Project Manual

PROJECT NO. SU-031714

PROJECT TITLE: Renovation of Purchase College Environmental Labs #0014 and #0033

DATE: March 17th, 2014

Purchase College

at

State University of New York

(Formal Contract for Construction)

SUNY PROJECT NO: SU-031714	PROJECT TITLE: Renovation of the Purchase College Environmental Labs #0014 & #0033
AGENCY NUMBER: 28260	
SECTION TITLE	PAGE NO(s).
Bidding Documents	5
Notice to Bidders	
Information for Bidders	
1 Definitions	IB-1
2 Issuance of Bidding and Contract Documents	
3 Proposals	IB-1, IB-2
5 Computation of Bid	
6 Payment of Security	IB-2 IB-3
7 Qualification of Bidders	
8 Submission of Post-Bid Information	IB-3, IB-4
9 Award of Contract	IB-4
10 Required Bonds	IB-4, IB-5
11 New York State Business Enterprises	IB-5
12 Examination of Site	IB-5
Proposal	P-1 to P-4
Bid Bond	BB-1
Acknowledgment for Bid Bond	BB-3

Contract Documents

Agreement

Article I General Provisions

Section 1.01	Definitions	A-1, A-2
Section 1.02	Captions	A-2
Section 1.03	Nomenclature	A-2
Section 1.04	Entire Agreement	A-2
Section 1.05	Successors and Assigns	A-2
Section 1.06	Accuracy and Completeness of Contract Documents	A-2
Section 1.07	Organization of Contract Documents	A-2
Section 1.08	Furnishing of Contract Documents	A-3
Section 1.09	Examination of Contract Documents and Site	A-3
Section 1.10	Invalid Provisions	A-3
Section 1.11	No Collusion or Fraud	A-3
Section 1.12	Notices	A-3
Section 1.13	Singular-Plural;Male-Female	A-3

(Formal Contract for Construction)

Agreement (continued)

Article II

Contract Administration and Conduct

Section 2.01	Consultant's Status	A-3
Section 2.02	Finality of Decisions	A-4
Section 2.03	Claims and Disputes	A-4
Section 2.04	Omitted Work	A-4
Section 2.05	Extra Work	A-4, A-5
Section 2.06	Contractor to Give Personal Attention	A-5
Section 2.07	Employment of Workers	A-5
Section 2.08	Detailed Drawings and Instructions	A-5
Section 2.09	Contract Documents to Be Kept at Site	A-5
Section 2.10	Permits and Building Codes	A-5
Section 2.11	Surveys	A-5, A-6
Section 2.12	Site Conditions	A-6
Section 2.13	Right to Change Location	A-6
Section 2.14	Unforeseen Difficulties	A-6
Section 2.15	Moving Materials and Equipment	A-6
Section 2.16	Other Contracts	A-6, A-7
Section 2.17	Inspection and Testing	A-7
Section 2.18	Subcontractors	A-7, A-8
Section 2.19	Shop Drawings and Samples	A-8, A-9
Section 2.20	Equivalents - Approved Equal	A-9
Section 2.21	Patents, Trademarks and Copyrights	A-9, A-10
Section 2.22	Possession Prior to Completion	A-10
Section 2.23	Completion and Acceptance	A-10
Section 2.24	Record Drawings	A-10
Section 2.25	Guarantees	A-10, A-11
Section 2.26	Default of Contractor	A-11, A-12
Section 2.27	Termination	A-12, A-13

Article III

Time of Performance

Section 3.01	Commencement. Prosecution and Completion of Work	A-13
Section 3.02	Time Progress Schedule	A-13, A-14
Section 3.03	Time Schedule for Shop Drawings and Samples	
Section 3.04	Notice of Conditions Causing Delay	A-14
Section 3.05	Extension of Time	A-14
Section 3.06	Contractor's Progress Reports	

Article IV Payment

Section 4.01	Compensation to Be Paid Contractor	A-14, A-15
Section 4.02	Value of Omitted and Extra Work	A-15
Section 4.03	Adjustment for Bond and Insurance Premiums	A-16
Section 4.04	Unit Prices	A-16
Section 4.05	Allowances	A-16
Section 4.06	Deductions for Unperformed and/or Uncorrected Work	A-16
Section 4.07	Liquidated Damages	A-16, A-17
Section 4.08	Contract Breakdown	A-17
Section 4.09	Prompt Payment Requirements	A-17
Section 4.10	Progress Payments	A-17
Section 4.11	Applications for Progress Payments	A-17
Section 4.12	Progress Payments for Materials Delivered to Site	A-17
Section 4.13	Transfer of Title to Materials Delivered to Site	A-17, A-18
Agreement (c	ontinued)	

(Formal Contract for Construction)

Section 4.14	Progress Payments for Materials Stored Off Site	A-18
Section 4.15	Withholding of Progress Payments	A-18
Section 4.16	Lien Law	A-1

Article IV

Section 4.17	Substitution of Securities for Retainage	A-19
Section 4.18	Final Payment	
Section 4.19	Acceptance of Final Payment	
Section 4.20	Guarantee Payment	A-19
Section 4.21	Acceptance of Guarantee Payment	A-19, A-20
Section 4.22	Contractor Limited to Money Damages	
Section 4.23	No Estoppel or Waiver	
Section 4.24	Limitation of Actions	A-20

Article V

Protection of Rights and Property

Section 5.01	Accidents and Accident Prevention	
Section 5.02	Adjoining Property	A-20, A-21
Section 5.03	Emergencies	
Section 5.04	Fire Safety	A-21
Section 5.05	Risks Assumed by Contractor	A-21, A-22
Section 5.06	Compensation and Liability Insurance	A-22, A-23
Section 5.07	Builder's Risk Insurance	A-23
Section 5.08	Effect of Procurement of Insurance	
Section 5.09	No Third Party Rights	A-23
Article VI		

Affirmative Action

Article VII

Provisions Required by Law

Section 7.01	Provisions Deemed Inserted	A-23, A-24
Section 7.02	Entire Agreement	
Section 7.03	Hierarchy of Precedent	
Section 7.04	Wage Rates	
Section 7.05	Contractor Responsibility	
Signature of F	Parties and Governmental Approvals	A-25
Acknowledgm	nents	
Schedule I		A-27, A-28
Exhibit A Sta	ndard Contract Clauses	

Exhibit A-1 Affirmative Action Clauses

(Formal Contract for Construction)

Forms:

Bid Bond and Acknowledgment for Bid Bond http://www.suny.edu/sunypp/documents.cfm?doc_id=512

Labor and Material Bond, Performance Bond, and Acknowledgment for Bonds <u>http://www.suny.edu/sunypp/documents.cfm?doc_id=514</u>

Form B, Affirmation with respect to State Finance Law §§139-j and 139-k http://www.suny.edu/sunypp/documents.cfm?doc_id=282

Form C, Disclosure and Certification with respect to State Finance Law §§139-j and 139-k http://www.suny.edu/sunypp/documents.cfm?doc_id=283

