connections (new and existing) and provide new typewritten directories (as described above) in all existing branch circuit panelboards that are associated with work on this project. Panelboards not associated with work on this project are not subject to this requirement.

END OF SECTION

SECTION 16440

DISCONNECT SWITCHES

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 SCOPE

- A. The work under this Section shall include furnishing and installing safety switches and/or bolted pressure switches as shown on the Drawings and herein specified.

1.03 QUALITY ASSURANCE

- A. All equipment, materials, and their installation shall conform to the requirements of the National Electrical Code (NEC), local code requirements, and these Specifications.
- B. All equipment and materials shall be listed by Underwriter's Laboratories, Inc. (UL) for their intended use and shall bear the UL label.
- C. Equipment shall be constructed in accordance with National Electrical Manufacturer's Association (NEMA) standards.
- D. Submittals are required in accordance with SECTION 16010 of these Specifications.

PART 2 - PRODUCTS

2.01 SAFETY SWITCHES

- A. This Contractor shall furnish and install where shown on the Drawings, heavy-duty type safety switches. Safety switches shall be NEMA heavy-duty type HD only and shall be UL listed. The heavy-duty safety switches shall be manufactured by CUTLER-HAMMER, GENERAL ELECTRIC or SIEMENS.
- B. Switches shall have a quick-make and quick-break operating handle and mechanism that shall be an integral part of the enclosure. Switches shall be horsepower rated 250 volt for 120/208 volt systems or 600 volt for 277/480 volt system. The lugs shall be UL listed for copper conductors and be front removable. Ampere ratings shall be as indicated on the Drawings.
- C. Safety switches required and/or noted on the Drawings to be "four wire" shall be

furnished by the manufacturer complete with a solid neutral assembly.

- D. Safety switches shall have defectable door interlocks that prevent the door from opening when the handle is in the "ON" position. Defeater mechanism shall be front accessible.
- E. Enclosures for the switches shall generally be NEMA 1 or NEMA 3R (rainproof) for exterior locations, or where noted "WP" on the Drawings.

2.02 BOLTED PRESSURE SWITCHES

- A. This Contractor shall furnish and install where shown on the Drawings, true bolted contact load-break type switches with provisions for NEMA Class L fuses (fuses shall be furnished and installed by this Contractor). The stored energy deadfront operating mechanism shall include disk springs, compressed and released by the operating handle, to provide quick-positive switching action independent of the speed with which it is operated. The mechanism shall be designed so that the switch can be closed only after the opening spring has been charged, ready for manual opening by mechanical pushbutton.
- B. The switch operating handle shall be mechanically interlocked with the fuse access door and have provisions for padlocking in OPEN position.
- C. The switch shall have an interrupting rating of twelve (12) times the continuous rating and capable of carrying 100% of rated current and shall have been tested in accordance with UL Subject 977. The switch shall be suitable for use on circuits having available fault currents of 65,000 RMS symmetrical amperes rated (250) (600) VAC and of the ampacity shown on the Drawings. High-pressure contact switches do not meet the intent of these specifications.
- D. The switch shall be complete with single phase protection to open the main device upon loss of any single phase but not upon simultaneous loss of all three (3) phases.
- E. The switch shall be complete with separate blown fuse protection to open the bolted pressure switch if one or more of the Class L fuses operate. Indicating lights mounted on the front of the switch shall be included as a means of showing that the fuses have operated. Operating lights shall operate only when a fuse has blown.
- F. The switch shall have two (2) sets of auxillary contacts (2 normally open and 2 normally closed) for switch position monitoring.
- G. A ground fault protection system shall be included for the bolted pressure switch as shown on the Drawings or as required by NEC.
 - 1. The system shall consist of a current sensor enclosing all phase and

neutral conductors of the circuit to be monitored, and appropriate relaying equipment to provide the desired ground fault current sensitivity and time-current response characteristics. The switch shall be equipped to function in conjunction with the other elements of the ground fault protection system. Installation of the equipment shall be in all respects in accordance with the manufacturer's recommendations.

2. A current sensor shall be provided of the size necessary to encircle the phase conductors and the neutral conductor of the circuit to be monitored. Current sensor output shall be coordinated with the required input to the relay. A test winding shall be included to simulate the flow of ground fault current through the current sensor in order to test the operation of the ground fault protection system including sensor pick-up relay, and circuit protective device operation. The frame of the current sensor shall be so constructed that one leg can be opened to allow removal of installation around cable or bus without disturbing the cable or requiring drop-links in the bus.
 3. The ground fault relay shall be of solid state construction, except that a coil operated output relay shall be provided to control 120 volt power to operate the associated fusible bolted pressure switch ground fault trip mechanism. The relay shall require 120 volt power to operate the associated main device. Adjustable pickup current sensitivity for ground currents from 200 amperes to 1200 amperes shall be provided. A calibrated dial shall be provided for setting the current pickup point in the field. Settings for individual relays shall be 1200 amperes. Time delay provided by the relay circuitry shall be nominally 0.2 seconds and shall be permanently calibrated. A self-contained test circuit utilizing the test coil provided in the current sensor shall be incorporated in the system. The test circuit shall be part of the monitor panel that shall be mounted on the front cover of the switch.
- H. The switch enclosure shall be NEMA 1, floor or wall mounted as shown on the Drawings.
- I. The switch shall be manufactured by PRINGLE and shall be type CBC or approved equal.

2.03 NAMEPLATE

- A. Disconnect switches, including exterior locations, shall have nameplates of 1/16 inch thick laminated plastic with 3/16 inch high white letters on a black background. Nameplates shall identify each piece of equipment and shall be mounted on the front top of the enclosure. Nameplates shall be screw fastened using stainless steel screws.
- B. Disconnect switches for elevator equipment shall also provide nameplates and

signage to identify the location of the supply side overcurrent protective device, including circuit numbers, per NEC Article 620. Nameplates and signage shall be laminated plastic as hereinbefore described.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The disconnect switches shall be securely mounted in accordance with the NEC, approximately forty eight (48) inches but no less than twelve (12) inches above the finished floor to the bottom unless otherwise noted.
- B. Mounting brackets and hardware exposed to weather shall be galvanized or otherwise suitably protected from corrosion.
 - 1. All NEMA 3R disconnect safety switches mounting openings not used must be permanently sealed to keep rain, moisture, insects, etc. from entering the switch housing. The use of stainless steel screws/nuts with rubber washers and silicone sealant may be used, or another approved method for a completely sealed switch housing.
- C. The fuses (type and size as noted on the Drawings) as specified shall be installed in disconnect switches requiring fuses. Rejection fuse clips shall be installed where called for on the Drawings or in these Specifications.
- D. Contractor shall install required safety labels.

END OF SECTION

SECTION 16460

GROUNDING

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 SCOPE

- A. The work under this Section shall consist of furnishing and installing grounding systems as shown on the Drawings and herein specified.

1.03 QUALITY ASSURANCE

- A. All equipment, materials, and their installation shall conform to the requirements of the National Electrical Code (NEC), local code requirements, and these Specifications.
- B. All equipment and material shall be listed by Underwriter's Laboratories, Inc. (UL) for their intended use and shall bear the UL label.
- C. Equipment shall be constructed in accordance with National Electrical Manufacturer's Association (NEMA) standards.

1.04 DESCRIPTION

- A. The equipment grounding system shall be designed so all building steel, metallic structures, raceways, enclosures, cabinets, machine frames, junction boxes, outlet boxes, portable equipment, and all other conductive items in close proximity with electrical circuits operate continuously at ground potential providing a low impedance path for possible ground fault currents.

PART 2 - PRODUCTS

2.01 MATERIALS AND COMPONENTS

- A. **MAIN GROUNDING SYSTEM:**
 - 1. The ground bus in the main distribution switchboard shall be connected to at least three (3) copper-clad ground rods, not less than 3/4 inches in diameter, ten (10) feet long, and driven full length into the ground outside

in unpaved earth. Where required to meet the requirements of herein specified tests, extra rods shall be installed at no additional cost to the Owner. The rods shall be located a minimum of ten (10) feet from each other, or any other electrode, and shall be loop interconnected with each other by a minimum No. 4/0 AWG bare copper conductor thermal welded, using the proper style mold, to each rod below grade.

2. Provide a minimum No. 4/0 AWG green insulated copper ground conductor from the main distribution switchboard ground bus to the main metallic water service entrance (before the first pipe joint inside the building) and connect to same by means of adequate ground clamps. Where a dielectric main water fitting is installed, this ground conductor shall be connected to the street side of the dielectric water fitting. The conduit shall be bonded to the ground conductor at each end. Furnish and install with ground clamps, a minimum No. 4/0 AWG jumper around the water meter.
3. Provide a secondary building ground bar to serve as part of the building grounding electrode system in each electric room and other utilitarian areas of the building where dry-type transformers will be located, and in each communication room and/or where telecommunications main distribution frames (MDF) and sub-distribution frames (SDF) will be located. A ground bar(s) shall also be located at the telephone and CATV service entrance demarcation point(s). The ground bar(s) shall be electro-tin plated copper, minimum size of 1/4" x 6" x 12" or larger sizes as shown on the Drawings or required, with 3/8" plastic standoff insulators bolted to the wall. These ground bars shall be connected with a continuous No. 4/0 AWG bare copper ground conductor using high compression two (2) hole lugs. The No. 4/0 AWG ground conductor shall originate at the main switchboard ground bus and route through the building corridor ceilings unspliced to each of the ground bars. Provide "low smoke" type exothermic welds in an accessible ceiling using the proper style mold. Where impractical to use an exothermic weld due to space constraints, the Contractor may use an irreversible compression type connection listed for the purpose but only at locations approved by the Owner.
4. Provide a secondary building ground bar to serve as part of the building grounding electrode system in each electric room and other utilitarian areas of the building where dry-type transformers will be located, and in each communication room and/or where telecommunications main distribution frames (MDF) and sub-distribution frames (SDF) will be located. A ground bar(s) shall also be located at the telephone and CATV service entrance demarcation point(s). The ground bar(s) shall be electro-tin plated copper, minimum size of 1/4" x 6" x 12" or larger sizes as shown on the Drawings or required, with 3/8" plastic standoff insulators bolted to the wall. These ground bars shall be connected with a

continuous No. 4/0 AWG bare copper ground conductor using high compression two (2) hole lugs. The No. 4/0 AWG ground conductor shall originate at the nearest accessible building steel beam or column using a "low smoke" type exothermic weld with the proper style mold. Remove the building steel paint completely prior to making grounding connections and repaint with proper galvanized paint when complete.

5. Bond the building steel at each building expansion joint with No. 4/0 AWG bare copper using a "low smoke" type exothermic weld using the proper style mold at accessible locations. Remove the building steel paint completely prior to making grounding/bonding connections and repaint with proper galvanized paint when complete.

6. New Buildings, Building Additions and Exterior Electrical Equipment Enclosures:

(ENGINEER TO EDIT PARAGRAPHS BELOW TO SUIT PROJECT)

- a. Buildings with new concrete foundations and/or footings shall be provided with a minimum No. 4/0 AWG bare copper ground conductor from the main distribution switchboard ground bus to the foundations and/or footings concrete-encased electrode rebar meeting the requirements of NEC 250.52(A)(3). The conductor shall be thermal welded to the concrete-encased electrode (rebar), using the proper style mold. Refer to the detail on the Drawings.
 - b. Exterior electrical equipment enclosures with new concrete foundations and/or footings shall be provided with a bare copper ground conductor from the ground rods (if provided) and/or from the ground bus of the main panel within the enclosure to the concrete-encased electrode, meeting the requirements of NEC 250.52(A)(3), as shown on the Drawings. The conductor shall be thermal welded to the concrete-encased electrode (rebar), using the proper style mold. The enclosure, if metal, shall be bonded to the grounded electrode.
 - c. Steel frame buildings shall also have the steel columns anchor bolt connected to the concrete-encased electrode (rebar) with a No. 4/0 AWG bare copper ground conductor having an exothermic weld at both ends, using the proper style molds. Coordinate the installation of the anchor bolts to the base plate to scrape away paint/rust prior to the installation of the washer and nut to the steel columns anchor bolts. Refer to the detail on the Drawings.
- B. Secondary services shall be grounded on the "line" side in accordance with the NEC. The neutral disconnecting link, or links, shall be located so that the main distribution switchboard neutral bus with all interior secondary neutrals can be

isolated from the common ground bus and the service entrance conductors.

- C. The equipment grounding conductors and straps shall be sized in compliance with the NEC. All equipment grounding conductors shall be provided with green insulation equivalent to the insulation on the associated phase conductors. The related feeder and branch circuit grounding conductors shall be connected to the ground bus with pressure connectors. A feeder serving several panelboards shall have a continuous grounding conductor which shall be connected to each related cabinet ground bus.
- D. This Contractor shall furnish and install a separate green insulated equipment grounding conductor for each single or three-phase feeder and each branch circuit with a two-pole or three-pole protective device. The required grounding conductor shall be installed in the same raceway with the related phase and/or neutral conductors. Where there are parallel feeders installed in more than one raceway, each raceway shall have a green insulated equipment ground conductor. Single-phase branch circuits required for 120 and 277 volt lighting, receptacles, and motors shall consist of phase and neutral conductors installed in a common metallic raceway, which shall serve as the grounding conductor. Flexible metallic conduit equipment connections utilized in conjunction with the above single-phase branch circuits shall be provided with suitable green insulated grounding conductors connected to grounding terminals at each end of the flexible conduit.
- E. This Contractor shall furnish and install in the same raceway with the associated phase and/or neutral conductors, a green colored equipment ground conductor having the same type insulation and connected as described below:
1. Where electrical devices, such as heaters, are installed in air ducts, provide a green insulated equipment ground conductor sized in accordance with the NEC based on the rating of the overcurrent device supplying the unit. This conductor shall be bonded to the ground bus in the associated panelboard.
 2. From the equipment ground bus in panelboards through raceways and flexible metallic conduit to ground terminal in a connection box mounted on three-phase motors, furnish and install a ground conductor sized as herein specified. Where the motor has a separate starter and disconnecting device, the ground conductor shall originate at the ground bus in the panelboard. Motors shall be bonded to each starter and disconnecting device enclosure.

PART 3 - EXECUTION

3.01 POWER SYSTEM GROUNDING

- A. This Contractor shall furnish and install green insulated ground conductor(s) in a

raceway to the main ground and domestic metallic water main with ground clamps designed specifically for that purpose.

- B. Main distribution system: From the ground electrodes, this Contractor shall furnish and install an insulated ground conductor to the ground bus within the switchgear, to the neutral of the switchgear, and to all non-current carrying parts.
- C. Secondary building grounding: Furnish and install secondary building ground bars where indicated and as detailed on the drawings. Connect the ground bars with No. 4/0 AWG bare copper ground conductors originating from the (switchgear ground bus) (building steel). Provide green tags on the ground conductors every fifty (50) feet or less. The tags shall identify the ground conductor as the building secondary grounding electrode system. Laminate tags and secure with tie wraps.
- D. Branch circuit grounding: This Contractor shall furnish and install grounding bushings, ground terminal blocks, and grounding jumpers at distribution centers, pullboxes, panelboards, and the like.
- E. Bonding jumpers: This Contractor shall furnish and install a green insulated bonding conductor (size shall correlated with the over-current device protecting the conductor) attached to grounding bushings on the raceway, to lugs on boxes, and other enclosures.
- F. Bonding conductors: This Contractor shall furnish and install a bonding conductor in all flexible conduits connected at each end to a grounding bushing.
- G. Pole mounting luminaire (lighting fixture) grounding: This Contractor shall furnish and install a ground conductor with green insulation to the lighting standard (pole). Connect to a corrosion-resistant ground stud or ground clamp furnished as part of the standard. The ground conductor shall originate and be run with the branch circuit wiring.
- H. All electrical outlets shall be connected from the device grounding terminal to the outlet box with No. 12 AWG green insulated conductor. This Contractor shall furnish and install a green screw terminal in the outlet box and a continuous green ground conductor from the green terminal screw to the grounding systems as indicated on the Drawings.

3.02 COMMUNICATION GROUNDING

- A. Telephone
 - 1. This Contractor shall furnish and install one (1) No. 2 AWG green ground conductor in a $\frac{3}{4}$ inch raceway from the telephone equipment demarcation space to the main service ground or building secondary grounding electrode system.

2. This Contractor shall furnish and install one (1) No. 2 AWG type green ground loop between each raceway terminating at the telephone equipment demarcation backboard by means of a grounding bushing.
- B. Fire detection and alarm systems: This Contractor shall furnish and install one (1) No. 8 AWG green ground conductor in a 3/4 inch raceway from system equipment enclosures to the main service ground or building secondary grounding electrode system.
- C. Ancillary communication systems: Provide additional grounding of other building systems as described elsewhere in these specifications.

3.03 TESTS

- A. The completed grounding system shall be subjected to a ground resistance test with an earth test megger to ensure that the ground resistance, without chemical treatment or other artificial means, does not exceed five (5) ohms at the service entrance equipment's ground bus. The Contractor shall furnish and install additional ground rods and conductors from the exterior ground grid to achieve the required resistance to ground. Testing equipment must be calibrated to the manufacturer's requirements. Upon request, the Contractor shall provide documentation of the testing equipment's most recent calibration.
- B. In addition to the above, steel framed buildings shall be subjected to a ground resistance test with an earth test megger for the adequacy of the steel framing of the building as a grounding electrode system for five (5) ohms or less. Testing shall be at all of the secondary building ground bar connection points. If testing results do not meet the required resistance, the engineer must be notified.

END OF SECTION

SECTION 16506

LIGHTING OCCUPANCY SENSORS

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 SCOPE

- A. The work covered under this Section shall include furnishing and installing a complete operational occupancy sensor based lighting control system as shown on the Drawings, detailed in the manufacturer's submittal and as herein specified.
- B. Work described in this section shall be coordinated with all applicable plans and specifications, including by not limited to interfacing with microprocessor based Lighting Control Systems, wiring, raceways, boxes and fittings, luminaires, and HAVC systems.

1.03 QUALITY ASSURANCE

- A. Occupancy sensors shall conform to the requirements of the National Electrical Code (NEC), state and local codes, and these Specifications.
- B. All components shall be listed by Underwriter's Laboratories, Inc. (UL) for their intended use and shall bear the UL label.
- C. Products supplied shall be from a single manufacturer that has been continuously involved in manufacturing of occupancy sensors for a minimum of five (5) years. Mixing of manufacturers shall not be allowed.
- D. Products shall be manufactured by an ISO 9002 certified manufacturing facility and shall have a defect rating of less than 1/3 of 1%.
- E. Wall switch products must be capable of withstanding the effects of inrush current. Submittals shall clearly indicate the method used.

1.04 SUBMITTALS

- A. Submittals are required in accordance with SECTION 16010 of these specifications. Submittals shall include, but not be limited to the following for review. Submittals not containing all of the information listed below will be

rejected.

1. Manufacturers shall substantiate conformance to this specification by providing the necessary documents, performance data and wiring diagrams. Any deviations to the specifications must be clearly stated by letter and submitted.
2. Submit a scaled building lighting plan (minimum size of 1/16" = 1'-0") clearly marked by the manufacturer showing proper product, location and orientation of each sensor and power pack (switch pack). Plans shall show detection coverage patterns. If necessary for clarity, provide a 1/8" = 1'-0" scaled plan or one plan with coverage areas shown and another plan with the other information shown. Illegible drawings will be rejected.
3. Submit interconnections diagrams per major subsystem and interfacing with Lighting Control Panels (LCP) [Refer to SECTION 16500, showing proper wiring.
4. Submit standard catalog literature which includes performance specifications indicating compliance to the specification.
5. Catalog sheets must clearly state any load restrictions when used with electronic ballasts.