MWBE Form 104 - Contractor's EEO Policy Statement http://www.suny.edu/sunypp/lookup.cfm?lookup_id=615

MWBE Form 107 – MWBE Utilization Plan http://www.suny.edu/sunypp/lookup.cfm?lookup_id=618

MWBE Form 108 – EEO Staffing Plan http://www.suny.edu/sunypp/lookup.cfm?lookup_id=621

Construction Vendor Responsibility Questionnaire with Attachments A, B and C http://www.suny.edu/sunypp/documents.cfm?doc_id=506 http://www.osc.state.ny.us/vendrep/forms_vendor.htm

Certificate of Insurance http://www.suny.edu/sunypp/docs/505.pdf

State University of New York Sub-Contracting Information Form AC 2947, NY State Labor Law, Section 220-a, Prime Contractor's Certification Form AC 2948, NY State Labor Law, Section 220-a, Subcontractor's Certification Form AC 2958, NY State Labor Law, Section 220-a, Sub-subcontractor's Certification http://www.suny.edu/sunypp/documents.cfm?doc_id=516

Form UF-4, Release http://www.suny.edu/sunypp/documents.cfm?doc_id=517

Contract Documents

Technical Specifications

Division 1 - General Requirements

Section A - Description of Work	
Section B - Alternates	
Section C - Special Conditions	
Section D – Supplemental Special Conditions	1-7

01 33 00 Submittal Requirements

01 33 02 Submittal Cover Sheet

01 42 19 Codes and Standards

01 43 26 Testing Laboratory Services

Technical Specifications (continued)

01 61 00 Materials and Equipment

01 74 19 Construction Waste Management

Division 2 – Existing Conditions

Project Number SU-031714

Renovation of the Purchase College Environmental Labs #0014 & #0033

Form Revised April 2007

(Formal Contract for Construction)

02 41 20 Selective Removals, Cutting and Patching

Division 3 – Concrete 03 54 00 Floor Fill/Underlayment Systems

Division 4 - Not Used

Division 5 – Metals 05 50 00 Metal Fabrications – Miscellaneous/Ornamental Metals

Division 6 – Wood & Plastics 06 10 00 Rough Carpentry 06 20 00 Finish Carpentry

Division 7 – Thermal & Moisture Protection 07 84 00 Firestopping 07 90 00 Caulking and Sealing / Joint Sealers

Division 8 – Doors & Windows 08 71 00 Finish Hardware

Division 9 – Finishes 09 00 01 Finish Schedule 09 29 00 Gypsum Drywall 09 65 00 Resilient Flooring 09 90 00 Painting

Division 10 – Specialties 10 11 00 Visual Display Boards

Division #11 – Equipment 11 00 00 Laboratory Equipment

Division 12 – Furnishings 12 35 53 Laboratory Casework – General Requirements 12 35 54 Metal Laboratory Casework

Division #22 – Plumbing 22 05 00 Common Work Results for Plumbing 22 05 23 General-Duty Valves for Plumbing Pipes 22 05 29 Hangers and Supports for Plumbing Piping & Equipment 22 07 00 Plumbing Installation 22 11 16 Domestic Water Piping 22 11 19 Domestic Water Piping Specialties 22 13 16 Sanitary Waste and Vent Piping

Technical Specifications (continued)

22 13 19 Sanitary Waste Piping Specialties
22 45 00 Emergency Plumbing Fixtures
22 66 00 Chemical-Waste Systems for Laboratory & Healthcare Facilities
Division 26 - Electrical
26 05 00 Common Work Results for Electrical
26 05 26 Grounding and Bonding for Electrical Systems

26 05 29 Hangers and Supports for Electrical Systems

26 05 33 Raceway and Boxes for Electrical Systems

26 05 53 Identification for Electrical Systems

26 08 00 Commissioning of Electrical

26 27 26 Wiring Devices

26 28 16 Enclosed Switches and Circuit Breakers

Project Number SU-031714

Renovation of the Purchase College Environmental Labs #0014 & #0033

Form Revised April 2007

(Formal Contract for Construction)

Appendices

Appendix 1 – Specifications for Asbestos & Hazardous-Containing Materials– Quest Environmental Corporation – March 12, 2014. Appendix 2 – Purchase College SUNY Network Cable Installation Specification & Scope of Work – Ver. 2.0 – May 26, 2011. Appendix 3 – Laboratory and Demonized water systems.

List of Drawings

CSK-001 CSK-002 CSK-003 CSK-004 CSK-005 CSK-006 CSK-007 CSK-007 CSK-008 CSK-009 CSK-010 CSK-011 CSK-012 CSK-012 CSK-012 CSK-012 CSK-012 CSK-013 CSK-014 CSK-015 CSK-015 CSK-016 CSK-017 CSK-017 CSK-018 CSK-021 CSK-022 to CSK 025	General Notes Site Location Plan Work Area Location Plan Abatement Plan - Lab #0014(Reference Only) Abatement Plan - Lab #0033(Reference Only) Demolition Plan - Lab #0014 Demolition Plan - Lab #0014 Construction Plan - Lab #0014 Construction Plan - Lab #0033 Power/Telecommunications Plan - Lab #0014 Power Telecommunications Plan - Lab #0013 Finish Plan - Lab #0014 Finish Plan - Lab #0014 Elevations - Lab #0014 Elevations - Lab #0014 Elevations - Lab #0014 Elevations - Lab #0014 Site Vater Line - Lab #0033 New Distilled Water Line - Lab #0033 New Lab Image(For Reference Only) Existing Lab Pictures – Lab#0033
CSK-022 – to CSK-025	Existing Lab Pictures –Lab#0033

AGENCY NUMBER: 28260

STATE UNIVERSITY OF NEW YORK

Purchase College, State University of New York will receive sealed Proposals for **Project SU-031714**, Titled "Renovation of Purchase College Environmental Labs #14 and #0033." until 1:00 P.M. Local Time on April 7th, 2014, at the Purchasing & Accounts Payable Office, Administration Building, Purchase College, State University of New York, 735 Anderson Hill Road, Purchase, New York 10577-1402, when they will be opened publicly and read. Proposals may be hand delivered or mailed to the above location and must be received by such time.

All work on this Contract is to be completed within **120** calendar days starting **ten (10)** calendar days after the contract approval date. The Labs needs to be handed over to campus by August 8th 2014.

A <u>Mandatory</u> Pre-Bid Conference and site walk-through for prospective Bidders will be held at the Capital Facilities Management conference room at Purchase College, 735 Anderson Hill Road, Purchase, New York 10577-1402 at **10:00AM on March 24th, 2014**. Please note: This will be the only guided walk-through of the subject project facilities.

For directions to Purchase College, see <u>http://www.purchase.edu/AboutPurchase/VisitorsGuide/Directions/</u> For a campus map, see <u>http://www.purchase.edu/sharedmedia/admissions/campus%20map.pdf</u>

Purchase College is dedicated to environmentally sustainable development. In an effort to conserve resources and reduce waste, the Bidding and Contract Documents will only be available electronically in PDF format for viewing and downloading at the following website: <u>http://www.purchase.edu/purchasemeansbusiness</u>

There will be an Open Question and Answer Period from **March 24th – March 27th, 2014.** During this time any questions must be submitted in writing (no telephone calls) to the following email address, <u>muneeza.ismail@purchase.edu</u>. The email should reference the project in the subject line and include bidders contact information and email address. A response to all questions submitted within the Open Question and Answer Period and any required Addendum will be posted no later than **March 31st, 2014** at the following website: <u>http://www.purchase.edu/purchasemeansbusiness</u>

Bids must be submitted in duplicate in accordance with the instructions contained in the Information for Bidders.

It is the policy of the State of New York and the State University of New York to encourage minority and womenowned business enterprise participation in its projects by contractors, subcontractors and suppliers, and all bidders are expected to cooperate in implementing this policy. The minority (MBE) and women (WBE) owned business contractor/subcontractor participation goals for this construction procurement are 10% for MBEs and 6% for WBEs.

The rates of wages and supplements determined by the Industrial Commissioner of the State of New York as prevailing in the locality of the site at which the work will be performed can be found at http://wpp.labor.state.ny.us/wpp/publicViewProject.do?method=showlt&id=1002300 . The Prevailing Rate Case (PRC) Number assigned to this project I 2014002036 .

Pursuant to State Finance Law §§139-j and 139-k, this solicitation includes and imposes certain restrictions on communications between Purchase College and an Offerer/Bidder during the procurement process. An Offerer/Bidder is restricted from making contacts from the earliest notice of intent to solicit proposals through final award and approval of the Procurement Contract by Purchase College/State University of New York and, if applicable, the Office of the State Comptroller ("restricted period") to other than designated staff unless it is a contact that is included among certain statutory exceptions set forth in State Finance Law §139-j(3)(a). Pursuant to the statute, Purchase College employees are also required to obtain certain information when contacted during the restricted period and maintain a record of the communication, and make a determination of a knowing and willful contact. Contact made to other than designated staff regarding this procurement may disqualify the vendor from the current award and affect future procurements with government entities in the State of New York.

The State University of New York reserves the right to reject any or all bids.

Designated Contacts:

Muneeza Ismail Project Manager, Capital Facilities Planning Purchase College State University of New York 735 Anderson Hill Road Purchase, NY 10577-1402 Tel: (914) 251-6024 Fax: (914) 251-6063 Email: <u>muneeza.ismail@purchase.edu</u>

Sealed bids are to be sent to: Nikolaus D. Lentner Director of Purchasing & Accounts Payable Purchase College State University of New York 735 Anderson Hill Road Purchase, NY 10577-1402 Tel: (914) 251-6070 Fax: (914) 251-6075 Email: L@purchase.edu

STATE UNIVERSITY OF NEW YORK INFORMATION FOR BIDDERS

Section 1 Definitions

All definitions set forth in the Agreement are applicable to the Notice to Bidders, Information for Bidders and the Proposal, all of which documents are hereinafter referred to as the Bidding Documents.

Section 2 Issuance of Bidding and Contract Documents

(1) Purchase College is dedicated to environmentally sustainable development. In an effort to conserve resources and reduce waste, the Bidding and Contract Documents will only be available electronically in PDF format for viewing and downloading at the following website: <u>http://www.purchase.edu/purchasemeansbusiness</u>

Any initial complete set shall consist of the following:

- a. Two separately bound copies of the Proposal.
- b. Two separately bound copies of an Experience Questionnaire and Financial Statement.
- c. Two separately bound copies of a Bid Bond.
- d. Two separately bound copies of the Contractor's EEO Policy Statement and Subcontracting Information
- e. One copy of the Bidding and Contract Documents.
- (2) Additional complete sets shall consist only of the Bidding and Contract Documents.

Section 3 Proposals

(1) Sealed Proposals must be submitted in duplicate on the forms provided by the University. Facsimile copies of the Proposal will not be accepted by the University. They shall be addressed to the University in a sealed envelope, marked with the name and address of the bidder, the title of the Project and the Project number to:

Nikolaus D. Lentner Director of Purchasing & Accounts Payable Purchase College State University of New York 735 Anderson Hill Road Purchase, NY 10577-1402

Proposals must be received in the Purchasing & Accounts Payable Office by the due date and time. Bidders mailing their Proposals must allow sufficient time to ensure receipt of their Proposals by the date and time specified. Bidders are cautioned that, although using a trackable mailing/courier/messenger service, bids must be received in the Purchasing Office by the due date and time. Although bids may be signed for by Purchase College Mail Operations personnel prior to bid opening time on the day of the bid, this does not guarantee that the Purchasing & Accounts Payable Office will receive the bid by bid opening time. No bid will be considered that is not physically received in the Purchase College Purchasing & Accounts Payable Office by the bid opening time.

- (2) All blank spaces in the Proposal must be filled in and, except as otherwise expressly provided in the Bidding Documents, no change is to be made in the phraseology of the Proposal or in the items mentioned therein.
- (3) Proposals that are illegible or that contain omissions, alterations, additions or items not called for in the Bidding Documents may be rejected as informal. In the event any bidder modifies limits or restricts all or any part of its Proposal in a manner other than that expressly provided for in the Bidding Documents, its Proposal may be informal.
- (4) Any Proposal may be considered informal which does not contain prices in words and figures in all of the spaces provided or which is not accompanied by a bid security in proper form. In case any price shown in words and its equivalent shown in figures do not agree, the written words shall be binding upon the bidder. In case of a discrepancy in the prices contained in

April 2007

the Proposal forms submitted in duplicate by the bidder, the Proposal form which contains the lower bid shall be deemed the bid of the bidder; provided, however, the University at its election may consider the Proposal of such bidder informal.

- (5) If the Proposal is made by a corporation, the names and places of residence of the president, secretary and treasurer shall be given. If by a partnership, the names and places of residence of the partners shall be given. If by a joint venture, the names and addresses of the members of the joint venture shall be given. If by an individual, the name and place of residence shall be given.
- (6) No Proposal will be considered which has not been deposited with the University at the location designated in and prior to the time of opening designated in the Notice to Bidders or as extended by Addendum.
- (7) Bids may be modified, withdrawn or canceled only by written, facsimile or telegraphic notice received by the University prior to the time of opening of bids designated in the Bidding and Contract Documents. A written, facsimile or telegraphic notice of modification, withdrawal or cancellation shall be marked by the bidder with the name and address of the bidder, the title of the Project and the Project number, and, upon receipt by the University, shall be sealed in an envelope by a duly authorized employee of the University, who shall sign and note thereon the date and time of receipt and shall thereupon attach said written, facsimile or telegraphic notice of modification, withdrawal or cancellation to the envelope submitted by the bidder pursuant to subdivision (1) of this section.
- (8) Permission will not be given to modify, explain, withdraw or cancel any Proposal or part thereof after the time designated in the Bidding and Contract Documents for the opening of bids, unless such modification, explanation, withdrawal or cancellation is permitted by law and the University is of the opinion that it is in the public interest to permit the same.