1.05 SYSTEM DESCRIPTION

- A. The objective of this specification section is to ensure the proper installation of the occupancy sensor based lighting control system so that lighting is turned off automatically after reasonable time delay when a room or area is vacated by the last person to occupy said room or area.
- B. The occupancy sensor based lighting control shall accommodate all conditions of space utilization and irregular work hours and habits.

1.06 SYSTEM TEST AND ACCEPTANCE

- A. Prior to the Architect/Engineer's final site visitation, and acceptance of each construction phase, this Contractor shall conduct a complete operation test of each system including each device. The systems shall test free from grounds, shorts, and other faults. All connections shall be thoroughly checked for mechanical and electrical connection. All equipment shall be demonstrated to operate in accordance with the requirements set forth in these Specifications and as shown on the Drawings.
- B. This Contractor shall perform all tests in the presence of the Owner. This Contractor shall furnish all personnel for use in the tests.

- C. When the work on the system has been completed and is ready for final review, a visit shall be made by the Owner at which time the Contractor shall demonstrate that the requirements of the Contract as it applies to this system have been carried out and that the system has been adjusted and operated in accordance herewith.

1.07 Training

- A. Upon completion of the project, the Contractor and manufacturer's factory authorized representative shall provide a minimum of four (4) hours of training to familiarize the Owner with the operation, use, adjustment, and problem solving diagnosis of the occupancy sensing devices and systems.

1.08 WARRANTY

- A. This Contractor shall warrant all equipment furnished in accordance with this specification to be undamaged, free of defects in materials and workmanship, and in conformance with these specifications. The warranty shall include repair or replacement, and testing without charge to the Owner on all or any parts of equipment which are found to be damaged, defective or non-conforming. There shall be no deductibles applied to such warranty. Satisfactory warranty documents shall be furnished. Refer to SECTION 01740 WARRANTIES AND BONDS.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. The lighting occupancy sensors shall be manufactured by SENSORSWITCH, as listed or equal by GREENGATE (COOPER CONTROLS), HUBBELL, or WATTSTOPPER.
- B. The listing of any manufacturer as "equal" does not imply automatic approval. This Contractor shall ensure submittals made are for sensors and associated equipment which meets or exceeds the specifications included herein.

2.02 LIGHTING OCCUPANCY SENSORS

- A. Occupancy sensors shall consist of, but not be limited to the following:
 - 1. Sensing technology shall be passive infrared (PIR), MicroPhonics (or ultrasonic), dual technology having both PIR and MicroPhonics (or ultrasonic).
 - 2. Passive infrared sensors shall provide high immunity to false triggering from RFI (hand-held radios) and EMI (electrical noise in the line). The

- PIR sensors shall have a multiple segmented Fresnel lens, in multi-tier configuration, with grooves-in to eliminate dust and residue build-up.
3. MicroPhonics shall be used in conjunction with PIR (passive infrared) sensing technology to enable a sensor to provide dual-technology sensing that is completely passive. MicroPhonics shall detect an occupant by detecting leading edge noises typical of human activity while filtering out building noises. The MicroPhonic sensing circuitry shall have automatic gain control to dynamically adapt to the sensor to its environment allowing it to filter out background noise.
 4. Ultrasonic sensors shall be able to adjust the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout controlled spaces. Ultrasonic operating frequency shall be crystal controlled at 32 kHz within $\pm 0.002\%$ tolerance, or 40 kHz within $\pm 0.002\%$ tolerance to assure reliable performance and eliminate sensor cross-talk. Sensors using multiple frequencies are not acceptable.
 5. Dual technology sensors shall consist of PIR and MicroPhonics (or ultrasonic) technologies for occupancy detection.
 6. All sensors shall be capable of operating normally with electronic ballasts, PL lamp systems and rated motor loads.
 7. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.
 8. All sensors shall have readily accessible, user adjustable settings for time delay and sensitivity. Settings shall be located on the sensor (not the control unit) and shall be recessed to limit tampering. Time delay shall be set to 10 minutes for all sensors.
 9. In the event of failure, a bypass manual override shall be provided on each sensor. When bypass is utilized, lighting shall remain on constantly or control shall divert to a wall switch or lighting control panel until the sensor is replaced. This control shall be recessed to prevent tampering.
 10. All sensors shall provide an LED as a visual means of indication at all times to verify that motion is being detected during both testing and normal operation.
- B. Ceiling mounted room occupancy sensors shall be low voltage dual technology type consisting of passive infrared (PIR) and MicroPhonic (or ultrasonic) technologies with 360° coverage for large classrooms, open office spaces or areas up to 1600 square feet; SENSORSWITCH Model CM PDT 10. Sensors

shall operate on 12 to 24 VAC or VDC and NEC Class 2 wiring. Each sensor shall be complete with one (1) power pack or two (2) power packs for rooms requiring two (2) lighting branch circuits. Rooms requiring multiple sensors may only require one (1) power pack for multiple sensors, where shown on the Drawings. Sensors shall also be equipped with an additional isolated relay.

1. Occupancy sensors shown on the Drawings to be powered from a Lighting Control Panel generally will not require a power pack.
- C. Ceiling mounted (or wall mounted where shown on the Drawings) room occupancy sensors shall be low voltage dual technology type consisting of passive infrared (PIR) and MicroPhonics (or ultrasonic) technologies for directional one-way coverage for classrooms, offices or areas up to 1000 square feet; SENSORSWITCH Model WV PDT 16. Sensors shall operate on 12 to 24 VAC or VDC and NEC Class 2 wiring. Each sensor shall be complete with one (1) power pack or two (2) power packs for rooms requiring two (2) lighting branch circuits. Rooms requiring multiple sensors may only require one (1) power pack for multiple sensors, where shown on the Drawings. Sensors shall also be equipped with an additional isolated relay.
1. Occupancy sensors shown on the Drawings to be powered from a Lighting Control Panel generally will not require a power pack.
- D. Corridor and corridor lobby ceiling mounted occupancy sensors, refer to lighting control specification section 16500.
- E. Wall switch occupancy sensors shall be line voltage dual-technology passive infrared (PIR) and MicroPhonic (or ultrasonic) technology type with coverage of approximately 30 to 40 square feet for use in small utility/storage rooms, small toilet rooms, etc. as shown on the Drawings; SENSORSWITCH Model WSX PDT-IV. Sensors shall operate on 120 or 277 volts. Load rating shall be 0 to 800 watts ballast or tungsten at 120 volts and 0 to 1200 watts ballast at 277 volts. Sensor shall use zero-cross circuitry to detect when the sine wave crosses at the "zero-point" so as to minimize wear on the switching contact.
1. Contractor shall supply stainless steel cover plates, not the plastic cover plates that may be included in the switch packaging. See Specification Section 16130 for type.
- F. Wall switch occupancy sensors, with dual ON/OFF button switches and dual relays for controlling two lighting loads or circuits, shall be line voltage dual-technology passive infrared (PIR) and MicroPhonic (or ultrasonic) technology type with coverage of approximately 30 to 40 square feet for use in small utility/storage rooms, small toilet rooms, etc. as shown on the Drawings; SENSORSWITCH Model WSX PDT 2P-IV. Sensors shall operate on 120 or 277 volts. Load rating shall be 0 to 800 watts ballast or tungsten at 120 volts and 0 to 1200 watts ballast at 277 volts.

1. Contractor shall supply stainless steel cover plates, not the plastic cover plates that may be included in the switch packaging. See Specification Section 16130 for type.

2.03 POWER PACKS AND AUXILIARY RELAY PACKS CONTROL UNITS

- A. Power packs shall accept 120 or 277 volts, be plenum rated, and provide Class 2 power to a minimum of two (2) occupancy sensors. Power packs shall be able to externally mount through a 1/2" knock-out on a standard electrical enclosure (junction box) and be an integrated, self-contained unit consisting internally of an isolated load switching control relay (load rated 20 amperes at 120 or 277 volts) and a transformer to provide low voltage power; SENSORSWITCH Model PP 20. Power pack shall provide a minimum of 150mA at 15 VDC to drive occupancy sensors and auxiliary relay packs.
- B. Power packs shall use zero-cross circuitry to detect when the sine wave crosses at the "zero-point" so as to minimize wear on the switching contact.
- C. Auxiliary relay packs shall be the same self-contained type unit as the power pack hereinbefore described, except shall not include a transformer; SENSORSWITCH Model SP 20. The auxiliary relay pack shall be used to control another lighting load with a different line voltage than the power pack. Auxiliary relay packs shall be powered from a power pack with 15 VDC.

2.04 ISOLATED RELAY

- A. Sensors hereinbefore described to include an isolated relay shall have the relay be internal with Normally Open, Normally Closed and Common outputs for use with Lighting Control Panels (LCP), HVAC control, and other control options as shown on the Drawings. Sensors utilizing separate components or specially modified units to achieve this function shall not be acceptable.
- B. Corridor and other location occupancy sensors indicated on the Drawings to interface with a Lighting Control Panel (LCP) shall have the isolated relay send a contact closure signal to the Lighting Control System. These sensors shall be powered from the LCP and not by a power pack. Operation of sensors in corridors and other areas where sensors are interfaced with the lighting control system shall operate in a manner such the lighting in the controlled areas is "held-on" during normal school operating hours. After normal schools hours, these controlled areas shall respond to the occupancy sensors for lighting control. See the Drawings and details for the sequence of operations via the LCP.

2.05 WIRING

- A. Low voltage wiring between occupancy sensors and power packs shall be three

(3) conductor, No. 18 AWG, unshielded, plenum rated with a temperature range for dry locations of minus ten (10) degrees C to sixty (60) degrees C. A cable that will meet this specification is WEST PENN Cat. No. 25234B.

- B. Low voltage wiring between occupancy sensors and Lighting Control Panels (LCP) shall be three (3) conductor, No. 18 AWG, unshielded, plenum rated with a temperature range for dry locations of minus ten (10) degrees C to sixty (60) degrees C. A cable that will meet this specification is WEST PENN Cat. No. 25234B.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. It shall be the Contractor's responsibility to provide the quantity of occupancy sensors required for complete and proper volumetric coverage to completely cover the controlled areas. Rooms shall have ninety (90) to one hundred (100) percent volumetric coverage to completely cover the controlled areas to accommodate all occupancy habits of single or multiple occupants at any location within the rooms. Proper judgment must be exercised in executing the work so as to ensure the best possible installation in the available space and to overcome local difficulties due to space limitations, interference of structural components, or furnishings in the rooms or spaces. The locations and quantities of sensors shown on the Drawings are based on coverage patterns of SENSORSWITCH sensors. Sensors of other approved manufacturers may require different quantities of sensors for full coverage of spaces being controlled. The sensors shown on the drawings are diagrammatic and do not necessarily show the exact locations of the sensors. This contractor shall confirm with the occupancy sensors manufacturer the exact quantities of sensors and power packs at time of bid. This Contractor shall provide additional sensors if required to properly and completely cover the respective rooms at no additional cost to the Owner.
- B. Line voltage wall switch type occupancy sensors shall be installed in a suitable wall outlet box in a method recommended by the equipment manufacturer similar to a standard line voltage light switch.
- C. Low voltage occupancy sensors shall be securely mounted to a ceiling or wall mounted junction box in a method recommended by the sensor manufacturer. Ceiling mounted junction boxes shall be supported from the building structure with no less than one (1) 1/4" threaded rod. Sensors shall be wired as detailed on the Drawings and as recommended by the equipment manufacturer.
- D. Power packs shall be located in accessible ceiling spaces and securely mounted to a standard electrical enclosure (junction box) through a standard 1/2" chase nipple. Plastic clips into the junction box shall not be acceptable. Junction box shall be supported from the building structure with no less than one (1) 1/4"

threaded rod. All Class 1 wiring shall pass through the chase nipple into the junction box without any exposure of wire leads. Low voltage Class 2 wiring to the sensors shall not be exposed in finished spaces. Power packs shall be wired as detailed on the Drawings and as recommended by the equipment manufacturer.

- E. Supports shall not terminate or be fastened directly to the roof decking except where specifically approved by the Owner.
- F. Wiring:
1. All low voltage field wiring in finished and unfinished spaces shall be installed by this Contractor in 1/2-inch conduit and/or surface metal raceway as shown on the Drawings or hereinbefore specified elsewhere. Conduit fill shall not exceed the conduit space capacity.
 2. All low voltage field wiring to be installed in areas without a ceiling or in areas without an accessible ceiling shall be installed by this Contractor in 1/2-inch conduit.
 3. All low voltage field wiring to be installed in areas with accessible ceilings shall be installed by this Contractor bundled together and run exposed above the ceilings. Bundles shall be supported by "J" hooks mounted not more than four (4) feet on center. "J" hooks shall be dedicated to the wiring specified in this specification section.
 4. All low voltage field wiring shall be run at right angles to the building structure.
 5. All low voltage field wiring shall be installed below the roof/floor structural supports (joists, beams, girders, etc.). Wiring installed between the structural supports mentioned above and the roof or floor deck will not be acceptable.
 6. All low voltage field wiring penetrations through new and/or existing walls shall be sleeved. Minimum sleeve size shall be one (1) inch. All sleeves shall be bushed both sides.
 7. All low voltage field wiring for the occupancy sensor systems shall be furnished and installed by this Contractor. All junction box covers shall be stenciled for distinct identification.
 8. All wiring connections shall be made by this Contractor as shown on the Drawings and as recommended by the equipment manufacturer. Splices shall be made only in junction boxes.

9. All occupancy sensor system wiring shall be checked and tested by this Contractor to insure the system is free from grounds, opens, and shorts.
 10. Contractor shall test all low voltage cable for integrity and proper operation of the system.
- G. The Contractor shall arrange a pre-installation meeting with the occupancy sensors manufacturer's factory authorized representative, at the project facility to verify proper placement of sensors and installation criteria.

3.02 TESTING

- A. Sensor Testing and Adjustment:
1. At the time of installation, the Contractor shall be responsible for testing and adjusting each sensor for proper detection of motion appropriate to room usage. The Contractor shall follow the testing and adjustment procedures as written in the installation instructions for each sensor model. **Note: Due to room conditions it may be necessary for the Contractor to make adjustments, change the location or type of sensor to obtain proper operation and coverage of the system in each room and should therefore make labor and material allowances for such changes and adjustments.**

END OF SECTION

SECTION 16610

FIRE DETECTION AND ALARM SYSTEM

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 SCOPE

- A. The work covered under this Section shall include engineering, designing, testing, furnishing and installing a complete and operable addressable type analog fire detection and alarm system shown on the Drawings and herein specified. The system shall include, but not be limited to: control panel including backbox; remote graphic annunciator panel including backbox; alarm initiating and indicating peripheral devices; outlet boxes; conduit; line and low voltage wiring; and all accessories required.
- B. The existing fire detection and alarm system shall remain in operation during the construction period until the new system has been installed, tested, and approved by the Fairfax County Fire Marshal and the Owner. The existing system shall then be removed as shown on the Drawings.

1.03 QUALITY ASSURANCE

- A. All devices and equipment for this system shall be listed by the Underwriter's Laboratories, Inc. (UL), bear the UL label and shall conform to the applicable sections of National Fire Protection Association (NFPA) 72 and 90A, and the Americans with Disabilities Act (ADA) Code of Federal Regulation.
- B. The installation shall be in accordance with all requirements of NFPA, the National Electrical Code (NEC), all state and local codes and requirements, and these Specifications.
- C. This Contractor shall furnish shop drawings submittals for all components of this system in accordance with SECTION 16010 of these specifications. Submittals shall include the following for review. Submittals not containing all of the information listed below will be rejected.
 - 1. A complete list by model number of each component of the system with a statement of how many pieces of each model are to be furnished and a listing of the specific data sheet.
 - 2. A description of the system as it functions by component in the system using model numbers where applicable.

3. A complete battery calculation listing by module for the system.
 4. A data sheet shall be furnished for each component of the system. The specific information shall be highlighted.
 5. A detailed drawing of the control panel shall be furnished showing all modules in their specific location with the specific terminal terminations shown.
 6. A detailed set of floor plans for the complete building shall be furnished showing the locations of all equipment and devices, their addresses, and their required interconnections. The interconnections shown shall indicate the system manufacturer's recommended number, size, and type of wires as described in this Specification. The plans shall show the locations of all required control and monitor modules and their addresses. The layout of all fire detection and alarm system equipment, devices, and conduit routings shall closely follow that shown on the Drawings.
 7. A detailed drawing shall be furnished of each type of device showing the exact terminal designations.
 8. A detailed list shall be furnished of each type of device in the system stating its program function in the system.
 9. A detailed list shall be furnished of the relays in the system and their program function.
 10. A detailed manufacturer's drawing shall be furnished of the graphic annunciator panel, as it shall appear on the wall in the location of its installation.
 11. Certification by the equipment distributor of the required service response time.
- D. Following review of the submittals by the Architect/Engineer and Owner, and prior to release of the fire alarm equipment, this Contractor shall submit to the Fairfax County Fire Marshal's office all copies of the corrected submittals for review, comment, and approval. This contractor shall not release any equipment prior to receiving the Fairfax County Fire Marshall approved shop drawing. This contractor shall be responsible for paying all fees associated with the Fire Marshall's review.
- E. The installation of all equipment and the final connection of all components and wiring shall be performed under the direct supervision of the system manufacturer's technical staff.

- F. Upon completion, the system shall be thoroughly tested by this Contractor to assure proper interfacing of all components.
- G. Prior to final inspection, this Contractor shall furnish to the prime Contractor, five (5) copies of the manufacturer's submittal drawings up-dated to reflect: any and all revisions to the system made during construction; and the final addresses of all devices. A printed list of system devices, which will include the following: device type, address, and custom message.
- H. The equipment to be furnished by this Contractor under these Specifications shall be the standard product of one manufacturer. Acceptable manufacturers shall be engaged in the manufacture of multiplexed fire alarm equipment for at least seven (7) years and have a fully equipped, factory trained and authorized service organization that will have a response time of four (4) hours or less to the job site The acceptable manufacturers shall be as follows EDWARDS SYSTEMS TECHNOLOGY (EST); NOTIFIER; and SIMPLEX TIME RECORDER CO.
- I. The fire detection and alarm system shall be furnished by a factory authorized distributor certified to design, program, and service the system. This distributor must show evidence of successfully furnishing systems as specified for at least five (5) years. This distributor shall provide twenty four (24) hour, seven (7) day a week (including holidays) service capability with a maximum four (4) hour response time. This distributor shall provide certification of this capability as part of the submittals.
- J. This contractor shall furnish to the Owner the following keys in the quantities indicated.
 - 1. Fire Alarm Annunciator Panel Access – Two (2)
 - 2. Fire Alarm Annunciator Control Switches – Five (5).
 - 3. Fire Alarm Control Panel – Five (5)

1.04 DESCRIPTION OF SYSTEM

- A. The fire detection and alarm system shall be individual point addressable, general alarm, electrically supervised, continuously sounding temporal tone signal with audible and visual alarm and trouble indications.
 - 1. Each individual alarm initiating device shall report to the control panel as a separate "address".
 - 2. The remote graphic annunciator panel's fire zone, and sprinkler zone boundaries shall be in accordance with the Fairfax County's regulations and the Architect/Engineer's detail on the Drawings.