Section 4 Examination of Bidding and Contract Documents

- (1) Prospective bidders shall examine the Bidding and Contract Documents carefully and, before bidding, shall make written request to the Consultant (with a copy thereof to the University) for an interpretation or correction of any ambiguity, inconsistency or error therein which should be discovered by a reasonably prudent bidder. Such interpretation or correction as well as any additional Contract provision the University shall decide to include will be issued in writing by the Consultant as an Addendum, which will be sent by certified or registered mail or telegraph or delivered to each person recorded as having received a copy of the Bidding and Contract Documents from the Campus or Consultant, and which also will be available at the places where the Bidding available for inspection, such Addendum will become a part of the Bidding and Contract Documents are available for eceives or acknowledges the actual notice of it. The requirements contained in all Bidding and Contract Documents shall apply to all Addenda.
- (2) Only the written interpretation or correction so given by Addendum shall be binding. Prospective bidders are warned that no trustee, officer, agent or employee of the University or the Consultant is authorized to explain or interpret the Bidding and Contract Documents by any other method, and any such explanation or interpretation, if given, must not be relied upon.

Section 5 Computation of Bid

- (1) In computing their bids, bidders are not to include the sales and compensating use taxes of the State of New York or any city and county in the State of New York for any supplies or materials which are incorporated into the completed Project as the University is exempt from such taxes.
- (2) Any unit prices listed in the Proposal by the University are based upon the Consultant's appraisal of a fair cost for the work involved. Such listed prices will be binding upon both the bidder and the University unless the bidder wishes to change any of such unit prices by crossing out the listed unit price and inserting a revised unit price. Such revised unit price shall not be binding upon the University unless it accepts the same, in writing, before it issues a Contract. In the event the Proposal contains blank spaces for unit prices or the Contractor revises any stated unit price, the amount of such unit prices for additions shall not vary by more than 15 percent from the prices inserted by the bidder for deductions, and, if the variance of such prices exceeds 15 percent, the University may adjust the deduction price inserted by the bidder so that it is only 15 percent lower than the addition price inserted by the bidder. In addition, the University may adjust any unit price filled in by a bidder to an amount agreeable to both the bidder and the University or it may reject any unit prices.
- (3) Alternatives, if any, listed in the Proposal and described in Section A of the Technical Specifications shall be accepted in the order indicated and will be used in combination with the Total Bid to determine the low bidder. Unit prices will not be used to determine the low bidder.

Section 6 Payment of Security

(1) Each Proposal must be accompanied by the required amount of the bid security in the form of a bank draft or certified check, payable at sight to the University and drawn on a bank authorized to do business in the United States, or by a Bid Bond, on the form provided, duly executed by the bidder as principal and having as surety thereon a surety company or companies, approved by the University, authorized to do business in the State of New York as a surety. Attorneys-in-fact who execute a Bid Bond on behalf of a surety must affix thereto a certified and effectively dated copy of their power of appointment.

- (2) The University will return, without interest, bid securities in accordance with the following procedure:
 - a. Bid securities in the form of bank drafts or certified checks, to all bidders except the apparent three (3) lowest bidders within two (2) working days after the opening of bids.
 - b. To any bidder submitting a Bid Bond, meeting the requirements of paragraph (1) hereof, after the opening of bids, as a substitute for a bank draft or certified check within two (2) working days after the University's approval of such Bid Bond.
 - c. To the apparent three (3) lowest bidders, unless their bid security was previously returned, within two (2) working days after delivery to the University by the successful bidder of the executed Agreement and required Bonds, or within two (2) working days of the University's rejection of all bids or within two (2) working days after the expiration of forty-five (45) calendar days after the bid opening, whichever event shall occur first.
 - d. Bid Bonds, due to their nature, will not be returned.
- (3) The University reserves the right to deposit bid security drafts or checks pending final disposal of them.

Section 7 Qualifications of Bidders

- (1) All prospective bidders are hereby notified that, on request of the University, they must be able to prove to the satisfaction of the University that they have the skill and experience, as well as the necessary facilities, ample financial resources, organization and general reliability to do the work to be performed under the provisions of the Contract in a satisfactory manner and within the time specified.
- (2) Each bidder must be prepared to show to the satisfaction of the University that it has working capital available for the Project upon which it is bidding in an amount equal to 15 percent of the first \$100,000 of the amount of its Total Bid plus 10 percent of the next \$900,000 plus 5 percent of the remainder of its Total Bid. Working capital is defined as the excess of current assets over current liabilities. The University defines current assets as assets which can be reasonably expected to be converted into cash within a year, and current liabilities as debts which will have to be paid within a year.
- (3) A bidder must also be prepared to prove, to the satisfaction of the University, that it has successfully completed a contract of similar work in an amount of not less than 50 percent of the amount of its Total Bid.

Section 8 Submission of Post-Bid Information

(1) Within forty-eight (48) hours after the opening of bids, each of the apparent three lowest bidders, unless otherwise directed by the University or otherwise provided in the Bidding and Contract Documents, shall submit to both the University and the Consultant:

a. A New York State Uniform Contracting Questionnaire with all requested information furnished.

b. The names of the bidder's proposed subcontractors for the Electrical Work, the Heating, Ventilating and Air Conditioning Work and the Plumbing Work for each of said work categories valued at more than \$20,000. Only one proposed subcontractor should be named for each of such trades and the naming of the bidder itself for any of such work is not acceptable and may result in rejection of the bidder unless the bidder can demonstrate to the University that it has successfully completed a contract for the designated work in an amount not less than 50 percent of the value thereof. The bidder will be required to establish, to the satisfaction of the Consultant and the University, the reliability and responsibility of each of their said proposed subcontractors to furnish and perform the work described in the sections of the Specifications pertaining to each of such proposed subcontractors' respective trades. The bidders must submit to the University, within seven (7) calendar days after the bid opening, a Contracting Questionnaire, on the form provided by the University, with all of the applicable blank spaces filled in, for each of the aforesaid proposed subcontractors. In the event that the University and the Consultant reject any of said proposed subcontractors, the bidder, within five (5) working days after receipt of notification of such rejection, shall again submit to the University and the Consultant the name of another proposed subcontractor in place of the one rejected and it will be required to establish to the satisfaction of the University and the Consultant the reliability and responsibility of said proposed subcontractor; provided, however, that the bidder will not be permitted to submit another proposed subcontractor if it designated itself for any of the aforesaid categories of work. Proposed subcontractors of the bidder, approved by the University and the Consultant, must be used on the work for which they were proposed and approved and they may not be changed except with the specific written approval of the University.

c. A breakdown of the amount of the bidder's Proposal. Such breakdown shall be prepared in accordance with industry

standards. No bidder shall be barred from revising, in the Contract breakdown required under the provisions of Section 4.08 of the Agreement, the various amounts listed in the bid breakdown required under the provisions of this Section. The amount set forth in said bid breakdown will not be considered as fixing the basis for additions to or deductions from the Contract consideration.

- (2) Notwithstanding the foregoing, any bidder or any of the proposed subcontractors referred to in paragraph (1) b, who, within the past year immediately preceding the bidding date, had submitted to the State or the University a Contracting Questionnaire, need not complete a new Questionnaire; provided, however, that they execute an Affidavit of No Change, and deliver the same together with the Questionnaire previously submitted.
- (3) Within 10 calendar days after the bid opening date each of the apparent three lowest bidders must complete the CONTRACTOR'S EEO POLICY STATEMENT and SUBCONTRACTING INFORMATION forms contained in the Project Manual and forward copies of the same to the University and the Consultant. This requirement applies only to Contracts in excess of \$100,000, and contracts which contain subcontracts that are in excess of \$25,000, regardless of their total value.

Contractor compliance with the Non-Discrimination Requirements indicated on Exhibit A of the Agreement and the University's Affirmative Action Policy as indicated on Exhibit A-1, of the Agreement is a precondition to entering into a valid and binding Contract with the University.

Successful contractors with contracts meeting the above criteria will be required to submit to the University a work force utilization report, in a form and manner required by the University. The form, contained in Project Manual, will indicate the work force actually utilized on the Contract, broken down by specified ethnic background, gender and Federal occupational categories or other appropriate categories specified by the University.

(4) The above information and such other information as the University or the Consultant may request or obtain will be used by the University in determining the reliability and responsibility of the bidder. Each bidder must comply promptly with all requests by the University and the Consultant for information and must actively cooperate with the University and the Consultant in their efforts to determine the qualifications of the bidder. All information required to be furnished to the University under this Section shall be sent to the State University of New York campus where the work is to be performed.

Section 9 Award of Contract

- (1) The award of the Contract shall be made to the bidder submitting the lowest bid who, in the opinion of the University, is qualified to perform the work involved and is responsible and reliable. The University shall determine the lowest bid by adding to or deducting from the Total Bid of the bidders the additive or deductive alternates, if any, the University elects to accept after the opening of the Proposals. Alternatives will be accepted in the order they are set forth in the Proposal. The unit prices set forth in the Proposal for additions to or deductions from the work shall not be considered in determining the lowest bid.
- (2) Subject to the rights hereinafter reserved, the work will be awarded within forty-five (45) calendar days after the opening of bids to a single responsible bidder or any combination of bidders whose Proposal conforms to the requirements of the Bidding Documents.
- (3) The right is reserved, if, in the University's judgment, the public interest will be promoted thereby, to reject any or all Proposals, to waive any informality in any Proposal received or to afford any bidder an opportunity to remedy any deficiency resulting from a minor informality or irregularity. Without limiting the generality of the foregoing:

a. A Proposal may be rejected if the bidder fails to furnish the required bid security or to submit the data required with or after its Proposal.

b. A Proposal may be rejected if the bidder cannot show to the satisfaction of the University: (i) that it has the necessary capital, skill and experience; or (ii) that it owns, controls or can procure the necessary plant and equipment to commence the work at the time prescribed in the Contract and thereafter to prosecute and complete the work at the rate, or within the time specified; or (iii) that it is not already obligated by the performance of so much other work as is likely to delay the commencement, prosecution or completion of the work contemplated by the Contract.

c. A Proposal will be rejected if it does not provide for the completion of the work by the date of completion specified in the Proposal.

- (4) The University also expressly reserves the right to reject any Proposal if, in its opinion, considering the work to be performed, the facts, as to the bidder's business or technical organization, plant, financial and other sources of business experience compared with the work bid upon, justify rejection.
- (5) The award of the Contract shall not be construed as a guarantee by the University that the plant, equipment and the general scheme of operations and other data submitted by the bidder with or after its Proposal is either adequate or suitable

for the satisfactory performance of the work.

Section 10 Required Bonds

- (1) Within ten (10) calendar days after the receipt of Notice of Award, the Contractor shall procure, execute and deliver to the Consultant and maintain, at its own cost and expense, a Performance Bond and a Labor and Material Bond, both of which Bonds shall be on the form prescribed by the University and in an amount not less than 100 percent of the total amount of the Contract awarded to the Contractor by the University. Said Bonds must be issued by a surety company approved by the University and authorized to do business in the State of New York as a surety.
- (2) Attorneys-in-fact who execute said Bonds on behalf of a surety must affix thereto a certified and effectively dated copy of their power of appointment.

Section 11 New York State Business Enterprises

- (1) It is the policy of New York State and the University to maximize opportunities for the participation of New York State Business Enterprises, including Minority and Women's Business Enterprises as bidders, subcontractors and suppliers on its procurement contracts.
- (2) Information on the availability of New York State subcontractors and suppliers is available from: Empire State Development Corporation (http://www.empire.state.ny.us/default.asp).
- (3) A directory of Minority and Women's Business Enterprises is available from: Empire State Development Corporation, Minority and Women's Business Development Division (<u>http://www.empire.state.ny.us/default.asp</u>).
- (4) The minimum MWBE goals for this will be: MBE= 10% MWBE=6%

Section 12 Examination of Site

- (1) A <u>Mandatory</u> pre-bid conference and project walk-through will be held on March 24th, 2014, with all contractors assembled at the Capital Facilities Conference Room 735 Purchase Street, Purchase, New York 10577-1402. The bidder can make arrangements to verify the quantity of pile at campus and can reach out to Muneeza.lsmail@purchase.edu.
- (2) No individual or additional walk-through will be performed under the pre-bid time period. Failure to attend a walk-through shall not be the cause for extra payment.

NAME OF BIDDER

E-MAIL OF BIDDER

ADDRESS OF BIDDER

PROPOSAL

FOR

SUNY PROJECT NO.: SU-031714

PROJECT TITLE: Renovation of Environmental Labs #0014 & #0033

SUNY CAMPUS: Purchase College

TO Research Foundation of SUNY:

1. The Work Proposed Herein Will Be Completed Within 120 Calendar Days, Starting 10 Calendar Days After The Contract Approval Date. The Labs needs to be handed over to Campus by August 8th 2014. In the event the bidder fails to complete such work by said date or dates, or within the time to which such completion may have been extended in accordance with the Contract Documents, the bidder agrees to pay the Purchase College of SUNY liquidated damages in an amount equal to the values indicate in the Liquidated Damages Schedule below for each calendar day of delay in completing the work.

Contract Amount Under \$100.000	<u>Liquidated Damages</u> \$100/day
\$100.000-\$499.999	\$200/day
\$500,000-\$999,999	\$300/day
\$1MM-\$1,999,999	\$400/day
\$2MM-\$3,499,999	\$500/day
\$3.5MM-\$5MM	\$700/day
Over \$5MM (to be determined by the Purchase College of SUNY in each instance)	\$/day

- 2. The bidder hereby declares that it has carefully examined all Bidding and Contract Documents and that it has personally inspected the actual location of the work, together with the local sources of supply, has satisfied itself as to all the quantities and conditions, and understands that in signing this Proposal, it waives all right to plead any misunderstanding regarding the same.
- 3. The bidder further understands and agrees that it is to do, perform and complete all work in accordance with the Contract Documents and to accept in full compensation therefore the amount of the Total Bid.
- 4. The bidder further agrees to accept the unit prices, if any, set forth in paragraph (5) hereof, except as the same may be modified as agreed to by both the Purchase College and the Bidder, in advance, as full payment for the amount of the credit to Purchase College for any deletions, additions, modifications or changes to the portion or portions of work covered by said unit prices.