- B. Activation of a manual fire alarm pull station; automatic smoke, heat detector; kitchen hood extinguishing system; or waterflow switch shall cause the following: (Activation of a Carbon Monoxide Detector shall actuate items #1, #3, #6, #7)
1. All audible/visual-signaling devices shall sound continuously having a temporal tone signal until manually silenced. A subsequent alarm received after silencing shall again cause the alarm indicating circuits to be activated. The fire alarm signals shall be distinctive from all other alarm signals and shall be clearly audible throughout the entire building.
 2. The appropriate alarm source indicating lamps shall energize on the remote graphic annunciator panel and indicate type of device and geographic fire zone. Graphic annunciator panel lamps, when lighted, shall be constantly illuminated. Flashing lamps will not be acceptable.
 3. Auxiliary contacts shall activate the security intrusion system.
 4. Operation of any intelligent thermal detector in the elevator machine room and/or elevator shaft shall automatically shut down the associated elevator.
 5. Close all normally held-open smoke doors.
 6. Carbon Monoxide Detectors (CO) shall actuate a local sounder base with a Temporal 4 Tone. The CO Detector shall be programmed as a latching device. Activation of the Alarm Silence button on the FACP shall not silence the Temporal 4 Tone on the CO Detector sounder base. The CO Sounder base shall only silence upon reset of the FACP.
 7. The system shall identify all off normal conditions and log each condition into the system as an event.
 - a. The system shall automatically display on the control panel Liquid Crystal Display (LCD) the first (oldest) event of the highest priority by type. The event priority shall be alarm, supervisory, trouble, and monitor.
 - b. The system shall utilize four event queues, and shall not require event acknowledgment by the system operator. Labeled, color coded indicators shall be provided for each type of event queue: alarm - red, supervisory - yellow, trouble - yellow, monitor - yellow. When an unseen event exists for a given type, the indicator shall be lit.
 - c. For each event, the display shall include the current time, the total number of events, the type of event, the time the event occurred and up to a 42 character custom user description.

- d. The user shall be able to review each event queue by simply selecting scrolling keys (up-down) for the event type.
 - e. New alarm, supervisory, or trouble events shall sound a distinct, silenceable audible signal at the control panel.
 - f. The LCD shall show the number of active alarm, supervisory, trouble and monitor events.
 - g. The LCD shall show the system time and the number of active and disabled points in the system.
 - h. Specific input/output devices shall operate in accordance with the alarm, supervisory, trouble, monitor sections that follow and the input/output matrix.
- C. Activation of a sprinkler valve tamper switch; dry pipe HI/LO air; air duct type detector; fire pump fault; or generator fault shall cause the following:
- 1. The appropriate amber alarm source indicating lamp shall energize on the remote graphic annunciator panel and the integral audible trouble signal shall sound.
 - 2. Auxiliary contacts shall activate the security intrusion system.
 - 3. The system shall identify all off normal conditions and log each condition into the system as an event.
 - a. The system shall automatically display on the control panel Liquid Crystal Display (LCD) the first (oldest) event of the highest priority by type. The event priority shall be alarm, supervisory, trouble, and monitor.
 - b. The system shall utilize four event queues, and shall not require event acknowledgment by the system operator. Labeled, color coded indicators shall be provided for each type of event queue: alarm - red, supervisory - yellow, trouble - yellow, monitor - yellow. When an unseen event exists for a given type, the indicator shall be lit.
 - c. For each event, the display shall include the current time, the total number of events, the type of event, the time the event occurred and up to a 42 character custom user description.
 - d. The user shall be able to review each event queue by simply selecting scrolling keys (up-down) for the event type.

- e. New alarm, supervisory, or trouble events shall sound a distinct, silenceable audible signal at the control panel.
 - f. The LCD shall show the number of active alarm, supervisory, trouble and monitor events
 - g. The LCD shall show the system time and the number of active and disabled points in the system.
 - h. Specific input/output devices shall operate in accordance with the alarm, supervisory, trouble, monitor sections that follow and the input/output matrix.
4. Operation of any air duct type smoke detector shall automatically shut down the associated air-handling unit and units which serve the same area, such as gymnasiums, cafeteria, auditoriums, etc.
- D. The system, including the remote graphic annunciator panel, shall remain in alarm condition until the initiating device is reset to normal and the control panel is reset. System reset shall be accomplished on a single key-operated switch on the remote graphic annunciator panel.
- E. The system shall use 120-volt commercial power as its normal source of power. Upon failure of the normal source, the system shall automatically transfer to the standby power supply which shall be capable of supporting all system supervisory functions for all initiation and signal circuits for a period of four (4) hours as required by NFPA 72A.
- F. In the event of failure of operating power, an open, or ground condition on the system wiring, the trouble signals (both audible and visual) shall actuate at the remote graphic annunciator panel. It shall be possible to silence audible trouble signals by means of silencing switches; however, it shall not be possible to extinguish the visual signals until the disarrangement has been corrected. Upon correction of the trouble condition, the audible trouble signal shall sound until the silencing switch is returned to normal or the system automatically resets the trouble indication. Alarm or trouble indication shall cause an auxiliary contact operation connected to the security system Field Interface Device.
- G. The system shall allow for trouble monitoring of each booster panel using a SIGA CT1 intelligent monitoring module.
- H. Each output function shall be bypassable via switch at the FACP. Any bypass feature shall generate a trouble condition on the FACP and to school security. Each bypass feature shall be grouped by type, Audio/Visual, Door holders,

elevator recall and any other outputs. One switch shall be programmed per type of output event.

1.05 TESTING

- A. Upon final completion of the installation, and acceptance of each construction phased space, and after satisfactory testing of the system by this Contractor in the presence of the equipment supplier, this Contractor shall test the system in the presence of the Architect/Engineer, Fire Marshall, Owner, and other authorities having jurisdiction. The manufacturer shall furnish to the Owner a two (2) year contract effective from the date of acceptance, for maintenance and inspection service of the manufacturers' equipment. The manufacturer shall maintain an adequate supply of spare parts for ten (10) years, and shall provide supervision of the installation. The manufacturer and/or their distributor shall provide twenty-four (24) hour/seven (7) day (including holidays) service to the system as hereinbefore described.

1.06 WARRANTY

- A. This Contractor shall deliver the work described herein in a first-class operating condition in every respect. This Contractor shall also warrant that the material, equipment, and workmanship furnished shall be entirely free from defects. Any materials, equipment, or workmanship in which defects may develop before or during the warranty period shall be repaired or replaced at the Contractor's own expense. Refer to SECTION 01740 for the start of the warranty period. The contractor shall further warrant that all material, equipment, and workmanship used in the installation, but not specifically mentioned in the Drawings and Specifications, is the best of their respective kinds and that the construction and installation was performed in accordance with the best accepted standard practices in all details.
- B. It is the intention of this Specification that a complete life-safety system be furnished from a single manufacturer. Equipment shall be UL listed for fire alarm use.

1.07 INSTRUCTION AND MANUALS

- A. The equipment manufacturer shall provide eight (8) hours of instruction to the Owner's maintenance personnel and shall furnish three (3) complete field service manuals.

1.08 SPARE PARTS

- A. This Contractor shall furnish to the Owner spare parts as follows. Spare parts shall be furnished prior to the installation of the system.
 - 1. Two (2) intelligent smoke detectors including bases.

2. Two (2) intelligent thermal type detectors including bases.
3. Two (2) Air duct type smoke detectors.
4. Four (4) intelligent control modules.
5. Four (4) intelligent monitor modules; one (1) single intelligent monitor module and three (3) dual intelligent monitor modules.
6. Two (2) manual pull stations and intelligent monitor modules for each.
7. Six (6) audio/visual alarm signals.
8. Two (2) exterior alarm signals including surface mounted weatherproof backboxes.
9. Four (4) visual only alarm signals
10. Two (2) Synchronization output modules; one (1) standard mount and one (1) board mount.

PART 2 - PRODUCTS

2.01 NEW MAIN CONTROL PANEL

- A. The fire alarm control panel(s) shall be a multi-processor based networked system designed specifically for fire, one-way Notification communications. The control panel shall be listed and approved for the application standard(s) as listed in the References section of this specification.
- B. The control panel shall include all required hardware, software and site specific system programming to provide a complete and operational system. The control panel(s) shall be designed such that interactions between any applications can be configured, and modified using software provided by the manufacturer. The control panel(s) operational priority shall assure that life safety takes precedence among the activities coordinated by the control panel.
- C. The operating controls shall be located in a dead-front steel enclosure behind a locked door with viewing window. All control modules shall be labeled, and all zone locations shall be identified. All panel modules shall be placement supervised for and signal a trouble if damaged or removed.
- D. System Features. Each control panel shall include the following capabilities:
 1. Supervision of the system electronics, wiring, detection devices and software

2. Up to 2500 analog/addressable input/output points
 3. Network connections with up to 63 other control panels and annunciators.
 4. Support multiple dialers (DACTs) and modems
 5. Two communication ports
 6. An internal audible signal with different patterns to distinguish between alarm, supervisory, trouble and monitor events
 7. Support multiple 24 VDC and Audio NACs
 8. User configurable switches and LED indicators to support auxiliary functions
 9. Log up to 1740 chronological events
 10. The ability to download all applications and firmware from the configuration computer at a single location on the fire network
 11. A real-time clock for time stamps and timed event control
 12. Electronic addressing of intelligent addressable devices
 13. Provide an independent hardware watchdog to supervise software and CPU operation
 14. "Dry" alarm, trouble and supervisory relay contacts
 15. Control panel modules shall plug in to a chassis assembly for ease of Maintenance
 16. Field wiring shall connect to the panel using removable connectors
- E. User Oriented Features. Each control panel shall include the following user oriented features:
1. An LCD user interface control/display that shall annunciate and control system functions.

2. Provide discreet system control switches for reset, alarm silence, panel silence, drill switch, previous message switch, next message switch and details.
3. A "lamp test" feature shall verify operation of all visual indicators on the panel.
4. An authorized user shall have the ability to operate or modify system functions including system time, date, passwords, holiday dates, restart the system and clear control panel event history file.
5. An authorized user shall have the ability to disable/enable devices, zones, actions, timers and sequences.
 - a) An authorized user shall have the ability to activate/restore outputs, actions, sequences, and simulate detector smoke levels.
 - b) An authorized user shall have the ability to enter time and date, reconfigure an external port for download programming, initiate programming and change passwords.
6. An authorized user shall have the ability to test the functions of the installed system.
7. Service groups shall facilitate one-man walk testing. Service/test groups shall be capable of being configured with any combination of addressable devices, independent of SLC wiring. It shall be possible to program alternate device responses when the device's service group is active. Devices not in an active service group shall process all events normally.
8. Provide internal system diagnostics and maintenance user interface controls to display/report the power, communication, and general status of specific panel components, detectors, and modules.
 - a) SLC loop controller diagnostics shall identify common alarm, trouble, ground fault, Class A fault, and map faults. Map faults include wire changes, device type changes by location, device additions/deletions and conventional open, short, and ground conditions. Ground faults on the supervised circuit wiring of remote addressable modules shall be identified by device address.
 - b) An authorized user shall have the ability to generate a report history for alarm, supervisory, monitor, trouble, smoke verification, watchdog, and restore activity.
9. System reports shall provide detailed description of the status of system parameters for corrective action or for preventative maintenance

- programs. Reports shall be displayed by the operator interface or capable of being printed on a printer.
10. An authorized user shall have the ability to display/report the condition of addressable analog detectors. Reports shall include device address, device type, percent obscuration, and maintenance indication. The maintenance indication shall provide the user with a measure of contamination of a device upon which cleaning decisions can be made.
 11. Programmability; A Windows-based Configuration Utility (CU) shall be used to create the site-specific system programming. The utility shall facilitate programming of any input point to any output point. The utility shall allow customization of fundamental system operations using initiating events to start actions, timers, sequences and logical algorithms.
 12. Zoning of initiation devices.
 13. Initiation of events by time of day, day of week, day of year.
 14. Initiation of events by matrix groups (X-Y coordinate relationships) for releasing systems.
 15. Initiation of events using OR, AND, NOT and counting functions.
 16. Prioritizing system events.
 17. Programmable activation of detector sounder bases by detector, groups of bases, or all bases.
 18. Directing selected device messages to specific panel annunciators
 19. Detector sensitivity selection by time of day
 20. Support of 256 Central Monitoring Station accounts and directing selected device messages to any one of ten Central Monitoring Stations.
- F. The configuration utility shall time and date stamp all changes to the site-specific program, and shall facilitate program versioning and shall store all previous program version data. The utility shall provide a compare feature to identify the differences between different versions of the site-specific program.
- G. The configuration utility shall be capable of generating reports which detail the configurations of all fire alarm panels, addressable devices and their configuration settings including generating electrical maps of the addressable device SLCs.

- H. The configuration utility shall support the use of bar code readers to expedite electronic addressing and custom programming functions.
- I. The fire alarm control panel shall be an Edwards 3-CPU3 and support components in an appropriately sized enclosure.
- J. A main fire alarm control panel, which will meet this Specification, shall consist of an EST Model No. EST-3 wall mounted equipment cabinet(s) complete with the following modules of the quantity required to perform all of the specified functions.
 - 1. EST-3
 - a. EST Model No. 3-CPU3 central processor unit.
 - b. EST Model No. 3-RS485B network communications card.
 - c. EST Model No. 3-RS232 RS232 communications card.
 - d. EST Model No. 3-SSDC1 signature single driver controller.
 - e. EST Model No. 3-PPS/M power supply.
 - f. EST Model No. 3-RS232
 - g. EST Model No. MN-COM1S
 - h. EST Model No. 3-12/S1RY
- K. Other main fire alarm control panels which will meet this Specification are:
 - 1. NOTIFIER Model No. NFS2-640
 - 2. SIMPLEX TIME RECORDER CO. Model No. 4100-U

2.02 INTELLIGENT PERIPHERAL REQUIREMENTS

- A. This Contractor shall furnish and install intelligent devices as shown on the Drawings and herein specified. All remote intelligent devices shall have a microprocessor with non-volatile memory to support their functionality and serviceability. Each device shall store as required for its functionality the following data: device serial number; device address; device type; personality code; date of manufacture; hours in use; time and date of last alarm; amount of environmental compensation left/used; last maintenance date; job/project number; current detector sensitivity values; diagnostic information (trouble codes); and algorithms required to process sensor data and perform

communications with the loop controller. Each device shall be capable of electronic addressing either automatically or application programmed assigned, to support physical/electrical mapping and supervision by location. Setting a device's address by physical means shall not be necessary.

- B. The intelligent detectors shall be capable of full digital communications using both broadcast and polling protocol. Each detector shall be capable of performing independent fire detection algorithms. The fire detection algorithm shall measure sensor signal dimensions, time patterns, and combine different fire parameters to increase reliability and distinguish real fire conditions from unwanted deceptive nuisance alarms. The devices shall eliminate by digital filters, signal patterns that are not typical of fires. Devices not capable of combining different fire parameters or employing digital filters shall not be acceptable. Each detector shall have an integral microprocessor capable of making alarm decisions based on fire parameter information stored in the detector head. Distributed intelligence shall improve response time by decreasing the data flow between detector and analog loop controller. Detectors not capable of making independent alarm decisions shall not be acceptable. Maximum total analog loop response time for detectors changing state shall be 0.5 seconds. Each detector shall have a separate means of displaying communication and alarm status. A green LED shall flash to confirm communication with the analog loop controller. A red LED shall flash to display alarm status. The detector shall be capable of identifying up to thirty-two (32) diagnostic codes. This information shall be available for system maintenance. The diagnostic code shall be stored at the detector. Each smoke detector shall be capable of transmitting pre-alarm and alarm signals in addition to the normal, trouble, and need cleaning information. It shall be possible to program control panel activity to each level. It shall be possible to individually program each smoke detector to operate at any one of five (5) sensitivity settings. Each detector microprocessor shall contain an environmental compensation algorithm, which shall identify and set ambient "environmental thresholds" approximately six (6) times an hour. The microprocessor shall continually monitor the environmental impact of temperature, humidity, other types of contaminants, as well as detector aging. The process shall employ digital compensation to adapt the detector to both twenty-four (24) hour long term and four (4) hour short term environmental changes. The microprocessor shall monitor the environmental compensation value and alert the system operator when the detector approaches eighty percent (80%) and one hundred percent (100%) of the allowable environmental compensation value. Differential sensing algorithms shall maintain a constant differential between selected detector sensitivity and the "learned" base line sensitivity. The base line sensitivity information shall be updated and permanently stored at the detector approximately once every hour.

2.03 INTELLIGENT PHOTOELECTRIC TYPE SMOKE DETECTOR

- A. This Contractor shall furnish and install intelligent photoelectric type smoke detectors as shown on the Drawings and herein specified. The analog

photoelectric type smoke detector shall utilize a light scattering type photoelectric smoke sensor to sense changes in air samples from its surroundings. The integral microprocessor shall dynamically examine values from the sensor and initiate an alarm based on the analysis of data. Systems using central intelligence for alarm decisions shall not be acceptable. The detector shall continually monitor any changes in sensitivity due to the environmental affects of dirt, smoke, temperature, aging, and humidity. The information shall be stored in the integral processor and transferred to the analog loop controller for retrieval using a laptop PC or similar program/service tool. The detector shall be rated for ceiling installation at a minimum of thirty (30) feet centers and shall be suitable for wall mount applications. The percent smoke obscuration per foot alarm set point shall be field selectable to any of five (5) sensitivity settings ranging from one percent (1%) to three and a half percent (3-1/2%). The photoelectric smoke detector shall be suitable for direct insertion into air ducts up to 3 ft (0.91m) high and 3 ft (0.91m) wide with air velocities up to 5,000 ft/min. (0-25.39 m/sec) without requiring specific duct detector housings or supply tubes. The detector shall be suitable for operation in the following environment:

1. Temperature: thirty-two (32)°F to one hundred twenty (120)°F.
 2. Humidity: zero (0) to ninety-three percent (93%) relative humidity, non-condensing.
 3. Elevation: no limit.
- B. Where noted on the Drawings, intelligent photoelectric type smoke detectors shall be furnished and installed by this Contractor complete with wire guards.
- C. An intelligent photoelectric type smoke detector, which will meet this Specification, is EST Model No. SIGA-PD complete with Model No. SIGA-SB base suitable for mounting over a four (4) inch octagonal or square outlet box.

2.04 INTELLIGENT THERMAL DETECTOR

- A. This Contractor shall furnish and install intelligent combination fixed temperature/rate-of-rise thermal detectors as shown on the Drawings and herein specified. The thermal detector shall have a low mass thermistor heat sensor and operate at a fixed temperature and at a temperature rate-of-rise. The detector shall continually monitor the temperature of the air in its' surroundings to minimize thermal lag to the time required to process an alarm. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. Systems using central intelligence for alarm decisions shall not be acceptable. The intelligent thermal detector shall have a nominal fixed temperature alarm point rating of one hundred thirty-five (135)°F and a rate-of-rise alarm point of fifteen (15)°F per minute. The intelligent thermal detector shall be rated for ceiling installation at a minimum of seventy (70) foot centers and be suitable for wall mount applications.

- B. An intelligent thermal detector which will meet this Specification is EST Model No. SIGA-HRD complete with Model No. SIGA-SB base suitable for mounting over a four (4) inch octagonal or square outlet box.

2.05 INTELLIGENT CARBON MONOXIDE (CO) DETECTOR

- A. This Contractor shall furnish and install intelligent carbon monoxide detectors with remote indicator as shown on the Drawings and herein specified. The carbon monoxide detectors detector shall have advanced electromechanical carbon monoxide sensing technology, ground fault detection, field replacable carbon monoxide sensor/daughterboard module and automatic device mapping with electronic addressing. The intelligent carbon monoxide detectors shall have a operating temperature range of 32°F To 120°F. The intelligent carbon monoxide detectors shall be rated for both ceiling and wall mounted installation. Wall mounted detectors shall be mounted at a height recommended by the system manufacturer.
- B. An intelligent carbon monoxide detector, which will meet this Specification, shall consist of the following.
 - 1. One (1) EST Model No. SIGA-COD intelligent carbon monoxide detectors
 - 2. One (1) EST Model No. SIGA-AB4G/T audible base.
 - 3. One (1) EST Model No. SIGA -TCDR Temporal Pattern Generator
 - 4. One (1) EST Model No. SIGA-LED remote indicator.