5. a. TOTALBID \$ ____

(in numbers)

(in words)

b. ALTERNATIVES: Reference Section B of the General Requirements. The bidder proposes the following additions to or deductions from the Total Bid for the alternatives listed below:

Alternate Number 01	Add/Deduct	Amount in Words Provide deduct credit for not electrostatically painting the existing fume hoods in both labs 0014 & 0033.	Amount in Figures
02		Furnish & install new fume hoods in labs 0014 & 033. Hemo Laboratory Planning Solutions - <u>http://hemcocorp.com/sefh.html</u> UniFlow SE AireStream Laboratory or approved equal	

c. UNIT PRICES: Reference Construction Documents and/or the technical specifications include in the Project Manual. The request for Unit Prices is for determining the value of omitted and/or extra work, and, in the case of extra work, such unit prices shall be deemed to include all profit, overhead and expenses, necessary for completion of the item for which the Unit Price was for.

Work or Materials Description	Amount in Words	Amount in Figures

6. ALLOWANCES: Reference page A-29 of the Agreement. The bidder further agrees that its Total Bid includes the following allowances:

Work or Materials Description	Amount in Words	Amount in Figures

7. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief: (a) the prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor; (b) unless otherwise required by law, the prices have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and (c) no attempt has been made or will be made by the bidder to include any person, partnership or corporation to submit or not to submit a bid for the purpose of restricting.

A bid shall not be considered for award nor shall any award be made where (a), (b) and (c) above have not been complied with; provided, however, that if in any case the bidder cannot make the foregoing certification the bidder shall so state and

shall furnish with the bid a signed statement which sets forth in detail the reasons therefore. Where (a), (b), and (c) above shall have not been complied with, the bid shall not be considered for award nor shall any award be made unless Purchase College or designee, or Assistant Vice Chancellor for Capital Facilities, or designee, determines that such disclosure was not made for purposes of restricting competition.

The fact that a bidder (a) has published price lists, rates, or tariffs covering items being procured, (b) has informed prospective customers of proposed or pending publication of new or revised price lists for such items, or (c) has sold the same items to other customers at the same prices being bid, does not constitute, without more, a disclosure within the meaning of this Section.

- 8. The bidder agrees that if awarded the Contract, it will commence work within (10) calendar days after date of receipt of a fully executed Agreement and that it will fully complete the work by the date stated herein.
- 9. The bidder acknowledges the receipt of the following addenda, but agrees that it is bound by all addenda whether or not listed herein.

Addendum Number	Date	Addendum Number	Date
	//		///
	//		///
	//		//

- 10. The bidder submits herewith bid security in an amount not less then five (5) percent of the Total Bid. In the event that (a) the bidder's Total Bid is the lowest one submitted and the bidder does not timely provide the Post-Bid Information required by the Information for Bidders or (b) this Proposal is accepted by the Purchase College and the bidder shall refuse or neglect, within ten (10) calendar days after date of receipt of Agreement, to execute and deliver said Agreement in the form provided herein, or to execute and deliver a Performance Bond and a Labor and Material Bond in the amounts required and in the form prescribed, the bidder shall be liable to Purchase College, as liquidated damages, for the amount of the bid security or the difference between the Total Bid of the bidder and the Total Bid of the bidder submitting the next lowest bid, whichever sum shall be higher, otherwise the total amount of the bid security will be returned to the bidder in accordance with the provisions set forth in the Information for Bidders. Purchase College may apply the bid security in full or partial payments, as the case may be, of said liquidated damages and in the event the bid security is less than the amount of liquidated damages to which Purchase College is entitled, the bidder shall pay the difference, upon demand, to Purchase College.
- 11. The bidder certifies that all wood products that are to be used in the performance of this Contract shall be in accordance with the Specifications and provisions of Section 167 b. of the State Finance Law which Section prohibits the purchase and use of tropical hardwoods.

Dated ____/___/

(If corporation, affix corporate seal)

Firm's Federal ID Number or Social Security Number as applicable ____

Legal name of person, partnership, joint venture or corporation:

Bv		
	(signature)	
Title		
E-Mail		

ACKNOWLEDGMENT FOR THE PROPOSAL

THE LEGAL ADDRESS OF THE BIDDE	R	
Telephone No	Facsimile No	
	If a Corporation	
Name	Address	
	PRESIDENT	
	P-4	

	If a Partnership
Name of Partners	Address
	If a Joint Venture
Name of Members	Address
	If an Individual
Name of Individual	Address

State University of New York AGREEMENT

Contract No. SU-031714

This Agreement made as of the ______ day of ______, 20____, for Contract Number SU-031714 by and between STATE UNIVERSITY OF NEW YORK, a corporation organized and existing under the laws of the State of New York, with its principal office located at State University Plaza, Albany, New York 12246, on behalf of State University of New York at Purchase located at 735 Anderson Hill Road, Purchase, New York 10577-1400 hereinafter referred to as "University" and ______having its principal office located at _______, hereinafter referred to as "Contractor".

Federal ID or

Social Security No. _____

The University and the Contractor agree as follows:

1. The Contractor shall perform all work and duties required for the construction of Project Number ____ SU-031714, titled"Renovation of Purchase College Environmental Labs

#0014 and #0033", as contained in the Contract Documents. Subject to authorized adjustments the work and duties contained in the same shall be completed within **120** calendar days starting 10 calendar days after the approval date. The Contractor agrees to pay the University liquidated damages in accordance with paragraph 1 of the Proposal for each calendar day of delay in completing the work.

 The University shall pay and the Contractor shall accept for the performance of work of the above referenced Project, the total contract compensation of \$_____, (in figures), (in word)s.

ARTICLE I General Provisions

Section 1.01 Definitions

Where the following words and expressions are used in the Contract Documents it is understood that they have the meaning set forth as follows:

CONSULTANT	The Architect, Engineer, Landscape Architect, or Surveyor named in the Notice to Bidders or such other person or firm designated by the University to provide general administration of the Contract and inspection of the work.
BIDDING DOCUMENTS	The Notice to Bidders, Information for Bidders and Proposals
BONDS	Performance Bond and Labor and Material Bond
CONTRACT OR CONTRACT DOCUMENTS	The Agreement, Project Manual, Proposal, Bonds, Specifications, Contract Drawings, Addenda issued prior to the opening of bids and Change Orders issued after the award of the Contract.
UNIVERSITY	State University of New York
NOTICE OF AWARD	Letter of Intent
PROJECT	The facility or facilities to be constructed including all usual, appropriate and necessary attendant work shown on, described in or mentioned in the Contract.
SITE	The area within the Contract limit lines, as shown on the Drawings, and all other areas upon which the Contractor is to perform work.
WORK	The using, performing, installing, furnishing and supplying of all materials, equipment, labor and incidentals necessary or proper for or incidental to the successful completion of the Project and the carrying out of all duties and obligations imposed upon the Contractor by the Contract.
NOT IN CONTRACT, "N.I.C."	Indicates equipment furnished by the Owner and installed under another construction contract or by another contractor, or operations at the site not included as part of this Contract.

PROVIDE, PROVIDED

Mean that the Contractor shall furnish and install all materials and labor for the item so specified.

Section 1.02 Captions

The titles or captions of Articles and Sections of the Contract are intended for convenience and reference purposes only and in no way define, limit or describe the scope or intent thereof or of the Contract or in any way affect the Contract.

Section 1.03 Nomenclature

Materials, equipment or other work described in words which have a well-known, technical or trade meaning shall be interpreted as having such meaning in connection with the Contract.

Section 1.04 Contract Documents

- (1) This agreement(2) Exhibit A and A-1
- (3) Here the list of the remaining contract exhibits and appendix should be cited.
 - (a) Contractor-completed Labor and Materials Bond and Performance Bond, and Acknowledgement for Bonds;
 - (b) Contractor-completed Vendor Responsibility Questionnaire;
 - (c) Contractor-completed Affirmation with respect to State Finance Law § 139-j and 139-k;
 - (d) Contractor-completed Contractor's Disclosure and Certification with respect to State Finance Law § 139-j and 139-k;
 - (e) Contractor-completed Contractor's EEO Policy Statement;
 - (f) Technical Specifications: Description of Work, Alternates, Special Conditions;
 - (g) List of Drawings: (see Table of Contents Project Manual for list of all drawings);
 - (h) Appendix 1: Hazardous Materials Report, dated March 2014, prepared by Quest Environmental Corporation.

The Contract, together with all exhibits thereto, constitutes the entire agreement between the parties hereto and no statement, promise, condition, understanding, inducement or representation, oral or written, expressed or implied, which is not contained herein shall be binding or valid and the Contract shall not be changed, modified, or altered in any manner except by an instrument in writing executed by the parties hereto.

Section 1.05 Successors and Assigns

To the extent allowed by the terms of "Exhibit A", the Contract shall bind the successors, assigns and representatives of the parties hereto. The University reserves the right to have the State University Construction Fund (Fund) act on its behalf at any time or duration of this Agreement. Such designation of the Fund to act on the behalf of the University shall be in writing and addressed to the Contractor and signed by the University.

Section 1.06 Accuracy and Completeness of Contract Documents

- (1) The Contract Documents are complementary and what is called for by any one shall be as binding as if called for by all. The intention of the Documents is to include all materials, plant, equipment, tools, skill and labor of every kind necessary for the proper execution of the work and also those things which may be reasonably inferable from the Contract Documents as being necessary to produce the intended results.
- (2) The Contract Documents contemplate a finished piece of work of such character and quality as is reasonably inferable from them. The Contractor acknowledges that the contract consideration includes sufficient money allowance to make its work complete and operational and in compliance with good practice and it agrees that inadvertent minor discrepancies or omissions or the failure to show details or to repeat on any part of the Contract Documents the figures or notes given on another shall not be the cause for additional charges or claims. In case of a conflict between any part or parts of the Contract Documents with any other part or parts thereof, as contrasted with an omission or failure to show details or to repeat on any part of the Contract Documents the figures or notes given on another part thereof, the following shall be given preference, in the order hereinafter set forth, to determine what work the Contractor is required to perform: (a) Addenda (later dates to take preference over earlier dates); (b) Amendments to Agreement; (c) Agreement; (d) Specifications; (e) Schedules; (f) Large scale detail Drawings (detail drawings having a scale of 3/4" and over); (g) Large scale plan and section Drawings (plan and section drawings having a scale detail Drawings (detail drawings having a scale of the basic floor or site plan and section Drawings (plan and section drawings having a scale less than 3/4"); and (i) Small scale plan and section Drawings (plan and section drawings having a scale less than that used for the basic floor or site plan, as the case may be). In the event of such a conflict between or among parts of the Contract Documents that are entitled to equal preference, the more expensive way of doing the work, the better quality or greater quantity of material shall govern unless the University otherwise directs.

Section 1.07 Organization of Contract Documents

The Specifications and Drawings are generally divided into trade sections for the purpose of ready references, but such division is arbitrary and such sections shall not be construed as the prescription by the Consultant or the University of the limits of the work of any subcontractor or as a determination of the class of labor or trade necessary for the fabrication, erection, installation or finishing of the work required. The Contractor will be permitted to allot the work of subcontractors at its own discretion regardless of the grouping of the Specifications and Drawings. It shall be the Contractor's responsibility to settle definitively with each subcontractor the portions of the work which the latter will be required to do. The University and the Consultant assume no responsibility whatever for any jurisdiction claimed by any of the trades involved in the work.

Section 1.08 Furnishing of Contract Documents

The Contractor shall be furnished, free of charge, with as many copies of the Specifications and Drawings as it may reasonably request, in the judgment of the University, within fifteen (15) working days after the Notice of Award. Any other copies of the Specifications and Drawings which the

Contractor may desire can be obtained by it from the Consultant at the latter's cost of duplication thereof.

Section 1.09 Examination of Contract Documents and Site

By executing the Contract, the Contractor agrees: that it has carefully examined the Contract Documents together with the site of the proposed work as well as its surrounding territory; that it is fully informed regarding all the conditions affecting the work to be done and the labor and materials to be furnished for the completion of the Contract; and that its information has been acquired by personal investigation and research and not in the estimates and records of the University.

Section 1.10 Invalid Provisions

If any term or provision of the Contract Documents or the application thereof to any person, firm or corporation or circumstance shall, to any extent, be invalid or unenforceable, the remainder of the Contract Documents, or the application of such terms or provisions to persons, firms or corporations or circumstances other than those to which it is held invalid or unenforceable, shall not be affected thereby and each term or provision of the Contract Documents shall be valid and be enforced to the fullest extent permitted by law.

Section 1.11 No Collusion or Fraud

Reference "Exhibit A" which is attached to and made a part of this Agreement.

Section 1.12 Notices

Any notice to either party hereunder must be in writing signed by the party giving it and shall be served either personally, by facsimile or registered mail of the United State Post Office and individuals indicated below:

TO THE UNIVERSITY:	Director of Purchasing Purchase College State University of New York 735 Anderson Hill Road Purchase, New York 10577-1402
And a copy to:	Vice Chancellor for Capital Facilities State University of New York State University Plaza Albany, New York 12246
TO THE CONTRACTOR:	At the address indicated on page 1 of this Agreement Or to such other addressee as may be hereafter designated by notice. All notices become effective only when received by the addressee.

Section 1.13 Singular-Plural; Male-Female

As used in the Contract Documents, the singular of any word or designation, whenever necessary or appropriate, shall include the plural and vice versa, and the masculine gender shall include the female and neuter genders and vice versa.