2.06 INTELLIGENT MONITOR MODULE

- A. This Contractor shall furnish and install intelligent single input monitor modules as shown on the Drawings and herein specified. The intelligent single input monitor module shall provide one (1) supervised Class B input circuit capable of a minimum of four (4) personalities, each with a distinct operation. The module shall be suitable for mounting on a 2-1/2" deep single gang outlet box or a 1-1/2" deep four (4) inch square outlet box. The single input module shall support the following circuit types:
 - 1. Normally-open alarm latching for manual pull stations, thermal detectors, etc.
 - 2. Normally-open alarm delayed latching for sprinkler flow alarm switches.
 - 3. Normally-open active non-latching for monitor, fans, dampers, door hold-open, etc.

4. Normally-open active latching for supervisory and sprinkler valve tamper switches.
- B. It shall be possible to address each intelligent monitor module without the use of DIP or rotary switches. Modules using DIP switches for addressing shall be acceptable. The personality of multifunction modules shall be programmable at the site to suit conditions and shall be changeable at any time using a personality code downloaded from the analog loop controller. Modules requiring EPROM, PROM, or ROM changes shall not be acceptable. DIP switch and/or jumper changes shall be acceptable. The module shall have a minimum of two (2) diagnostic LEDs mounted behind a finished cover plate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The module shall be capable of storing up to twenty-four (24) diagnostic codes that may be retrieved for troubleshooting assistance. Input and output circuit wiring shall be supervised for open and ground faults. The module shall be suitable for operation in the following environment:
1. Temperature: thirty-two (32)°F to one hundred twenty (120)°F.
 2. Humidity: Zero (0) to ninety-three percent (93%) relative humidity, non-condensing.
- C. An intelligent monitor module, which will meet this Specification, is EST Model No. SIGA-CT1 complete with a cover plate designed to conceal the address setting means but allow the polling LED to show.

2.07 INTELLIGENT CONTROL MODULE

- A. This Contractor shall furnish and install intelligent control relay modules as shown on the Drawings and herein specified. The intelligent control relay module shall provide one (1) form C dry relay contact rated at two (2) amps at 24 VDC to control external appliances or equipment shutdown. The control relay shall be rated for pilot duty and releasing systems. The position of the relay contact shall be confirmed by the system firmware. The module shall be suitable for mounting on a 2-1/2" deep single gang outlet box or a 1-1/2" deep four (4) inch square outlet box.
- B. It shall be possible to address each intelligent monitor module without the use of DIP or rotary switches. Modules using DIP switches for addressing shall be acceptable. The personality of multifunction modules shall be programmable at the site to suit conditions and shall be changeable at any time using a personality code downloaded from the analog loop controller. Modules requiring EPROM, PROM, or ROM changes shall not be acceptable. Modules using DIP switch and/or jumper changes shall be acceptable. The module shall have a minimum of two (2) diagnostic LEDs mounted behind a finished cover plate. A green LED shall flash to confirm communication with the loop controller. A red LED shall

flash to display alarm status. The module shall be capable of storing up to twenty-four (24) diagnostic codes that may be retrieved for troubleshooting assistance. Input and output circuit wiring shall be supervised for open and ground faults. The module shall be suitable for operation in the following environment:

1. Temperature: thirty-two (32)°F to one hundred twenty (120)°F.
 2. Humidity: Zero (0) to ninety-three percent (93%) relative humidity, non-condensing.
- C. An intelligent control module, which will meet this Specification, is EST Module No. SIGA-CR complete with a cover plate designed to conceal the address setting means but allow the polling LED to show.

2.08 INTERIOR MANUAL PULL STATIONS

- A. This Contractor shall furnish and install single action, single stage, and manual pull stations as shown on the Drawings and herein specified. The single action manual pull stations shall be addressable. Pull stations using DIP or rotary switches shall be acceptable. Pull stations shall have a minimum of two (2) diagnostic LEDs mounted on their integral, factory assembled single or two stage input module. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The station shall be capable of storing up to twenty-four (24) diagnostic codes that shall be capable of being retrieved for troubleshooting assistance. The pull station shall include a locked test feature and an internal toggle switch. The red manual station shall be constructed of rugged aluminum or high impact Lexan and shall be complete with a break glass rod. Stations shall be keyed alike with the control panel. The module shall be suitable for mounting on a 2-1/2" deep single gang outlet box or a 1-1/2" deep four (4) inch square outlet box with a single gang cover. The manual station shall be suitable for operation in the following environment:
1. Temperature: thirty-two (32)°F to one hundred twenty (120)°F.
 2. Humidity: Zero (0) to ninety-three percent (93%) relative humidity, non-condensing.
- B. Manual stations areas noted on the Drawings shall be complete with wire guards furnished and installed by this Contractor.
- C. A manual pull station, which will meet this Specification, is EST Model No. SIGA-270 complete with Model No. 950017C wire guard (where noted on the Drawings), and Model No. 27193-11 surface mounted steel outlet box (where noted on the Drawings to be surface mounted).
- D. Furnish and install Safety Technology International, Inc. (STI) clear lexan alarm

covers Model No. 1100 (flush mounted) and/or 1130 (surface mounted) Stopper II, except in Gymnasiums where manual pull stations shall be provided with wire guards.

2.09 EXTERIOR MANUAL PULL STATIONS

- A. This Contractor shall furnish and install weatherproof single action, single stage, and manual pull stations as shown on the Drawings and herein specified. The single action manual pull stations shall be addressable. Pull stations using DIP or rotary switches shall be acceptable. Pull stations shall be solid corrosion-resistant type construction. Rated NEMA 4X for outdoor use. The manual pull station shall come complete with a surface mounted backbox with gasket.
 - 1. Temperature: negative 30 (-30)°F to one hundred fifty (150)°F.
- B. Manual stations shall be complete with an intelligent monitor module. The monitor module shall be installed in the interior of the building at a location near the exterior manual pull station location.
- C. A weatherproof manual pull station and backbox which will meet this Specification, is EST Model No. MPSR1-SHTW-GE.
- D. Furnish and install Safety Technology International, Inc. (STI) clear lexan alarm covers Model No. STI-13020FR (flush mounted) and/or STI-13220FR (surface mounted) Stopper II.

2.10 AIR DUCT TYPE SMOKE DETECTORS

- A. This Contractor shall furnish photoelectric duct smoke detectors as shown on the Drawings and herein specified. The intelligent duct smoke detector shall operate in ducts having from 100ft/min to 4,000ft/min air velocity. The detector shall be suitable for operation over a temperature range of -20 to 158F° and offer a harsh environment gasket option. The detector shall utilize an air exhaust tube and an air sampling inlet tube that extends into the duct air stream up to ten (10) feet. Design of the detector shall permit sampling tube installation from either side of the detector and permit sampling tube installation in 45- degree increments to ensure proper alignment with duct airflow. Drilling templates and gaskets to facilitate locating and mounting the housing shall be provided. The intelligent duct smoke detector shall obtain information from a photoelectric sensing element. The detector shall be able to differentiate between a long term drift above the pre alarm threshold and fast rise above the threshold. The detector shall monitor the sensitivity of the smoke sensor. If the sensitivity shifts outside the UL limits, a trouble signal shall be sent to the panel. Each detector shall utilize an environmental compensation algorithm that shall automatically adjust for background environmental conditions such as dust, temperature, and pressure. The detector shall provide a maintenance alert signal when 80% (dirty) of the

available compensation range has been used. The detector shall provide a dirty fault signal when 100% or greater compensation has been used. Each duct detector shall be installed and tested in accordance with manufacturer's instructions.

- B. The detectors shall be furnished complete with auxiliary relay contacts to shut down the associated air handling unit upon activation of the duct detector and to provide contact closure for connection to building ATC system for associated HVAC unit(s) shutdown. The intelligent duct smoke detector shall provide a form "C" auxiliary alarm relay rated at 2amps @ 30Vdc. The position of the relay contact shall be supervised by the control panel software. Operation of the relay shall be controlled either by its respective detector processor or under program control from the control panel as required by the application. Detector relays not capable of programmed operation independent of the detector's state shall not be considered as equal. The detector shall be equipped with a local magnet-activated test switch.
- C. Air duct type smoke detectors shall be furnished by this Contractor and installed in the air duct under DIVISION 15. Motor control wiring shall be furnished and installed under DIVISION 15. The detector shall be made part of the fire detection and alarm system by this Contractor.
- D. Where duct detectors are installed in area with a suspended ceiling, this contractor shall furnish and install a label on the ceiling grid below where the duct detector is installed.
- E. This Contractor shall furnish and install a remote alarm indicator for each air duct type smoke detector. Each alarm indicator shall be complete with an engraved nameplate mounted adjacent to the indicator by this Contractor and lettered with the air handling unit number.
- F. An air duct type smoke detector, which will meet this Specification, shall consist of the following.
 - 1. One (1) EST Model No. SIGA-SD intellegent photoelectric duct type detector.
 - 2. One (1) EST Model No. ST sampling tube of the length required to suit the duct dimension.
 - 3. One (1) EST Model No. SIGA-CRH intelligent control module for shutdown of the air handling equipment.
 - 4. One (1) EST Model No. SIGA-LED remote indicator.

2.11 SPRINKLER WATERFLOW SWITCHES

- A. Sprinkler waterflow switches shall be furnished and installed under DIVISION 15. This Contractor shall make connections to the fire detection and alarm system.
- B. This Contractor shall furnish and install an intelligent monitor module for each waterflow switch installed.

2.12 VALVE TAMPER SWITCHES

- A. Valve tamper switches shall be furnished and installed under DIVISION 15. This Contractor shall make connections to the fire detection on and alarm system.
- B. This Contractor shall furnish and install an intelligent monitor module for each tamper switch installed.

2.13 WALL MOUNTED AUDIO/VISUAL ALARM SIGNALS

- A. This Contractor shall furnish and install wall mounted electronic alarm signals as shown on the Drawings and herein specified. The alarm signals shall be of solid-state construction and shall produce a temporal horn sound output of 94.5 dBA avg. and 97.6 dBA peak at ten (10) feet. The strobes shall be selectable to produce a minimum of 15, 30, 75, 95, 110, 115, 150 and 177 candela effective intensity as shown on the drawings. The flash rate shall not exceed three (3) flashes per second nor be less than one (1) flash every three (3) seconds. This Contractor shall furnish and install wall mounting styles for surface, semi-flush, or flush installation as shown on the Drawings. Alarm signals shall be complete with screw terminals for in-out field wiring of up to No. 12 AWG conductors and a red finish.
- B. Audio/visual alarm signals shall be listed to: UL 1971; UL 1638; UL 464; ULC S525 and S526; ADA Chapter 28, Part 36 Final Rule; and NFPA 72.
- C. All audio/visual alarm signals shall be UL listed for fire protective service.
- D. Audio/visual alarm signals shall be capable of operating from standard signaling circuits or from addressable intelligent signal modules.
- E. Audio/visual alarm signals in areas noted on the Drawings shall be installed complete with wire guards furnished and installed by this Contractor.
- F. The wall mounted audio/visual alarm signals, which meet this Specification, are EST Model No. G1RF-HDVM Multi-candela Strobe field selectable at 15, 30, 75 or 110 Candela and G1RF-HDVMH Multi-candela Strobe field selectable at 95, 115, 150 or 177 Candela complete with red finish, mounting plate, and Model No. 27193-11 red finished surface mounting box (where indicated on the Drawings to be surface mounted).

2.14 CEILING MOUNTED AUDIO/VISUAL ALARM SIGNALS

- A. This Contractor shall furnish and install ceiling mounted electronic alarm signals as shown on the Drawings and herein specified. The alarm signals shall be of solid state construction and shall produce temporal horn sound output of 94.5 dBA avg. and 97.6 dBA peak at ten (10) feet. The strobes shall be selectable to produce a minimum of 15, 30, 75, 95, 115, 150 and 177 Candela. The flash rate shall not exceed three (3) flashes per second nor be less than one (1) flash every three (3) seconds. This Contractor shall furnish and install a mounting style for installation flush in the ceiling as shown on the Drawings. Alarm signals shall be complete with screw terminals for in-out field wiring of up to No. 12 AWG conductors and a red finish.
- B. Audio/visual alarm signals shall be listed to: UL 1971; UL 1638; UL 464; ULC S525 and S526; ULC S525; ADA Chapter 28, Part 36 Final Rule; and NFPA 72.
- C. Audio/visual alarm signals shall be capable of operating from standard signaling circuits or from addressable intelligent signal modules.
- D. The ceiling mounted audio/visual alarm signals, which will meet this Specification, are EST Model No. GCF-HDVM Multi-candela Strobe field selectable at 15, 30, 75 or 95 Candela, and GCF-HDVMH Multi-candela Strobe field selectable at 95, 115, 150 or 177 Candela. Complete with white finish, mounting plate and ceiling orientated lettering.

2.15 WALL MOUNTED VISUAL ONLY ALARM SIGNALS

- A. This Contractor shall furnish and install wall mounted electronic visual only alarm signals as shown on the Drawings and herein specified. The visual only alarm signal strobes shall be selectable to produce a minimum of 15, 30, 75, 95, 110, 115, 150 and 177 candela effective intensity as shown on the drawings. The flash rate shall not exceed three (3) flashes per second nor be less than one (1) flash every three (3) seconds. This Contractor shall furnish and install wall mounting styles for surface or semi-flush installation as shown on the Drawings. Visual only alarm signals shall be complete with screw terminals for in-out field wiring of up to No. 12 AWG conductors and a red finish.
- B. Visual only alarm signals shall be listed to: UL 1971; UL 1638; ULC S525 and S526; ADA Chapter 28, Part 36 Final Rule; and NFPA 72.
- C. Visual only alarm signals shall be capable of operating from standard signaling circuits or from addressable intelligent control modules.
- D. Visual only alarm signal noted on the Drawings shall be complete with wire guards furnished and installed by this Contractor.
- E. The wall mounted visual alarm signals, which will meet this Specification, are EST Model No. G1RF-VM Multi-candela Strobe field selectable at 15, 30, 75 or

110 and G1RF-VMH Multi-candela Strobe field selectable at 95, 115, 150 or 177 candela complete with red finish, mounting plate, and Model No. 27193-11 red finished surface mounting box (where indicated on the Drawings to be surface mounted).

- F. This Contractor shall furnish and install a flush mounted electronic visual only alarm signal with a red lens for alert of Carbon Monoxide Detector Operation. The wall mounted visual alarm signal for Carbon Monoxide Detector Operation which will meet this Specification, are EST Model No. GCWN-VMC (Red) Multi – candela Strobe field selectable at 15, 30, 75 or 95 candela. The Visual only alarm device shall be located in the main administrative suite at a location visible to the office staff or as directed by the owner. Coordinate location with owners technical staff prior to installation. Label device “CO Detection Alarm”.

2.16 CEILING MOUNTED VISUAL ONLY ALARM SIGNALS

- A. This Contractor shall furnish and install ceiling mounted electronic visual only alarm signals as shown on the Drawings and herein specified. The visual only alarm signals strobes shall be selectable to produce a minimum of 15, 30, 75, 95, 115, 150 and 177 Candela effective intensity as shown on the drawings. The flash rate shall not exceed three (3) flashes per second nor be less than one (1) flash every three (3) seconds. This Contractor shall furnish and install a ceiling mounting style for flush installation as shown on the Drawings. Visual only alarm signals shall be complete with screw terminals for in-out field wiring of up to No. 12 AWG conductors and a red finish.
- B. Visual only alarm signals shall be listed to: UL 1971; UL 1638; ULC S525 and S526; ADA Chapter 28, Part 36 Final Rule; and NFPA 72.
- C. Visual only alarm signals shall be capable of operating from standard signaling circuits or from addressable intelligent control modules.
- D. The ceiling mounted visual only alarm signals, which will meet this Specification, is EST Model No. GCF-VM Multi-candela ceiling strobe field selectable at 15, 30, 75 or 95 Candela and GCF-VMH Multi-candela Strobe field selectable at 95, 115, 150 or 177 Candela complete with white finish, mounting plate, and ceiling orientated lettering.

2.17 EXTERIOR ALARM SIGNALS

- A. This Contractor shall furnish and install exterior alarm signals as shown on the Drawings and herein specified. The exterior alarm signals shall be of solid state construction and shall produce a temporal horn sound output of 92 dBA peak at ten (10) feet. Maximum current shall be 0.023 Amps at 24 VDC. Exterior alarm signals shall be complete with screw terminals for in-out field wiring of up to No. 12 AWG conductors and a red finish.

- B. Exterior alarm signals shall be listed to: UL 1971; UL 1638; UL 464; ULC S525 and S526; ADA Chapter 28, Part 36 Final Rule; and NFPA 72.
- C. All exterior alarm signals shall be UL listed for fire protective service.
- D. Exterior alarm signals shall be capable of operating from standard signaling circuits or from addressable intelligent signal modules.
- E. Exterior alarm signals shall be suitable for installation of the exterior of the building, bear the appropriate UL label, and shall be furnished complete with a surface mounted weatherproof outlet box.
- F. An exterior alarm signal that will meet this Specification is EST Model No. 757-1A-T complete with red finish, mounting plate, and Model No. 757A-WB red finished surface mounted weatherproof outlet box.
- G. Provide an exterior Waterflow Bell mounted in a weatherproof backbox. The bell will be on a separate individual circuit, which shall be sound upon any waterflow activation. The bell shall mount on the exterior of the building as shown on the drawings. An exterior Bell which meets this specification is EST Model 439-10AWR with an EST Model 449 weatherproof backbox.

2.18 EXTERIOR AUDIO/VISUAL ALARM SIGNALS

- A. This Contractor shall furnish and install exterior audio/visual alarm signals as shown on the Drawings and herein specified. The exterior alarm signals shall be of solid state construction and shall produce a temporal horn sound output of 92 dBA peak at ten (10) feet. The strobes shall be minimum of 75 and 110 Candela. The flash rate shall not exceed three (3) flashes per second nor be less than one (1) flash every three (3) seconds. This Contractor shall furnish and install wall mounting styles for surface or semi-flush installation as shown on the Drawings. Audio/Visual alarm signals shall be complete with screw terminals for in-out field wiring of up to No. 12 AWG conductors and a red finish.
- B. Exterior audio/visual alarm signals shall be listed to: UL 1971; UL 1638; UL 464; ULC S525 and S526; ADA Chapter 28, Part 36 Final Rule; and NFPA 72.
- C. All exterior audio/visual alarm signals shall be UL listed for fire protective service.
- D. Exterior audio/visual alarm signals shall be capable of operating from standard signaling circuits or from addressable intelligent signal modules.
- E. Exterior audio/visual alarm signals shall be suitable for installation of the exterior of the building, bear the appropriate UL label, and shall be furnished complete with a surface mounted weatherproof outlet box.

- F. An exterior audio/visual alarm signals that will meet this Specification is EST Model No. 757-7A-T (75cd) and/or 757-8A-T (110cd) complete with white finish, mounting plate, and Model No. 757A-WB red finished surface mounted weatherproof outlet box.

2.19 REMOTE GRAPHIC ANNUNCIATOR PANEL

- A. This Contractor shall furnish and install where shown on the Drawings, a remote graphic annunciator panel. The annunciator panel shall have black photo-emulsion graphics as detailed on the Drawings. The graphics shall be applied to a white Plexiglas panel to assure legibility and ease of future on-site updating. The graphics panel shall be protected by a outer layer of non-glare Plexiglas. All electrical connections shall be made to screw terminals mounted on a back plate that shall connect to the faceplate with ribbon cables. The LED system, positioned behind the graphic panel shall be visible only in the ON mode. The panel shall be framed in architectural gray aluminum and mounted by this Contractor in a flush steel backbox. A key lock and hidden-screw construction shall be provided for tamper resistance. The annunciator panel shall be keyed alike for all the control switches but different from the annunciator panel door access key.
- B. The annunciator shall operate via a RS485 serial data line connected to the main control panel. Annunciators that require a separate conductor for each indicator shall not be acceptable.

2.20 MAGNETIC DOOR HOLDERS

- A. Magnetic door holders shall be furnished and installed by this Contractor as required for the mounting conditions and controlled by the fire alarm and detection system. This Contractor shall coordinate with the hardware supplier and the door installer to assure proper alignment, preparation, and operation with the associated doors. The door mounted magnets shall be mounted with bolts through the door with finish grade back plates. Magnets shall be 24VDC and shall be mounted as indicated on the Drawings.
- B. This Contractor shall furnish and install an intelligent control module for each set, or adjacent sets, of magnetic door holders as shown on the Drawings or provide a power source at the main FACP with a control relay for deactivation.
- C. A magnetic door holder, which will meet this Specification, is EST Model No. 1504-AQ (flush mounted with a long catch plate), 1505-AQ (flush mounted with a short catch plate), or 1508-AQ (surface mounted).

2.21 FIELD WIRING

- A. Field wiring for each intelligent loop shall consist of cables furnished and installed by this Contractor in minimum 1/2 inch conduit and as hereinbefore specified.

The type, size, and number of conductors in the cable shall be in strict compliance with the manufacturer's requirements.

- B. Field wiring for all alarm signals shall consist of cables furnished and installed by this Contractor in minimum 1/2 inch conduit and as hereinbefore specified. The type, size, and number of conductors in the cable shall be in strict compliance with the manufacturer's requirements.
- C. Magnetic door holder power wiring from the main control panel shall consist of two (2) conductor, No. 12 AWG, furnished and installed by this Contractor in 1/2 inch conduit and as hereinbefore specified.

PART 3 EXECUTION

3.01 FIRE ALARM CONTROL EQUIPMENT

- A. All fire alarm control equipment, including the main control panel and any signal extender panels shall be supplied from the building's 120 volt EMERGENCY power source as shown on the Drawings. All fire alarm control equipment, including the main control panel and any signal extender panels shall be located in the Communications Room as shown on the Drawings. Contractor shall be responsible for providing any additional devices required by code or these specifications for any control equipment located other than in the Communications Room, including 120 volt EMERGENCY power. These other locations must be specifically approved by the Owner.

3.02 MAIN CONTROL PANEL

- A. The main control panel backbox(s) shall be mounted on the wall, and all interior components furnished and installed by this Contractor, at the location shown on the Drawings in accordance with manufacturer's recommendations. Mounting height shall be approximately sixty (60) inches above the finished floor to the center of cabin.

3.03 MANUAL STATIONS

- A. Manual stations shown on the Drawings to be installed on existing walls or partitions shall be furnished and installed in surface device boxes of the appropriate size and shall be suitable for use with surface metal raceway. Existing conduits concealed in masonry walls may be reused only with the written approval of the Owner.
- B. Manual stations shown on the Drawings to be installed in new construction shall be furnished and installed by this Contractor to flush device boxes of the appropriate size as recommended by the equipment manufacturer.
- C. Wire guards shown on the Drawings to be installed over manual stations shall be

furnished and installed by this Contractor. Wire guards shall not be anchored into acoustical wall panels. This Contractor shall insure that wood blocking is installed behind the wall panels. The wire guards shall be anchored through the wall panels and into the wood blocking.

3.04 SMOKE DETECTORS

- A. Smoke detectors shown on the Drawings to be installed in areas with suspended ceilings shall be surface mounted as high as possible on ceiling with concealed outlet boxes supported from structure.
- B. Smoke detectors shown on the Drawings to be installed in areas without suspended ceilings shall be mounted to a surface mounted outlet box rigidly attached to the building structure independently of the associated conduits.
- C. Smoke detectors required for smoke damper control shall be furnished and installed by this contractor. Coordinate locations with Mechanical drawings.
- D. All smoke detectors shall be thoroughly cleaned at the end of the project prior to the system being turned over to the Owner.

3.05 THERMAL DETECTORS

- A. Thermal detectors shown on the Drawings to be installed in areas with suspended ceilings shall be surface mounted on the ceiling with concealed outlet boxes.
- B. Thermal detectors shown on the Drawings to be installed in areas without suspended ceilings shall be mounted as high as possible to surface mounted outlet boxes rigidly attached to the building structure independently of the associated conduits.

3.06 INTELLIGENT CARBON MONOXIDE (CO) DETECTOR

- A. intelligent carbon monoxide detectors shown on the Drawings to be installed in areas with suspended ceilings shall be surface mounted as high as possible on ceiling with concealed outlet boxes supported from structure.
- B. intelligent carbon monoxide detectors shown on the Drawings to be installed in areas without suspended ceilings shall be mounted to a surface mounted outlet box rigidly attached to the building structure independently of the associated conduits.
- C. All intelligent carbon monoxide detectors shall be thoroughly cleaned at the end of the project prior to the system being turned over to the Owner.

3.07 INTELLIGENT CONTROL, MONITOR, AND SIGNAL MODULES

- A. Intelligent control, monitor, and signal modules shall be flush mounted in the ceiling as close as possible to the associated device. In areas without ceilings, the modules may be mounted to the underside of the structure, or wall mounted. Wherever possible, the modules shall be ganged together.
- B. Intelligent control and monitor modules for sprinkler flow and tamper switches and the fire pump shall be flush mounted in the front face of a wiring trough as detailed on the Drawings.

3.08 REMOTE GRAPHIC ANNUNCIATOR PANEL

- A. The remote graphic annunciator panel backbox shall be flush mounted and all interior components furnished and installed by this Contractor, at the location shown on the Drawings in accordance with manufacturer's recommendations. Mounting height shall be approximately fifty two (52) inches above finished floor to the center of cabinet.

3.09 SPRINKLER FLOW ALARM SWITCHES

- A. All sprinkler flow switches shall be furnished and installed under DIVISION 15. This Contractor shall make all electrical connections necessary to properly integrate these devices into the fire detection and alarm system.

3.10 SPRINKLER VALVE TAMPER SWITCHES

- A. Sprinkler valve tamper switches shall be furnished and installed on all sprinkler system valves under DIVISION 15. This Contractor shall make all electrical connections necessary to properly integrate these devices into the fire detection and alarm system.

3.11 ALARM SIGNALS

- A. Audio/visual and visual only alarm signals shown on the Drawings to be installed on existing walls or partitions shall be furnished and installed by this Contractor over surface device boxes of appropriate size and suitable for use with surface metal raceways.
- B. Audio/visual and visual only alarm signals shown on the Drawings to be installed in new construction shall be furnished and installed by this Contractor over concealed device boxes of appropriate size with the appropriate trim rings.
- C. Wire guards shown on the Drawings to be installed over alarm signals shall be furnished and installed by this Contractor. Wire guards shall not be anchored into acoustical wall panels. This Contractor shall insure that wood blocking is installed behind the wall panels. The wire guards shall be anchored through the wall panels and into the wood blocking.

- D. Audio/visual and visual only alarm signals shown on the Drawings to be installed flush and/or semi-flush mounted in ceilings shall be installed by this Contractor over concealed flush mounted device boxes of appropriate size with the appropriate trim rings. The box shall be supported by ceiling support bridges and steel wire directly to building structure.
- E. Audio/Visual and Visual only alarm signals shown on the Drawings to be ceiling mounted in areas with open structure (no suspended ceiling) shall be furnished by this contractor over surface device boxes of the appropriate size and suitable for use with surface conduit. The boxes shall be mounted directly to the underside of the structural members or metal framing channels bridging the structural members.

3.12 AIR DUCT TYPE SMOKE DETECTORS

- A. Air duct type smoke detectors shall be furnished under this DIVISION and mounted into ducts and connected to the air handler control circuit under DIVISION 15. This Contractor shall perform all wiring connections to the fire detection and alarm system and complete system test.
- B. Air duct type smoke detectors shall be thoroughly cleaned at the end of the project prior to the system being turned over to the Owner.

3.13 FIELD WIRING

- A. All line and low voltage wiring, conduit, backboxes, device mounting boxes, and junction boxes required for the fire detection and alarm system shall be furnished and installed by this Contractor.
- B. All low voltage field wiring shall be installed, by this Contractor, in ½" conduit and/or surface metal raceway.
- C. This Contractor shall make all connections to panels, devices, and detectors with crimp type spade terminal connectors. Splices in station circuits shall be made only in junction boxes and shall be crimp connected.
- D. All wiring shall be checked and tested by this Contractor to insure the system is free from grounds, opens, and shorts.
- E. The installation and final connections of all components and devices shall be performed in accordance with manufacturer's instructions and recommendations. Manufacturer's technical staff shall verify proper installation during testing.
- F. A maximum of ten (10) T-taps on the Signalling Line Circuit (SLC) shall be allowed only at the FACP head end cabinet location. (**Note: T-taps in the field are prohibited**).

- G. A copy of the SLC device map shall be provided to the owner upon completion and acceptance of the system.
- H. The end of line (EOL) resistor shall be terminated on barrier strip and from barrier strip, #14AWG wiring shall go to to the fire alarm device.

3.14 FIELD PROGRAMMING

- A. The manufacturer's technical representative shall field program the fire detection and alarm system after all related equipment has been installed and prior to any final testing. The technical representative shall be factory certified for programming. The initial program shall be developed by the equipment supplier in conjunction with the Owner and Fire Marshal.
- B. In addition to the initial field programming described above, the manufacturer shall furnish an additional two (2) sessions of field programming changes to be performed at any time during the warranty period at no additional expense to the Owner.

3.15 ON-SITE AS-BUILT DRAWINGS

- A. The Contractor shall provide one (1) set of the fire alarm system supplier's as-built drawings for permanent use on-site. The Contractor shall: laminate each page of these drawings; provide a rigid means for mounting such as 1/4 inch thick x two (2) inch wide x width of the drawings through-bolted wood along the left edge of the drawings; furnish and install hanging hooks on the back of the Communications Room door; and hang the bound set of drawings.

END OF SECTION

SECTION 16620

SECURITY INTRUSION SYSTEM

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 SCOPE

- A. The work covered under this Section shall include furnishing and installing a centrally controlled complete and satisfactorily operating security intrusion system for the pick-up, amplification, and annunciation of: building intrusion; fire alarm activation and trouble signals; emergency engine generator set run and fault signals; and boiler trouble signals to the Owner's central office.
- B. This Contractor shall furnish and install the temporary security loop for the building as described on the Drawings.

1.03 QUALITY ASSURANCE

- A. All equipment and materials for this system shall be listed by Underwriter's Laboratories, Inc. (UL), bear the UL label, and shall be installed in accordance with all requirements of the National Electrical Code (NEC), all state and local codes, and these Specifications.
- B. This Contractor must show evidence of successfully furnishing and installing systems specified for at least five (5) years, and shall be Department of Criminal Justice Services (DCJS) certified for security installations by the Commonwealth of Virginia.
- C. Equipment shall be constructed in accordance with National Electrical Manufacturer's Association (NEMA) standards.
- D. This Contractor shall furnish submittals for all components of the security system in accordance with SECTION 16010 of these Specifications. Submittals shall include the following for review. Submittals not containing all of the information listed below will be rejected.
 - 1. A complete list by model number of each component of the system with a statement of how many pieces of each model to be furnished and a listing of the specific data sheet.
 - 2. A description of the system as it functions by component in the system using model numbers where applicable.

3. A data sheet shall be furnished for each component of the system. The specific information shall be highlighted.
 4. A detailed set of floor plans for the complete building shall be furnished showing the locations of all equipment and devices and their required interconnections. Security devices shall be zoned as shown on the Drawings. The interconnections shown shall indicate the number, size, and type of wires as described in this Specification. The layout of all security intrusion system equipment and devices shall closely follow that shown on the Drawings.
 5. A detailed drawing shall be furnished of each type of device showing the exact terminal designations.
 6. A detailed list shall be furnished of each type of device in the system stating its program function in the system.
- E. This Contractor shall furnish and install all outlet boxes, conduit, wiring, door switches, security motion detectors, equipment locations, terminals, and all other accessories required to install a security intrusion system as herein specified and as indicated on the Drawings. The system shall be installed, connected, tested, and left in a first class operating condition.
- F. Catalog numbers specified for the security system constitute type, quality, and operating characteristics of the equipment and system to be furnished. The master and all peripheral devices that comprise the system shall be listed by Underwriter's Laboratories, Inc., (UL) and shall bear the UL label and shall be installed in accordance with all requirements of the National Electrical Code (NEC), all local codes, and these Specifications.

1.04 DOCUMENTATION

- A. This Contractor shall furnish to the Owner four (4) bound copies of complete operating and maintenance instructions of the system including Digital Monitoring Products (DMP) XR500 series programming sheets, circuit diagrams and all other information necessary for the proper operation, service, and maintenance.
- B. This Contractor shall furnish to the Owner a set of "as-built" drawings complete with field wiring diagrams.

1.05 TRAINING

- A. This Contractor shall furnish the Owner's designated representatives eight (8) hours of on-the-job technical service instructions in the operating, maintenance, and troubleshooting of the system.

1.06 DESCRIPTION OF OPERATION

- A. The security system shall be furnished and installed as shown on the Drawings and as specified herein and shall function as follows:
1. Monitor the normally open (with resistor at end of the line) door switch zones. Zones shall be circuited as shown on the Drawings.
 2. Monitor the fire detection and alarm system through normally opened contacts at the fire alarm control panel to activate by contact break on alarm condition and on a trouble condition.
 3. Respond to motion detection contacts normally open (with resistor at end of the line) and tamper. Zones shall be circuited as shown on the Drawings.
 4. Monitor roof hatch openings by opening switch contacts in normally open (with resistor at end of the line) zone loops. Zones shall be circuited as shown on the Drawings.
 5. Provide remote arming and disarming of the system from a semi-flush mounted keypad.
 6. Monitor the normally open (with resistor at end of the line) knock box zone. Zones shall be circuited as shown on the Drawings.
 7. Monitor the normally open contacts on the emergency generator for generator run and fault. Zones shall be circuited as shown on the Drawings.
 8. Monitor the normally open contacts for each boiler shown for boiler alarm. Zones shall be circuited as shown on the Drawings.
 9. Monitor the normally open contacts at automatic temperature control (ATC) main control panel for panel trouble and building temperature sensor (to be programmable at ATC panel). Zones shall be circuited as shown on the Drawings.

1.07 SYSTEM TEST AND ACCEPTANCE

- A. Prior to the Architect/Engineer's final site visitation, and acceptance of each construction phase, this Contractor shall conduct an operating test of the complete system including each device. The system shall test free from grounds, shorts, and other faults. All connections shall be thoroughly checked for mechanical and electrical connection. All equipment shall be demonstrated to operate in accordance with the requirements set forth in these Specifications and as shown on the Drawings.

- B. This Contractor shall perform all tests in the presence of the Owner. This Contractor shall furnish all personnel for use in the test.
- C. When the work on the system has been completed and is ready for final review, a visit shall be made by the Owner at which time the Contractor shall demonstrate that the requirements of the Contract as it applies to this system have been carried out and that the system has been adjusted and operated in accordance herewith.

1.08 WARRANTY

- A. This Contractor shall deliver the work in first-class operating condition in every respect. This Contractor shall also warrant that the material, equipment, and workmanship furnished shall be entirely free from defects. Any materials, equipment, or workmanship in which defects may develop before or during the warranty period shall be repaired or replaced at the Contractors own expense. Refer to SECTION 01740 for the start of the warranty period. This contractor shall further warrant that all material, equipment, and workmanship used in the installation, but not specifically mentioned in the Drawings and Specifications, is the best of their respective kinds and that the construction and installation was performed in accordance with the best accepted standard practices in all details.

1.09 SPARE PARTS

- A. This Contractor shall furnish to the Owner spare parts as follows. Spare parts shall be furnished prior to the installation of the system.
 - 1. Two (2) wide pattern, narrow pattern and barrier pattern type motion detectors.

1.10 EQUIPMENT LOCATIONS

- A. This Contractor shall furnish and install where shown on the Drawings, wall mounted main and sub-distribution equipment locations consisting of fire resistant 3/4 inch thick plywood backboards and the distribution equipment as detailed on the Drawings.

PART 2 - PRODUCTS

2.01 FIELD INTERFACE COMMUNICATOR DEVICE

- A. The (new) field interface communicator device shall be furnished and installed by this Contractor as detailed on the Drawings. Digital Monitoring Products (DMP) Cat. No. XR550 complete with 16.5 VAC 50 VA transformer, one (1) 893A dual phone line module, one (1) 318 battery harness and two (2) 365 lead-acid batteries.
- B. The field interface communicator device exists and shall be relocated (removed)

by this Contractor as detailed on the Drawings.

2.02 ZONE EXPANDER MODULES

- A. The zone expander modules shall be furnished and installed by this Contractor as detailed on the Drawings.
 - 1. LX-Bus zone expander modules shall be Digital Monitoring Products (DMP) Cat. No. 714-16 sixteen (16) zone expander. Refer to floor plans for exact number required.
 - 2. Keypad zone expander modules shall be Digital Monitoring Products Cat. No. 714 four (4) zone expander surface mounted on a single gang device box. Refer to floor plans for exact number required.
- B. The zone expander modules exist and shall be relocated by this Contractor as detailed on the Drawings.

2.03 SECURITY DOOR SWITCHES

- A. Security door switches shall be HONEYWELL Cat. No. 7939-2 complete with spacers, covers and mounting screws.

2.04 SECURITY OVERHEAD DOOR AND ROOF HATCH SWITCHES

- A. Security overhead door and roof hatch switches shall be single pole, single throw, two (2) wire, HONEYWELL Cat. No. 958-2.

2.05 SECURITY MOTION DETECTORS

- A. Security wall mounted motion detectors noted on the Drawings to be the wide pattern type shall be HONEYWELL Cat. No. DT-900 or BOSCH Cat. No. DS720i anti-mask type and shall include mounting brackets and hardware for wall mounting as shown on the Drawings.
- B. Security wall mounted motion sensors noted on the Drawings to be the narrow pattern type shall be HONEYWELL Cat. No. DT-906 or BOSCH Cat. No. DS720i anti-mask type and shall include mounting brackets and hardware for wall mounting as shown on the Drawings.
- C. Security wall mounted motion sensors noted on the Drawings to be the barrier pattern type shall be HONEYWELL Cat. No. DT-7450TC or Digital Security Controls (DSC) Cat. No. LC-124-PIMW-WNL and shall include mounting brackets and hardware for wall mounting as shown on the Drawings.

2.06 POWER SUPPLY FOR SECURITY MOTION DETECTORS

- A. This Contractor shall furnish and install at the main distribution equipment

location power supply unit(s) rated 12 volts DC with a minimum six (6) amp capacity. The power supply shall be ALTRONIX or approved equal.

2.07 REMOTE KEYPAD

- A. The remote keypad shall be furnished and installed by this Contractor over a flush mounted single gang outlet box as detailed on the Drawings. Digital Monitoring Products (DMP) Cat. No. 7060N (white) security command keypad mounted on a 696-W back box.
- B. The remote keypad is existing and shall be relocated by this Contractor as shown on the Drawings. The outlet box shall be furnished and installed by this Contractor.

2.08 EQUIPMENT LOCATIONS

- A. This Contractor shall furnish and install where shown on the Drawings, wall mounted main and sub-distribution equipment locations consisting of fire resistant 3/4-inch thick plywood backboards and IDEAL cat. No. 89-212 terminal strips as detailed on the Drawings.

2.09 WIRING

- A. Zone wiring for security door switches (including the overhead door and roof hatch switches), as shown on the Drawings shall be furnished and installed by this Contractor and shall consist of a two (2) conductor, No. 18 AWG, plenum rated cable with a temperature range for dry locations of minus ten (10) degrees C to sixty (60) degrees C. A cable which will meet this Specification is WEST PENN Cat. No. 25224B or equal as manufactured by BELDEN, CONSOLIDATED WIRE, GENERAL CABLE, PAIGE, or TAPPAN.
- B. Zone wiring and power wiring for the security motion detectors as shown on the Drawings shall be furnished and installed by this Contractor and shall consist of a single four (4) conductor, No. 18 AWG, unshielded, plenum rated cable with a temperature range for dry locations of minus ten (10) degrees C to seventy-five (75) degrees C. A cable, which will meet the specification, is WEST PENN Cat. No. 25244B or equal as manufactured by BELDEN, CONSOLIDATED WIRE, GENERAL CABLE, PAIGE, or TAPPAN. Conductor colors shall be white and green conductors for zone wiring and red (positive) and black (negative) conductors for power wiring.
- C. Security motion detectors power wiring from the main power supply (located at the main distribution equipment location [SIS-MDEL-A]) to each sub-distribution equipment location shall be two (2) conductor, No. 12 AWG plenum rated cable with a temperature range for dry locations of minus ten (10) degrees C to sixty (60) degrees C. A cable that will meet this specification is WEST PENN Cat. No. 25227B or equal as manufactured by BELDEN, CONSOLIDATED WIRE, GENERAL CABLE, or PAIGE. Conductor colors shall be red (positive) and black

(negative).

- D. This Contractor shall furnish and install one (1) six (6) conductor, No. 18 AWG, unshielded, plenum rated cable with a temperature range for dry locations of minus ten (10) degrees C to seventy-five (75) degrees C in 1/2 inch conduit to the fire alarm control panel and connect to the normally open auxiliary trouble and alarm relays as detailed on the Drawings. A cable that will meet this Specification is WEST PENN Cat. No. 25186B or equal as manufactured by BELDEN, CONSOLIDATED WIRE, GENERAL CABLE, or PAIGE.
- E. Wiring for the remote keypad and LX busses shall be furnished and installed by this Contractor and shall consist of a one (1) four (4) conductor, No. 18 AWG unshielded, plenum rated cable with a temperature range for dry locations of minus ten (10) degrees C to seventy-five (75) degrees C to the field interface device as shown on the Drawings. A cable that will meet this Specification is WEST PENN Cat. No. 25244 or equal as manufactured by BELDEN, CONSOLIDATED WIRE, GENERAL CABLE, or PAIGE.
- F. Outside plant (flooded) wiring for LX busses shall be furnished and installed by this Contractor and shall consist of a one (1) four (4) conductor, No. 18 AWG unshielded cable to the field interface device as shown on the Drawings. A cable that will meet this Specification is WEST PENN Cat. No. AQ244 or equal as manufactured by BELDEN, CONSOLIDATED WIRE, GENERAL CABLE, or PAIGE

2.10 MISCELLANEOUS EQUIPMENT

- A. This Contractor shall furnish, where shown on the drawing, the following equipment:
 - 1. LX and Keypad Bus extender modules, Digital Monitoring Products (DMP) Cat. No. 708.
 - 2. LX and Keypad Bus splitter/repeater module, Digital Monitoring Products (DMP) Cat. No. 710.

PART 3 - EXECUTION

3.01 FIELD INTERFACE COMMUNICATOR DEVICE

- A. The field interface communicator device shall be furnished and installed by this Contractor adjacent to the security intrusion system main distribution equipment location. This Contractor shall extend LX and Keypad Bus wiring as detailed on the Drawings and connect as directed by the Owner.
- B. The field interface communicator device exists and shall be relocated by this Contractor adjacent to the security intrusion system main distribution equipment location. This Contractor shall extend LX and Keypad Bus wiring as detailed on

the Drawings and connect as directed by the Owner.

3.02 ZONE EXPANDER MODULE

- A. The zone expander module(s) shall be furnished and installed by this Contractor as detailed on the Drawings. All connections to the field interface communicator shall be as directed by the Owner. This Contractor shall extend zone wiring from the security intrusion device(s) (door switches, motion detectors) to the zone expander module(s) as detailed on the Drawings and connect as directed by the Owner.
- B. The zone expander module(s) exists and shall be relocated by this Contractor as detailed on the Drawings. All connections to the field interface communicator shall be as directed by the Owner. This Contractor shall extend zone wiring from the security intrusion device(s) (door switches, motion detectors) to the zone expander module(s) as detailed on the Drawings and connect as directed by the Owner.

3.03 DOOR SWITCHES

- A. This Contractor shall install the door switches, including overhead door and roof hatch switches, in accordance with mounting details as shown on the Drawings and as appropriate for each field condition.

3.04 SECURITY INTRUSION SYSTEM MOTION DETECTORS

- A. The wall mounted security motion detectors shall be securely mounted to the wall. Wide and narrow pattern motion detectors shall be mounted directly to wall 10'-0" above the floor. Where ceiling heights do not allow a 10'-0" mounting, then mount twelve (12) inches below the ceiling. Do not mount wide and narrow pattern motion detectors to a flush or surface mounted device box. The barrier pattern motion detectors shall be mounted at 7'-6" above the floor and be mounted to a flush or surface mounted device box. All mounting measurements shall be to the bottom of the wall mounting bracket.

3.05 FIELD WIRING

- A. All vertical low voltage field wiring shall be installed by this Contractor in 1/2-inch conduit and/or surface metal raceway as shown on the Drawings.
- B. All horizontal low voltage field wiring to be installed in areas without a ceiling or in areas without an accessible ceiling shall be installed by this Contractor in 1/2-inch conduit. Conduit is not required in areas designated on the Drawings as "Electric/Communications" rooms or closets.
- C. All horizontal low voltage field wiring to be installed in areas with accessible ceilings shall be installed by this Contractor bundled together and run exposed above the ceilings. Bundles shall be supported by "J" hooks mounted not more

than four (4) feet on center. "J" hooks to be dedicated to the wiring specified in this specification section.

- D. All horizontal low voltage field wiring shall be installed below the roof/floor structural supports (joists, beams, girders, etc.) wiring installed between the structural supports mentioned above and the roof or floor deck will not be acceptable.
- E. This Contractor, with insulated crimp wire connections, shall make all low voltage wiring terminations. All low voltage field-wiring interconnections shall be made in junction boxes. All junction box covers shall be stenciled for distinct identification.
- F. All conduits, device mounting boxes, junction boxes, and line voltage wiring shall be furnished and installed by this Contractor.
- G. All wiring installed outside the footprint of a building shall be outside plant (flooded), indoor/outdoor, type cables.

3.06 INSTALLATION

- A. All low-voltage wiring and connections shall be made by this Contractor as directed by the equipment manufacturer.
- B. This Contractor shall label all security intrusion system junction boxes covers with the zone numbers contained therein.
- C. All wiring shall be checked and tested by this Contractor to insure the system is free from grounds, opens, and shorts.
- D. The interconnections of components shall be as recommended by the manufacturer of the equipment including the fire alarm system interface.
- E. Door switches shall be wired by this Contractor in series for each zone as shown on the Drawings.
- F. The installation and final connections of all components and wiring shall be performed by this Contractor under the direct supervision of the Owner's technical staff.
- G. Final connection of all security zones wiring to the field interface device shall be performed by this Contractor under the supervision of the Owner's technical staff. Security system zones shall be as shown on the drawings.
- H. All horizontal low voltage field-wiring penetrations through new and/or existing walls shall be sleeved. Minimum sleeve size shall be 3/4 inch. All sleeves shall be bushed both sides.

- I. All horizontal, low voltage field wiring shall be run at right angles to the building structure.
- J. Motion detector tamper switches and anti-mask shall be wired by this contractor in strict conformance with the manufacturer's recommendations.

3.07 ON-SITE AS-BUILT DRAWINGS

- A. The Contractor shall provide one (1) set of the security intrusion system supplier's as-built drawings for permanent use on-site. The Contractor shall: laminate each page of these drawings; provide a rigid means for mounting such as 1/4 inch thick x two (2) inch wide x width of the drawings through-bolted wood along the left edge of the drawings; furnish and install hanging hooks on the back of the Communications Room door; and hang the bound set of drawings.

END OF SECTION

SECTION 16713

CLASSROOM AMPLIFICATION SYSTEMS (Phonak)

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. The general provisions of the Contracts, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 SCOPE

- A. The work covered under this Section shall include furnishing and installing locally controlled complete and satisfactorily operating classroom amplification system where shown on the Drawings for the pick up, amplification, and reproduction of voice/audio at classroom locations.

1.03 QUALITY ASSURANCE

- A. All equipment specified herein shall be the product of a manufacturer of established reputation and experience who shall have produced similar apparatus for a period of at least ten (10) years and who shall be able to refer to similar installations now rendering satisfactory service.
- B. The classroom amplification system(s) shall be a dynamic digital modulation (DM) type system. Specifically, it must utilize digital transmission technology in the 2.4 GHz band with automatic frequency hopping to avoid interference issues.
- C. The classroom amplification system(s) shall be furnished by a factory authorized distributor certified to design, program, and service the system. The distributor must show evidence of successfully furnishing similar systems for at least five (5) years.
- D. All equipment for this system shall be listed by Underwriters Laboratories, Inc. (UL), bear the UL label and shall be installed in accordance with all requirements of the National Electrical Code (NEC), state and local codes, and these Specifications.
- E. The classroom amplification system(s) shall be furnished and installed by this Contractor as shown on the Drawings and as specified herein.
- F. Shop drawing submittals are required per SECTION 16010 and shall include the following for review. Submittals not containing all of the information listed below will be rejected.
 - 1. A complete list of equipment shall be furnished indicating the specific quantities to be furnished by this Contractor. The catalog or model number for each module of the system(s) shall be listed next to the quantities. This information shall be furnished in the front of the submittal.

2. A specific description of the system(s) shall be furnished describing each module and how it shall function in the system.
3. A data sheet shall be furnished for each module and device. The information shall be highlighted that applies to the particular module or device to be furnished.
4. A detailed diagram showing how to connect the audio hub device to a computer and the CATV system shall be furnished indicating the exact final connection information.

1.04 DOCUMENTATION

- A This Contractor shall furnish to the Contractor four (4) sets of factory operation and maintenance manuals. These manuals shall include factory service manuals with complete parts lists, wiring and component schematics including circuit diagrams, and all other information necessary for the proper operation and service maintenance of the system.

1.05 TRAINING

- A. This Contractor shall furnish eight (8) hours of technical service training to the Owner's technical staff using the factory operation manuals previously specified.
- B. This Contractor shall furnish eight (8) hours of operating and programming training to the Owner's operating staff which shall be delivered in two (2) separate four (4) hour sessions to be scheduled at the Owner's convenience over the warranty period.
- C. All training specified herein shall be performed by a factory certified technician.

1.06 DESCRIPTION OF OPERATION

- A. Each system shall provide for the distribution of voice/audio to associated loudspeaker.
- B. Each system shall provide auxiliary inputs for the connection to a computer and/or the building CATV system.
- C. Each system shall have the capability to interact with a student's hearing aid and/or cochlear implant device .

1.07 SYSTEM TEST AND ACCEPTANCE

- A. Prior to the final site visitation, and acceptance of each construction phased spaces, this Contractor shall conduct an operating test of the each complete classroom amplification system. Each system shall test free from grounds, shorts, and other

faults. All connections shall be checked for mechanical and electrical connection. All equipment shall be demonstrated to operate in accordance with the requirements set forth in these Specifications and as shown on the Drawings.

- B. This Contractor shall perform all tests in the presence of the Architect/Engineer. This Contractor shall furnish all personnel and test instruments required for use in the test.

1.08 WARRANTY

- A. This Contractor shall deliver the work described herein in a first class operating condition in every respect. This Contractor shall also warrant that the material, equipment, and workmanship shall be entirely free from defects. Any materials, equipment, or workmanship in which defects may develop before or during the warranty period shall be repaired or replaced at the Contractors own expense. Refer to SECTION 01740 for the start of the warranty period. The contractor shall further warrant that all material, equipment, and workmanship used in the installation, but not specifically mentioned in the Drawings and Specifications, is the best of their respective kinds and that the construction and installation was performed in accordance with the best accepted standard practices in all details.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. The classroom amplification system(s) shall be as manufactured by PHONAK or approved equal.

2.02 WALL MOUNTED SPEAKER

- A. This Contractor shall furnish and install, wall mounted classroom amplification system speaker where shown on the Drawings and herein specified.

1. One (1) PHONAK Digimaster 5000 wall mounted speaker complete with the following:
 - a. Wall mounted bracket.
 - b. 12 speaker-line array
 - c. Mini USB port
 - d. 3.5 mm audio input
 - e. LED status indicating light
 - f. Power supply with mini USB connection

2.03 TRANSMITTER

- A. This Contractor shall furnish at each classroom amplification wall mounted speaker location shown on the Drawings one (1) PHONAK Transmitter complete with the following:

1. DM Transmitter Mode.
2. Voice activity detector.
3. Built in automatic and manual directional microphone system.
4. One (1) Pass Around (handheld) microphone
5. Touchscreen display.
6. Lanyard device to be worn around neck of user.

2.04 AUDIO HUB

- A. This Contractor shall furnish at each classroom amplification wall mounted speaker location shown on the Drawings one (1) PHONAK Roger Multimedia hub complete with the following:
1. One (1) audio input.
 2. Micro USB charging hub.
 3. On/off switch
 4. Connect button
 5. One (1) 3.5mm male to 3.5mm male patch cable. Minimum 10ft. in length.
 6. Power supply with micro USB connection

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All work shall be under the direct supervision of an accredited factory sound engineer. It shall be the responsibility of the sound engineer and this Contractor to check and inspect this installation to the Owner's approval.
- B. All transmitters, microphones, audio hubs and patch cables shall be properly stored and protected during construction.

3.02 WALL MOUNTED SPEAKER

- A. The classroom amplification system wall mounted speaker(s) shall be installed by this Contractor with the proper adapters, mounting kits, and brackets at 48" above finished floor to bottom of speaker. All interconnecting power wiring shall be secured, and terminated by this Contractor in a neat and professional manner.

3.03 TRANSMITTER/MICROPHONES

- A. This Contractor shall unpack each transmitter and microphone, assemble, connect and make ready for operation.

3.04 AUDIO HUB

- A. This Contractor shall unpack each audio hub, connect power and 3.5mm patch cables and make ready for operation.

END OF SECTION

SECTION 16750

TELECOMMUNICATIONS SYSTEM

(Cat 6)

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 SCOPE

- A. The work covered under this Section shall include furnishing and installing a complete telecommunications system as shown on the Drawings and herein specified for the distribution of telephone and/or networked data signals.
- B. The telephone service into the building shall be provided by COX COMMUNICATIONS. It shall be the responsibility of this Contractor to coordinate with the telephone utility to insure timely delivery of permanent telephone service.
- C. The electronic telephone switch and all telephone instruments shall be furnished and installed by the Owner.
- D. The existing telecommunications service and system shall remain in operation during the construction period until the new service and system has been installed and tested, ready for operation. After the new service and system has been placed in operation, the existing service and system shall be removed as shown on the Drawings.

1.03 QUALITY ASSURANCE

- A. All equipment and materials for this system shall be listed by Underwriter's Laboratories, Inc. (UL), bear the UL label, and shall be installed in accordance with all requirements of the National Electrical Code (NEC), all state and local codes, and these Specifications.
- B. Equipment shall be constructed in accordance with National Electrical Manufacturer's Association (NEMA) standards.
- C. All work relating to the telephone service entrance shall comply with the requirements of the telephone utility company.
- D. Shop drawing submittals are required per Section 16010 and shall include the following for review. Submittals not containing all of the information listed below will be rejected.

1. Manufacturer's shop drawings for the networking main and sub-distribution frames including the equipment mounting rack and all associated accessories, components, and equipment to be installed therein.
 2. Manufacturer's data sheets for the telecommunications outlets and the telecommunications cable.
 3. A detailed set of floor plans for the complete building shall be furnished showing the locations of all equipment and devices and their required interconnections. The interconnections shown shall indicate the number, size, and type of wires as described in this Specification. The layout of all telecommunications system equipment, devices, and conduit routings shall closely follow that shown on the Drawings.
- E. This Contractor shall be prepared, upon request by the Owner, to provide proof of the ability to provide the above listed drawings in a mechanical form.
- F. This Contractor shall be an AMP, HUBBELL, P&S ACTIVATE, LEVITON, PANDUIT, ORTRONICS, and BICSI certified installer of copper and fiber optic cabling systems and have a fully equipped and trained service organization that will have a response time of thirty six (36) hours or less to the job site. This contractor shall have a minimum of one (1) certified installer on site during construction of this project. This contractor must show evidence of successfully furnishing systems specified for at least five (5) years. This Contractor shall be prepared to show proof of such certification upon request by the Owner. This Contractor shall also be prepared to offer to the Owner upon request, a fifteen (15) year manufacturer's warranty covering defects in material and workmanship in the passive components of the telecommunications wiring system (outlets, patch panels, etc.).
- G. Prior to final inspection, this Contractor shall furnish two (2) complete as-built sets of drawings prepared by mechanical drafting methods.

1.04 SYSTEM TEST AND ACCEPTANCE

- A. Prior to the final site visitation, and acceptance of each construction phased spaces, this Contractor shall conduct an operating test of all telecommunications system cabling. The cabling shall test free from grounds, shorts, and other faults. All connections shall be checked for mechanical and electrical connection. Phased space test results shall be furnished to the Owner in bound binders prior to acceptance.
- B. This Contractor shall perform the following tests certifying each telecommunications outlet Cat 6 cable. Test results shall be tabulated listing each outlet (by number), the cable, and the test results.

<u>TEST</u>	<u>FREQUENCY</u>	<u>REQUIREMENTS</u>
1. Impedance	1 MHz 10 MHz 25 MHz 100 MHz 250 MHz	100 ohms \pm 15%
2. Attenuation	1 MHz 10 MHz 25 MHz 100 MHz 250 MHz	2 dB max. per 100m 6 dB max. per 100m 9.5 dB max. per 100m 19.8 dB max. per 100m 32.8 dB max. per 100m
3. Crosstalk (Next)	1 MHz 10 MHz 25 MHz 100 MHz	min. 62 dB min. 47 dB min. 41 dB min. 44.3 dB
4. PS-Next (min)	100 MHz	42.3 dB
5. EL-FEXT (min)	100 MHz	27.8 dB
6. PS-ELFEXT (min)	100 MHz	24.8 dB
7. Return Loss (min)	100 MHz	20.1 dB
8. Delay Skew (max)	100 MHz	45 nS
9. Mutual Capacitance:	less than 46 pf per meter	
10. Cable Length:	less than 100 meters	
C.	Each fiber optic cable shall have a FOIRL specification, bi-directional testing at both 850 nm and 1300 nm with 3 db light signal loss per km and 2000/500 MHz-km bandwidth at 850/1300nm.	
D.	This Contractor shall perform all tests in the presence of the Architect/Engineer. This Contractor shall furnish all personnel and test instruments required for use in the test.	
E.	This Contractor shall be prepared, upon request by the Owner, to show current ownership of all instruments and equipment necessary to perform all of the tests	

listed above.

1.05 TRAINING

- A. This Contractor shall furnish to the Owner's designated representatives project specific cable plant layout orientation (4 hours).

1.06 WARRANTY

- A. This Contractor shall deliver the work described herein in a first class operating condition in every respect. This Contractor shall also warrant that the material and workmanship shall be entirely free from defects. Any materials, equipment, or workmanship in which defects may develop before or during the warranty period shall be repaired or replaced at the Contractors own expense. Refer to SECTION 01740 for the start of the warranty period. The contractor shall further warrant that all material, equipment, and workmanship used in the installation, but not specifically mentioned in the Drawings and Specifications, is the best of their respective kinds and that the construction and installation was performed in accordance with the best accepted standard practices in all details.

PART 2 - PRODUCTS

2.01 CONDUITS

- A. This Contractor shall furnish and install underground telephone service entrance conduit(s) as shown on the Drawings and as hereinbefore specified.
- B. This Contractor shall furnish and install telephone distribution conduits, minimum 1/2 inch, only as shown on the Drawings and as hereinbefore specified.
- C. This Contractor shall furnish and install all fiber optic cable in conduit for the entire run. Minimum conduit size for fiber optic cable shall be 1/2 inch.

2.02 TELECOMMUNICATIONS EQUIPMENT LOCATIONS

- A. This Contractor shall furnish and install where shown on the Drawings, wall mounted main and sub-distribution telecommunications equipment locations consisting of fire resistant 3/4 inch thick plywood backboards and networking hubs as hereinafter described and as detailed on the Drawings.

2.03 TELECOMMUNICATIONS OUTLETS

- A. This Contractor shall furnish and install where shown on the Drawings, wall mounted telecommunications outlets each consisting of: one (1) ORTRONICS Part No. OR-40300270 single-gang faceplate; one (1) ORTRONICS Part No. OR-41900018 TrackJack frame; one (1) ORTRONICS Part No. OR-TJ600-00

(black) single category 6, RJ-45 (568A/B) TrackJack insert; two (2) ORTRONICS Part No. OR-63700005 single RJ-25C TrackJack inserts; and one (1) ORTRONICS Part No. OR-42100002 blank TrackJack insert mounted in a single-gang outlet box. The equivalent outlets as manufactured by AMP, HUBBELL, P&S ACTIVATE, LEVITON or PANDUIT will also be considered provided they are fully equal to the type specified herein.

- B. This Contractor shall furnish and install where shown on the Drawings, wall mounted data only outlets each consisting of: one (1) ORTRONICS Part No. Part No. OR-40300270 single-gang faceplate; one (1) ORTRONICS Part No. OR-41900017 TrackJack frame; two (2) ORTRONICS Part No. OR-TJ600-00 (black) single category 6, RJ-45 (568A/B) TrackJack inserts mounted in a single-gang outlet box. The equivalent outlets as manufactured by AMP, HUBBELL, P&S ACTIVATE, LEVITON or PANDUIT will also be considered provided they are fully equal to the type specified herein.
- C. This Contractor shall furnish and install where shown on the Drawings, flush floor telecommunications outlets consisting of a telecommunications jack assembly mounted in a flush floor outlet box as described on the Drawings and elsewhere in these Specifications.
- D. This Contractor shall furnish and install were detailed on the drawings, telecommunications and data only outlets in the surface raceway manufactured by ORTRONICS or EQUAL AS MANUFACTURED BY PASS AND SEYMOUR ACTIVATE SERIES, or PANDUIT.
- E. This Contractor shall furnish and install where shown on the Drawings, wall mounted telephone outlets consisting of a four (4) inch square flush outlet box with plaster cover and a single gang stainless steel coverplate with a 3/8 inch diameter bushed opening.

2.04 NETWORKING MAIN DISTRIBUTION FRAME (MDF)

- A. This Contractor shall furnish and install where shown on the Drawings, a floor mounted networking main distribution frame as detailed on the Drawings. Components shall be as shown or equivalent as manufactured by ADC, AMP, HUBBELL, P&S ACTIVATES, LEVITON or PANDUIT.
 - 1. Furnish and install ORTRONICS Part No. OR-19-72-T2SD heavy duty EIA compliant nineteen (19) inch wide, seven (7) foot tall equipment racks (of the quantity detailed on the Drawings) each consisting of fifteen (15) inch self-supporting base; two (2) three (3) inch wide side channels; top angle; and assembly hardware. All components shall have a brushed aluminum finish. Side channels shall be drilled and tapped on both sides.
 - 2. Furnish and install ORTRONICS Part No. OR-DVMS704 vertical cable management modules (CM-2) with cover including all required mounting

hardware in the locations and of the quantity detailed on the Drawings.

3. Furnish and install ORTRONICS Part No. OR-60400405 cable management shelves (CM-3) including all required mounting hardware in the locations and of the quantity detailed on the Drawings.
4. Furnish and install ORTRONICS Part No. OR-DVMS706 vertical cable management modules (CM-4) with cover including all required mounting hardware in the locations and of the quantity detailed on the Drawings.
5. Furnish and install light interface unit(s). The unit(s) shall be rack mounted type with a strain bracket for securing cables. A light interface unit, which meets this specification, shall be CORNING Part No. CCH-01U with Two (2) Part No. CCH-CP12-E4 chamber connector panel and part no. 95-050-99-X type "LC" multimode bulkhead interconnects of the quantity indicated. Other acceptable manufacturers are RADIANT COMMUNICATIONS, FONS, ORTRONICS and PASS and SEYMOUR ACTIVATE.
6. Furnish and install ORTRONICS Part No. OR-PHD68U96 ninety-six (96) port, RJ-45 (568A/B) type patch panel(s) suitable for rack mounting in the quantity required to crossconnect all of the telecommunications and/or data only outlet RJ-45 ports.
7. Furnish and install ORTRONICS Part No. OR-PHD68U48 forty-eight (48) port. RJ-45 (568A/B) type patch panel(s) suitable for rack mounting in the quantity required to cross connect all of the wireless access point wiring. Label patch panel as "MAIN DISTRIBUTION WIRELESS ACCESS POINT PATCH PANEL (MD-WAPP)."
8. Furnish and install ORTRONICS Part No. OR-PHD68U48 forty-eight (48) port. RJ-45 (568A) type patch panel(s) suitable for rack mounting in the quantity required to cross connect all of the CCTV wiring. Label patch panel as "CCTV CAMERAS".
9. Furnish and install ORTRONICS Part No. PHD68U24 twenty-four port. RJ-45 (568A) type patch panel(s) suitable for rack mounting in the quantity required to cross connect all of the two way communication wiring. Label patch panel as "TWO WAY COMMUNICATION".
10. Furnish and install ORTRONICS Part No. OR-110ABC5E100 one hundred (100) pair rack mounted 110 punchdown blocks including all necessary mounting hardware in the locations detailed on the Drawings, in the quantity required to terminate all of the 100 pair distribution cables and 4 pair station cables from the RJ-25C ports.
11. Furnish and install ORTRONICS Part. No. OR-8050F157B fifty (50) pair

“66” clip connecting blocks mounted by this Contractor on a blank rack mounting panel including all necessary mounting hardware in the locations and of the quantity detailed on the Drawings.

12. The networking main distribution frame shall include one (1) rack mounted 110-volt power strip/surge suppressor in each floor-mounted rack. Each power strip/surge suppressor shall consist of eight (8) front mounted outlets, and eight (8) foot long AC power cord. The rack mounted 110-volt power strip/surge suppressor shall be AMERICAN POWER CONVERSION (APC) Part No. AP7900.
13. The networking main distribution frame shall have a nameplate of 1/16-inch thick laminated plastic with 3/16-inch high white engraved letters on a black background. The nameplate shall identify the frame as indicated on the Drawings and shall be mounted on the front top of the frame.

2.05 NETWORKING SUB-DISTRIBUTION FRAME(S) (SDF)

- A. This Contractor shall furnish and install where shown on the Drawings, a floor mounted networking sub-distribution frame as detailed on the Drawings. Components shall be as shown or equivalent as manufactured by AMP, HUBBELL, P&S ACTIVATE, LEVITON or PANDUIT.
 1. Furnish and install ORTRONICS Part No. OR-19-72-T2SD heavy duty EIA compliant nineteen (19) inch wide, seven (7) foot tall equipment rack each consisting of fifteen (15) inch self-supporting base; two (2) three (3) inch wide side channels; top angle; and assembly hardware. All components shall have a brushed aluminum finish. Side channels shall be drilled and tapped on both sides.
 2. Furnish and install ORTRONICS Part No. OR-DVMS704 vertical cable management modules (CM-2) with cover including all required mounting hardware in the locations and of the quantity detailed on the Drawings.
 3. Furnish and install ORTRONICS Part No. OR-DVMS706 vertical cable management modules (CM-4) with cover including all required mounting hardware in the locations and of the quantity detailed on the Drawings.
 4. Furnish and install light interface unit(s). The unit(s) shall be rack mounted type with a strain bracket for securing cables. A light interface unit, which meets this specification, shall be CORNING Part No. CCH-01U with Two (2) Part No. CCH-CP12-E4 chamber connector panel and part no. 95-050-99-X type "LC" multimode bulkhead interconnects of the quantity indicated. Other acceptable manufacturers are RADIANT COMMUNICATIONS, FONS, ORTRONICS and PASS and SEYMOUR ACTIVATE.

5. Furnish and install ORTRONICS Part No. OR-PHD68U96 ninety-six (96) port, RJ-45 (568A) type patch panel(s) suitable for rack mounting in the quantity required to cross connect all of the telecommunications and/or data only outlet RJ-45 ports.
6. Furnish and install ORTRONICS Part No. OR-PHD68U48 forty-eight (48) port. RJ-45 (568A) type patch panel(s) suitable for rack mounting in the quantity required to cross connect all of the wireless access point wiring. Label patch panel as "SUB DISTRIBUTION WIRELESS ACCESS POINT PATCH PANEL (SD-WAPP)."
7. Furnish and install ORTRONICS Part No. OR-PHD68U48 forty-eight (48) port. RJ-45 (568A) type patch panel(s) suitable for rack mounting in the quantity required to cross connect all of the CCTV wiring. Label patch panel as "CCTV CAMERAS".
8. Furnish and install ORTRONICS Part. No. ORPHD68U24 twenty-four (24) port. RJ-45 (568A) type patch panel(s) suitable for rack mounting in the quantity required to cross connect all of the two way communication wiring. Label patch panel as "TWO WAY COMMUNICATIONS".
9. Furnish and install ORTRONICS Part No. OR-110ABC5E100 one hundred (100) pair rack mounted 110 punchdown blocks including all necessary mounting hardware in the locations detailed on the Drawings, in the quantity required to terminate all of the 100 pair distribution cables and 4 pair station cables from the RJ-25C ports.
10. The networking sub-distribution frame shall include one (1) rack mounted 110-volt power strip/surge suppressor in each floor-mounted rack. Each power strip/surge suppressor shall consist of eight (8) front mounted outlets, and eight (8) foot long AC power cord. The rack mounted 110-volt power strip/surge suppressor shall be AMERICAN POWER CONVERSION (APC) Part No. AP7900.
11. The networking sub-distribution frame shall have a nameplate of 1/16 inch thick laminated plastic with 3/16 inch high white engraved letters on a black background. The nameplate shall identify the frame as indicated on the Drawings and shall be mounted on the front top of the frame.

2.06 NETWORKING SPORTS FIELD SUB-DISTRIBUTION FRAME(S) (SDF) - **HIGH SCHOOLS ONLY**

- A. This Contractor shall furnish and install where shown on the Drawings, wall mounted networking sports field sub-distribution frame(s) arranged as detailed on the Drawings. Components shall be as shown or equivalent as manufactured by AMP, HUBBELL, P&S ACTIVATES, LEVITON or PANDUIT.

1. Furnish and install ORTRONICS Part No. OR-19-35-T25DHYDTB heavy duty EIA compliant nineteen (19) inch wide, 35 inch tall equipment rack. Side channels shall be drilled and tapped on both sides.
2. Furnish and install light interface unit(s). The unit(s) shall be rack mounted type with a strain bracket for securing cables. A light interface unit, which meets this specification, shall be CORNING Part No. CCH-01U with Two (2) Part No. CCH-CP12-E4 chamber connector panel and part no. 95-050-99-X type "LC" multimode bulkhead interconnects of the quantity indicated. Other acceptable manufacturers are RADIANT COMMUNICATIONS, FONS, ORTRONICS and PASS and SEYMOUR ACTIVATE
3. Furnish and install ORTRONICS Part No. OR-PHD5E8U24 twenty four (24) port, RJ-45 (568A/B) type patch panel suitable for rack mounting in the quantity required to cross connect all of the telecommunications and/or data only outlet RJ-45 ports.
4. Furnish and install ORTRONICS Part No. OR-PSD5E6U12 twelve (12) port, RJ-45 (568A/B) type patch panel suitable for rack mounting to cross connect all future wireless access point wiring. Label patch panel as "SUB DISTRIBUTION WIRELESS ACCESS POINT PATCH PANEL (SD-WAPP)."
5. Furnish and install ORTRONICS Part No. OR-110ABC5E100 one hundred (100) pair rack mounted 110 punchdown block with legs including all necessary mounting hardware in the quantity required to terminate all of the 25 pair outside plant distribution cables and 4 pair station cables from the RJ-25C ports.
6. The networking sub-distribution frame shall include one (1) rack mounted 110-volt power strip/surge suppressor in each floor-mounted rack. Each power strip/surge suppressor shall consist of eight (8) front mounted outlets, and eight (8) foot long AC power cord. The rack mounted 110-volt power strip/surge suppressor shall be AMERICAN POWER CONVERSION (APC) Part No. AP7900.
7. The networking sub-distribution frame shall have a nameplate of 1/16 inch thick laminated plastic with 3/16 inch high white engraved letters on a black background. The nameplate shall identify the frame as indicated on the Drawings and shall be mounted on the front top of the frame.

2.07 CABLE

- A. This Contractor shall furnish and install telecommunications distribution cables as shown on the Drawings and specified herein. The cable shall be UL listed, plenum rated, unshielded, fifty (50) twisted pairs, No. 24 AWG, category 3,

UTP/100 type with a flame retardant polyvinyl chloride jacket and a temperature range for dry locations of minus ten (10) degrees C to sixty (60) degrees C. A telecommunications distribution cable, which meets this specification, is BERK-TEK Cat. No. 10032112 or equal as manufactured by AMP, AT&T, BELDEN, THE CABLE COMPANY, GENERAL CABLE, GENESIS, HITACHI, MOHAWK, NORTHERN TELECOM, PAIGE, or OPTICAL CABLE CORPORATION.

- B. This Contractor shall furnish and install telecommunications and data only station cables where shown on the Drawings and specified herein. The cable shall be UL listed, plenum rated, unshielded, four (4) twisted pairs, No. 23 AWG, category 6, extended distance, high speed data type with a flame retardant polyvinyl chloride jacket and a temperature range for dry locations of minus ten (10) degrees C to sixty (60) degrees C. A telecommunications cable, which meets this specification, is BERK-TEK Cat. No. 10132983 (Gray) or equal as manufactured by AMP, AT&T, BELDEN, THE CABLE COMPANY, GENERAL CABLE, GENESIS, HITACHI, MOHAWK, NORTHERN TELECOM, PAIGE, or OPTICAL CABLE CORPORATION.
- C. This Contractor shall furnish and install wireless access point station cable where shown on the Drawings and specified herein. The cable shall be UL listed, plenum rated, unshielded, four (4) twisted pairs, No. 23 AWG, category 6, extended distance, high speed data type with a flame retardant polyvinyl chloride jacket and a temperature range for dry locations of minus ten (10) degrees C to sixty (60) degrees C. A telecommunications cable, which meets this specification, is BERK-TEK Cat. No. 10136749 (Yellow) or equal as manufactured by AMP, AT&T, BELDEN, THE CABLE COMPANY, GENERAL CABLE, GENESIS, HITACHI, MOHAWK, NORTHERN TELECOM, PAIGE, or OPTICAL CABLE CORPORATION.
- D. This Contractor shall furnish and install outside plant telecommunications distribution cables (flooded) as shown on the Drawings and specified herein. The cable shall be UL listed, shielded, twenty five (25) twisted pairs, No. 24 AWG, category 3, UTP/25 type with a temperature range for wet locations and a UV resistant jacket. An outside plant telecommunications distribution cable, which meets this specification, is PAIGE Cat. No. 700190 or equal as manufactured by AMP, AT&T, BELDEN, BERK TEK, THE CABLE COMPANY, GENERAL CABLE, GENESIS, HITACHI, MOHAWK, NORTHERN TELECOM, or OPTICAL CABLE CORPORATION.
- E. This Contractor shall furnish and install outside plant telecommunications and data only cables (flooded) as shown on the Drawings and specified herein. The cable shall be UL listed, unshielded, four (4) twisted pairs, No. 23 AWG, category 6, extended distance, high speed data type with a temperature range for wet locations and a UV resistant jacket. An outside plant telecommunications and data only cable, which meets this specification, is BERK TEK Cat. No. 10139885 or equal as manufactured by AMP, AT&T, BELDEN, THE CABLE COMPANY, GENERAL CABLE, GENESIS, HITACHI, MOHAWK, NORTHERN TELECOM,

PAIGE, or OPTICAL CABLE CORPORATION.

- F. This Contractor shall furnish and install indoor, plenum rated, fiber optic distribution cables, from Main Distribution Frame (MDF) to Sub Distribution Frame(s) (SDF), in conduit as shown on the Drawings and as specified herein. The cables shall be UL listed, twenty four (24) strand, tight buffer, 50/125 laser optimized type with a thermoplastic jacket and a temperature range for dry locations of minus forty (40) degrees C to eighty-five (85) degrees C. A fiber optic distribution cable, which meets this specification, is BERK-TEK Part No. PDP024XB3010-X5 or equal as manufactured by AMP, BELDEN, CORNING, GENERAL CABLE, MOHAWK, OPTICAL CABLE CORP., PAIGE, SIECOR, SUMITOMO ELECTRIC, or WEST PENN.
- G. This Contractor shall furnish and install outside plant (flooded), indoor/outdoor, plenum rated, fiber optic distribution cables in conduit as shown on the Drawings and as specified herein. The cables shall be UL listed, twenty four (24) strand, loose tube, 50/125 laser optimized type with dry gel filled tubes and a temperature range for wet or dry locations of minus forty (40) degrees C to seventy-five (75) degrees C. A fiber optic distribution cable, which meets this specification, is BERK-TEK Part No. OPRZK12B024XB3010/X5 or equal as manufactured by AMP, BELDEN, CORNING, GENERAL CABLE, MOHAWK, OPTICAL CABLE CORP., PAIGE, SIECOR, SUMITOMO ELECTRIC, or WEST PENN.
- H. This Contractor shall furnish and install two way communication cables where shown on the Drawings and specified herein. The cable shall be UL listed, plenum rated, unshielded, four (4) twisted pairs, No. 23 AWG, category 6, extended distance, high speed data type with a flame retardant polyvinyl chloride jacket and a temperature range for dry locations of minus ten (10) degrees C to sixty (60) degrees C. A telecommunications cable, which meets this specification, is BERK-TEK Cat. No. 10136748 (Green) or equal as manufactured by AMP, BELDEN, CORNING, GENERAL CABLE, MOHAWK, OPTICAL CABLE CORP., PAIGE, SIECOR, SUMITOMO ELECTRIC, or WEST PENN.
- I. Telecommunication's system service entrance cables shall be furnished and installed by the telephone utility company. It shall be the responsibility of this Contractor to coordinate with the telephone utility to insure timely delivery of permanent telephone service.

2.08 LIGHTNING PROTECTION

- A. This contractor shall furnish and install for all outside plant telecommunications distribution, telecommunications and data only cables, lightning protection unit(s). The unit(s) shall be located as shown on the drawings and shall be installed no greater than fifty (50) feet from the exterior of the building(s). A Lightning Protection unit, which meets this specification:

1. For telecommunications distribution cables - CIRCA TELECOM Model No. 1880ECA1-25 or approved equal.
2. For Telecommunications and data only cables --CIRCA TELECOM Model No. 1880ENA1/NSC-12 or approved equal.

2.09 TELEPHONE RINGER BELL/CHIME

- A. This contractor shall furnish and install in the kitchen area, one (1) wall mounted bell/chime ringer. The bell/chime ringer shall be connected to telephone ringing voltage circuit of the Kitchen managers telephone located in the kitchen office. This contractor shall run ringer/chime plenum rated, Cat 6 cable to the main/sub communications closet feeding the kitchen and connect to the patch panel in the MDF/SDF. Label patch panel "Bell/Chime Ringer". A bell/chime that meets this specification is: Viking Model No. LPR-1 or equal. Coordinate exact mounting location with Owner.

2.10 TWO WAY COMMUNICATION SYSTEM

- A. This Contractor shall furnish and install where shown on the drawings, wall mounted IP Video Help Station in elevator lobby/lobbies. Two way communication that meets this specification is TALKAPHONE Model No. VOIP-200H3; Flush Mount Configuration or VOIP-201H3; Surface Mount Configuration. Coordinate exact mounting location with Owner.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All fiber optic cable shall be installed in conduit as hereinbefore specified for the entire run. Minimum conduit size for the fiber optic cable shall be $\frac{3}{4}$ " inch.
- B. All vertical wiring for the telecommunications system shall be installed by this Contractor in conduit and/or surface metal raceway as shown on the Drawings.
- C. All horizontal wiring for the telecommunications system to be installed in areas without a ceiling or in areas without an accessible ceiling shall be installed by this Contractor in 1/2-inch conduit. Conduit is not required in areas designated on the Drawings as "Electric/Communications" rooms or closets.
- D. All horizontal wiring for the telecommunications system to be installed in areas with accessible ceilings shall be installed by this Contractor bundled together and run exposed above the ceiling. Bundles shall be supported by "J" hooks mounted not more than four (4) feet on center. "J" hooks to be dedicated to the wiring specified in this specification section.

- E. All horizontal wiring for the telecommunications system shall be run at right angles to the building structure.
- F. All horizontal wiring for the telecommunications system shall be installed below the roof/floor structural supports (joists, beams, girders, etc.). Wiring installed between the structural supports mentioned above and the roof or floor deck will not be acceptable.
- G. All horizontal wiring penetrations for the telecommunications system through new and/or existing walls shall be sleeved. Minimum sleeve size shall be 3/4 inch. All sleeves shall be bushed both sides.
- H. All wiring for the telecommunication system in millwork or casework only shall be installed in flexible metal conduit complete with an additional 200-pound pull string.
- I. All wiring for the telecommunications system shall be furnished and installed by this Contractor as hereinbefore specified and as showed on the Drawings. All junction box covers shall be stenciled for distinct identification.
- J. All wiring connections shall be made by this Contractor as detailed on the Drawings. Cables shall be run free of splices from the equipment enclosures to the telecommunications outlets.
- K. All wiring shall be checked and tested by this Contractor to insure the system is free from grounds, opens, and shorts.
- L. All wiring installed outside the footprint of a building shall be outside plant (flooded), indoor/outdoor, type cables.
- M. All fiber optic outside plant (flooded), indoor/outdoor, type cables shall be installed in min. 3/4" conduit below finished grade with a single No. 10 AWG bare copper conductor. Copper conductor shall run the entire length of the conduit.

3.02 TELECOMMUNICATIONS OUTLETS

- A. This Contractor shall assemble telecommunications outlets and install, connect, and label as shown on the Drawings.

3.03 RACK MOUNTED EQUIPMENT

- A. The networking main distribution frame and the networking sub-distribution frame(s) shall be furnished and installed by this Contractor in the equipment rack(s) as detailed on the Drawings using the proper adapters, rack mounting kits, and brackets. All of this required mounting hardware shall be furnished and installed by this Contractor. All internal wiring shall be labeled, bundled, secured

using the cable management modules, and terminated by this Contractor in a neat and professional manner.

- B. All frame mounted equipment AC power cords shall be plugged into the adjacent duplex receptacle by the Owner.

3.04 WIRELESS ACCESS POINT WIRING

- A. All wiring for the wireless access point system shall be terminated in the main and sub distribution frames on the designated wireless access point patch panel(s) as shown on the drawings and herein specified.
- B. All wiring for the future wireless access points located in the classrooms, office areas, etc., shall be terminated to a single RJ-45, 568A, trackjack insert module as detailed on the drawings.

3.05 TWO WAY COMMUNICATION

- A. All wiring for the two way communication help station shall be terminated in the main and sub distribution frames on the designated two way communication patch panel as shown on the drawings and herein specified.
- B. All wiring for the two way communication help station shall be terminated with a RJ-45 (568A) connector (s). This contractor shall leave twenty five (25) feet of slack in the wiring for two way communication help station installation. Label junction box with the two way communication help station designation.

3.06 OWNER FURNISHED EQUIPMENT

- A. The networking electronic hub equipment and wireless access points shall be furnished and installed by the Owner.

3.07 ON-SITE AS-BUILT DRAWINGS

- A. The Contractor shall provide one (1) set of the telecommunications system supplier's as-built drawings for permanent use on-site. The Contractor shall: laminate each page of these drawings; provide a rigid means for mounting such as 1/4 inch thick x two (2) inch wide x width of the drawings through-bolted wood along the left edge of the drawings; furnish and install hanging hooks on the back of the Communications Room door; and hang the bound set of drawings.

END OF SECTION

SECTION 16760

CABLE TELEVISION/BROADBAND DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 SCOPE

- A. The work covered under this Section shall include furnishing and installing a complete bi-directional cable television/broadband distribution system to distribute both analog and digital RF carriers up to a frequency of 860 MHz, utilizing 860 MHz passive and 860 MHz active components and hardware, as shown on the Drawings and herein specified for the distribution of cable television and/or broadband data signals.
- B. The cable television/broadband distribution system shall deliver the following minimum performance requirements:
- Sub-split, (Return): Inbound: 5MHz – 36MHz.
 - Outbound, (Forward): 44 MHz – 860 MHz.
 - Drop cable Outlet Level: + 10dBmv, +/- 5dB.
 - Minimal distribution system Carrier to noise ratio (CNR): 49 dB.
 - Composite Second Order, (CSO), Distortion: 53 dBc or greater.
 - Composite triple Beat, (CTB), Distortion: 53dBc or greater, 49 dBc or greater(HRC & IRC carrier systems).
 - No more than +/- 3.0 dB difference between adjacent channel video carriers.
 - Maximum Outlet Spectral Bandwidth tilt: +/- 10dB on any visual carrier on system up to 300MHz with a +/- 1 dB of separation for every additional 100MHz of total system bandwidth.
 - RF channel Aural carrier level: -15dB below RF channel visual carrier.
 - HUM: Maximum of 3% of visual signal level.
 - RF leakage: per FCC, part 76
- C. Cable television service into the building shall be provided by (COX COMMUNICATION) (COMCAST COMMUNICATIONS). It shall be the responsibility of this Contractor to coordinate with the cable television utility to insure timely delivery of permanent cable television service.
- D. The cable television head end equipment rack exists and shall be relocated by the Owner.
- E. The cable television head-end equipment and cabinet shall be furnished by the

Owner and installed by this Contractor as directed by the Owner.

- F. The existing cable television/broadband distribution system shall remain in operation throughout the construction period until the new system has been installed and tested, ready for operation. After the new system has become operational, the existing system shall be removed as shown on the Drawings.

1.03 QUALITY ASSURANCE

- A. All active devices for this system shall be listed by Underwriters Laboratories, Inc. (UL), bear the UL label, and shall be installed in accordance with all requirements of the National Electrical Code (NEC), all state and local codes, and these Specifications.
- B. Equipment shall be constructed with National Electrical Manufacturer's Association (NEMA) standards.
- C. All work relating to the cable television service entrance shall comply with the requirements of the cable television utility company.
- D. Shop drawing submittals are required per SECTION 16010 and shall include the following for review. Submittals not containing all of the information listed below will be rejected.
 - 1. Manufacturer's shop drawings for the main and sub-distribution equipment location layouts and equipment.
 - 2. Manufacturer's data sheets for all system components including cables.
 - 3. A detailed set of engineered floor plans for the complete bi-directional system for building shall be furnished showing the locations of all equipment and devices and their required interconnections. The shop drawings shall including the cable path from each wall outlet to its respective main or sub-distribution location. The interconnections shown shall indicate the device designation number, size, type of devices and wires as described in this Specification. The layout of all cable television/broadband distribution system equipment and devices shall include the engineered Db levels at each designated wall outlet as described below in this specification section and shall closely follow that shown on the Drawings.
- E. Prior to final inspection, this Contractor shall furnish two (2) complete sets of as-built drawings prepared by mechanical drafting methods. The Drawings shall include: the measured Db level at each outlet on Channel 2 and Channel 9; and the exact locations and descriptions of all outlets, tap equipment, and the like and the location and number of all spare ports.
- F. The entire cable television/broadband distribution system installation with the exception of pulling of cable shall be performed by a factory certified installer

having a minimum record of five (5) years of successful installations. The installer must show evidence of successfully furnishing systems specified for at least five (5) years. The installer of the cable television/broadband distribution system shall be named within fourteen (14) days of the bid opening. The contractor shall be prepared, upon the Owners request, to provide proof of factory certifications.

1.04 SYSTEM TEST

- A. Prior to the final acceptance of each phase of construction and at total completion of project, this Contractor shall conduct an operating test of the complete system. The system must test free from grounds, shorts, and other faults. The system shall provide ten (10) dBmV (+/- 5 dBmV) at each outlet when a signal of 50 DBMV is applied from the headend cable. This Contractor shall inform the Owner of any slope injected into the system during testing. All connections shall be thoroughly checked for mechanical and electrical connections. All equipment shall be demonstrated by this Contractor to operate in accordance with the requirements set forth in these Specifications and shown on the Drawings.
- B. This Contractor shall perform all tests in the presence of the Architect/Engineer. This Contractor shall furnish all personnel and test instruments required for use in the test, including signal generator and amplifier. This contractor is not permitted to use building CATV headend equipment for testing purposes.
- C. The maximum deviation of drop signals between 50 and 860 MHz (slope) shall not exceed fifteen (15) dBmV. This Contractor shall furnish to the Owner, in the final test documents, the exact slope setting used. Upon request of the owner this contractor shall test the bi-directional system at a maximum of five (5) locations, selected by the owner, to show compliance.

1.05 WARRANTY

- A. This Contractor shall deliver the work described herein in a first class operating condition in every respect. This Contractor shall also warrant that the material, equipment, and workmanship shall be entirely free from defects. Any materials, equipment, or workmanship in which defects may develop before or during the warranty period shall be repaired or replaced at the Contractors own expense. Refer to SECTION 01740 for the start of the warranty period. The contractor shall further warrant that all material, equipment, and workmanship used in the installation, but not specifically mentioned in the Drawings and Specifications, is the best of their respective kinds and that the construction and installation was performed in accordance with the best accepted standard practices in all details.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. The cable television/broadband distribution system equipment shall be

manufactured by BLONDER-TONGUE, PPC., PICO MACOM, INC., TONER CABLE EQUIPMENT, INC.

2.02 EQUIPMENT LOCATIONS

- A. This Contractor shall furnish and install where shown on the Drawings, wall mounted main and sub-distribution equipment locations consisting of fire resistant 3/4 inch thick plywood backboards and the distribution equipment as detailed on the Drawings.

2.03 MODULAR TAP DEVICES

- A. This Contractor shall furnish and install modular tap units in each CATV equipment location as shown on the drawings, in the quantity required to terminate all of the CATV wall outlets. The modular tap units shall consist of the following:
1. Modular tap unit shall have a die cast aluminum housing with six (6) tap cavities for the installation of six (6) plug in tap plates to provide service for up to 48 CATV wall outlets. The housing shall have a cable entry fitting at each end so it can be fed from one end using a terminator plate in the last position or fed from one end with the other end being an output. The modular tap unit shall have a bandwidth of 5 to 1,000 MHz. The modular tap unit shall be TONER CABLE EQUIPMENT, INC., "TOTAL TAP" MODEL No. TXMT-6H with GILBERT ENGINEERING CO., PART No. GF-625-CH KS to F female adaptors.
 2. Plug-in tap plates shall have 8 ports each for insertion into the modular tap unit. The tap values of the 8 port plug-in tap plates shall range from 11.5 dB to 26 dB at 5 to 1,000 MHz and shall be selected by this Contractor to meet the test requirements hereinbefore described. The 8 port plug-in tap plates shall be TONER CABLE EQUIPMENT, INC., Model No. TXMT108 series; terminator plates Model No. TXMT108-T series; blank plates Model No. TXMT-B for insertion into unused cavities of the modular tap unit housing; and Equalizer plates Model No. TXMT-EQ series.

2.04 AMPLIFIERS

- A. This Contractor shall furnish and install bi-directional, self-attenuating amplifiers as required to complete the system. Amplifiers shall be BLONDER-TONGUE series "5800" and shall have all necessary internal components for a complete bi-directional system. Amplifiers shall only be installed in CATV main and sub-distribution equipment locations.

2.05 CONNECTORS

- A. This contractor shall furnish and install CATV compression type, color coded cable connectors to complete the system. Connectors shall be specifically

designed for plenum rated cable. The connectors shall be PPC Model No. EX6, and EX11 as appropriate for RG-6 and RG-11 coaxial cables.

- B. The connectors shall be compressed by the appropriate compression tool. The compression tool shall be PPC Model No. VT300 for RG-6 and RG-11 cable.

2.06 CABLE TELEVISION/BROADBAND DISTRIBUTION WALL OUTLETS

- A. This Contractor shall furnish and install where shown on the Drawings, wall outlets consisting of "F" type connectors complete with stainless steel outlet coverplates. The cable television/broadband wall outlets shall be TONER CABLE EQUIPMENT, INC., Model No. F-81-NW.

2.07 TERMINATORS

- A. This Contractor shall furnish and install terminators on all unused female "F" connector jacks throughout the system. The terminator shall be PICO MACOM, INC., Model No. F-59T.

2.08 CABLE

- A. This Contractor shall furnish and install all cable television/broadband distribution system zone cables as shown on the Drawings. The cables shall be UL listed, plenum type, coaxial RG-6/U, No. 18 AWG, seventy-five (75) degree C solid bare copper with a maximum resistance of 6.5 ohms per 1,000 feet, foam polyethylene insulation with a tape barrier, and a bifoil (100% coverage) plus an aluminum braid (65% coverage) shield. The television/broadband distribution system zone cable shall be WEST PENN Cat. No. 25841 or equal as manufactured by BELDEN, PAIGE, GENERAL CABLE, or THE CABLE COMPANY.
- B. This Contractor shall furnish and install all cable television/broadband distribution system trunk cables as shown on the Drawings. The cables shall be UL listed, plenum type, coaxial RG-11/U, No. 14 AWG, one hundred twenty-five (125) degree C solid bare copper with a maximum resistance of 6.5 ohms per 1,000 feet, foam polyethylene insulation with a tape barrier, and a bifoil (100% coverage) plus an aluminum braid (65% coverage) shield. The television/broadband distribution system trunk cable shall be WEST PENN Cat. No. 25821 or equal as manufactured by BELDEN, GENERAL CABLE, PAIGE, or THE CABLE COMPANY.
- C. This Contractor shall furnish and install all outside plant (flooded) cable television/broadband distribution system trunk cables as shown on the Drawings. The cables shall be UL listed, plenum type, coaxial RG-11/U, No. 14 AWG, one hundred twenty-five (125) degree C solid bare copper with a maximum resistance of 11.0 ohms per 1,000 feet, foam polyethylene insulation with a tape barrier, and a bifoil (100% coverage) plus an aluminum braid (61% coverage) shield and flooding. The outside plant (flooded) television/broadband distribution system trunk cable shall be WEST PENN Cat. No. 1110 or equal as

manufactured by BELDEN, GENERAL CABLE, PAIGE, or THE CABLE COMPANY.

- D. Cable television system service entrance cables shall be furnished and installed by the cable television utility company. It shall be the responsibility of this Contractor to coordinate with the cable television utility to insure timely delivery of permanent cable television service.

2.09 MISCELLANEOUS EQUIPMENT

- A. This Contractor shall furnish the following items of equipment for installation by the Owner in the headend equipment rack. There shall be no substitutions for this equipment.
1. One (1) BLONDER TONGUE Model No. AM-60-550 w/option 4 Channelized Agile Audio/Video Modulator +60 dBmV, 54-300 MHz complete with ANVIL CASES "Forge II" model carrying case, 20 inches wide x 4-1/2 inches high x 19-1/4 inches deep with handle, removable front and rear, and interior rack mounting rails on the handle end.

2.10 LABELING

- A. This Contractor shall label all cable television/broadband distribution wall outlets as shown on the drawings.
- B. This Contractor shall label all cable television/broadband distribution system zone and trunk cables at each main and sub distribution equipment location.
1. Each zone cable shall be clearly labeled with the correct corresponding wall outlet designation. Each zone cable shall be labeled using a labeling machine with minimum 1/4" high letters. Each label shall be wrapped around the zone cable and securely fastened.
 2. Each trunk cable shall be clearly labeled with the correct corresponding main or sub distribution equipment location. Each trunk cable shall be labeled using a labeling machine with minimum 1/4" high letters. Each label shall be wrapped around the trunk cable and securely fastened.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All cable television/broadband distribution system homerun cables shall be routed from each catv outlet to the main or sub distribution equipment location indicated through the corridors. Routing homerun cables through adjacent spaces is not acceptable.

- B. All vertical cable television/broadband distribution system cable shall be installed by this Contractor in conduit and/or surface metal raceway as shown on the Drawings.
- C. All horizontal cable television/broadband distribution system cable to be installed in areas without a ceiling or in areas without an accessible ceiling shall be installed by this Contractor in 3/4-inch conduit. Conduit is not required in areas designated on the Drawings as "Electric/Communications" rooms or closets.
- D. All horizontal cable television/broadband distribution system cable to be installed in areas with accessible ceilings shall be installed by this Contractor bundled together and run exposed above the ceilings. Bundles shall be supported by "J" hooks mounted not more than four (4) feet on center. "J" hooks to be dedicated to the wiring specified in this specification section.
- E. All horizontal cable television/broadband distribution system cable shall be run at right angles to the building structure.
- F. All horizontal cable television/broadband distribution system penetrations through new and/or existing walls shall be sleeved. Minimum sleeve size shall be 3/4 inch. All sleeves shall be bushed both sides.
- G. All cable television/broadband distribution system cable shall be terminated and labeled by this Contractor as shown on the Drawings. Cables shall not be nicked, strained, or damaged during the pulling operation. Cables shall be run free of splices from the equipment enclosures to the outlets. All junction box covers shall be stenciled for distinct identification.
- H. All cables shall be checked and tested by this Contractor to insure the system is free from grounds, opens, and shorts.
- I. This Contractor shall notify the Owner when the service entrance conduit system is complete, ready for installation of the service entrance cable.
- J. All work shall be under the direct supervision of a factory accredited engineer. It shall be the responsibility of the Contractor to check and inspect this installation to the Architect/Engineer's approval.
- K. This Contractor shall demonstrate, to the Owners technical staff, the ability to properly terminate RG-6 and RG-11 connectors prior to commencement of work.
- L. This Contractor shall demonstrate the capabilities of the upstream modulator for up to five (5) locations. The Owner shall select locations. Signal shall be demonstrated to flow back to the headend equipment and then through the entire system for distribution.
- M. All wiring installed outside the footprint of a building shall be outside plant (flooded), indoor/outdoor, type cables.

3.02 WALL MOUNTED EQUIPMENT

- A. Cable television/broadband distribution system equipment shown on the Drawings or otherwise required to be mounted at a main or sub-distribution equipment location shall be furnished and installed by this Contractor with the proper adapters, mounting kits, and brackets.
- B. All equipment enclosure mounted equipment AC power cords shall be plugged into the associated duplex receptacle by this Contractor.
- C. All modular tap devices shall be properly grounded to the main building grounding system with minimum #12 A.W.G. grounding conductor.

3.03 CABLE TELEVISION/BROADBAND DISTRIBUTION OUTLETS

- A. This Contractor shall install, connect, and label all cable television/broadband wall outlets, as shown on the Drawings.

3.04 ON-SITE AS-BUILT DRAWINGS

- A. The Contractor shall provide one (1) set of the cable television/broadband distribution system supplier's as-built drawings for permanent use on-site. The Contractor shall: laminate each page of these drawings; provide a rigid means for mounting such as 1/4-inch thick x two (2) inch wide x width of the drawings through-bolted wood along the left edge of the drawings; furnish and install hanging hooks on the back of the Communications Room door; and hang the bound set of drawings.

END OF SECTION