ARTICLE II

Contract Administration and Conduct

Section 2.01 Consultant's Status

- (1) The Consultant, as the University's representative, shall provide general administration of the Contract and inspection of the work. The Consultant will not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the work, and it will not be responsible for the Contractor's failure to carry out the work in accordance with the Contract Documents. The Consultant's duties, services and work shall in no way supersede or dilute the Contractor's obligation to perform the work in conformance with all Contract requirements, but it is empowered by the University to act on its behalf with respect to the proper execution of the work and to give instructions when necessary to require such corrective measures as may be necessary, in its professional opinion, to insure the proper execution of the Contract or to otherwise protect the University's interest.
- (2) The Consultant shall have the authority to stop the work or to require the prompt execution thereof whenever such action may be necessary, in its professional opinion, to insure the proper execution of the Contract or to otherwise protect the interests of the University.
- (3) Except as otherwise provided in the Contract, the Consultant shall determine the amount, quality, acceptability, fitness and progress of the work covered by the Contract and shall decide all questions of fact which may arise in relation to the interpretation of the plans and Specifications, the performance of the work and the fulfillment by the Contractor of the provisions of the Contract. The Consultant shall in the first instance be the interpreter of the provisions of the Contract and the judge of its performance and it shall use its power under the Contract to enforce its faithful performance.

Section 2.02 Finality of Decisions

- (1) Any decision or determination of the Consultant under the provisions of the Contract shall be final, conclusive and binding on the Contractor unless the Contractor shall, within ten (10) working days after such decision, make and deliver to the University a verified written statement of its contention that the decision of the Consultant is contrary to a provision of the Contract. The University shall thereupon determine the validity of the Contractor's contention. Pending decision by the University, the Contractor shall proceed in accordance with the Consultant's decision.
- (2) Wherever it is provided in the Contract Documents that an application must be made to the University and/or determination made by the University, the University's decision on such application and/or its determination under the Contract Documents shall be final, conclusive and binding upon the Contractor unless the same shall be determined by a court of competent jurisdiction to have been fraudulent, capricious, arbitrary or so grossly erroneous as necessarily to imply bad faith and unless the Contractor, within ten (10) working days after receiving notice of the University's decision or determination, files a written statement with the University and the Consultant that it reserves its rights in connection with the matters covered by said decision or determination.

Section 2.03 Claims and Disputes

- (1) If the Contractor claims (i) that any work it has been ordered to do is extra work or (ii) that it has performed or is going to perform extra work or (iii) that any action or omission of the University or the Consultant is contrary to the terms and provisions of the Contract, it shall:
 - a. Promptly comply with such order;
 - b. File with the University and the Consultant, within five (5) working days after being ordered to perform the work claimed by it to be extra work or within five (5) working days after commencing performance of the extra work, whichever date shall be the earlier, or within five (5) working days after the said action or omission on the part of the University or the Consultant occurred, a written notice of the basis of its claim and request a determination thereof;
 - c. File with the University and the Consultant, within thirty (30) calendar days after said alleged extra work was required to be performed or said alleged extra work was commenced, whichever date shall be the earlier, or said alleged action or omission by the University or the Consultant occurred, a verified detailed statement, with documentary evidence, of the items and basis of its claim;
 - d. Produce for the University's examination, upon notice from the University, all its books of account, bills, invoices, payrolls, subcontracts, time books, progress records, daily reports, bank deposit books, bank statements, checkbooks and canceled checks, showing all of its actions and transactions in connection with or relating to or arising by reason of its claim, and submit persons in its employment and in its subcontractors' employment for examination under oath by any person designated by the University to investigate any claims made against the University under the Contract, such examination to be made at the offices of the Contractor; and
 - e. Proceed diligently, pending and subsequent to the determination of the University with respect to any such disputed matter, with the performance of the Contract and in accordance with all instructions of the University and the Consultant.
- (2) The Contractor's failure to comply with any or all parts of subdivision b of paragraph (1) of this Section shall be deemed to be (i) a conclusive and binding determination on its part that said order, work, action or omission does not involve extra work and is not contrary to the terms and provisions of the Contract; and (ii) a waiver by the Contractor of all claims for additional compensation or damages as a result of said order, work, action or omission b of paragraph (1) of this Section are for the purpose of enabling the University to avoid waste of public funds by affording it promptly the opportunity to cancel or revise any order, change its plans, mitigate or remedy the effects of circumstances giving rise to a claim or take such other action as may seem desirable and to verify any claimed expenses or circumstances as they occur. Compliance with such provisions is essential whether or not the University is aware of the circumstances of any order or other circumstances which might constitute a basis for a claim and whether or not the University has indicated it will consider a claim in connection therewith.
- (3) No person has power to waive or modify any of the foregoing provisions and, in any action against the University to recover any sum in excess of the sum certified by the University to be due under or by reason of the Contract, the Contractor must allege in its complaint and prove at the trial compliance with the provisions of this Section.
- (4) Nothing in this Section shall in any way affect the University's right to obtain an examination before trial or a discovery and inspection in any action that might be instituted by or against the University or the Contractor.

Section 2.04 Omitted Work

The University reserves the right at any time during the progress of the work to delete, modify or change the work covered by the Contract, by a Change Order thereto providing for either a reduction or omission of any portion of the work, without constituting grounds for any claim by the Contractor for allowances for damages or for loss of anticipated profits and in such event a deduction shall be made from the Contract consideration, the amount of which is to be determined in accordance with the provisions of Section 4.02 of the Agreement.

Section 2.05 Extra Work

(1) The University reserves the right at any time during the progress of the work to add, modify or change the work covered by the Contract by a Change Order thereto providing for extra work of either a qualitative or quantitative nature and in such event the Contract consideration shall be increased by an amount to be determined in accordance with the provisions of Section 4.02 of the Agreement and the completion date for all or any part of the work shall be extended for such period of time as may be determined by the University as necessary, because of the extra work, to complete the work or any part thereof.

(2) Nothing in the Contract Documents shall excuse the Contractor from proceeding with the extra work as directed and, except as otherwise

specifically provided for in a Change Order, the terms and conditions of the Contract Documents shall be fully applicable to all extra work.

- (3) The Contractor shall have no claim for extra work if the performance of such work, in the judgment of the Consultant, is made necessary or desirable because of any act or omission of the Contractor which is not in accordance with the Contract.
- (4) Notwithstanding the provisions of Section 2.02 of the Agreement and any other provisions of the Contract Documents to the contrary, the University, after conferring with the Consultant, shall have the right to overrule a determination or decision of the Consultant, that relates to whether certain work is included in the Contract Documents or is extra work, which he or she believes is incorrect; in the event an officer exercises such right, his or her determination or decision shall be final, conclusive and binding upon the Contractor and the University unless the same shall be determined by a court of competent jurisdiction to have been fraudulent, capricious, arbitrary or so grossly erroneous as necessarily to imply bad faith.

Section 2.06 Contractor to Give Personal Attention

- (1) The Contractor shall give its constant personal attention to all the work while it is in progress and shall place the working charge of a competent and reliable full-time superintendent acceptable to the Consultant and the University who shall have authority to act for the Contractor and who shall be accountable to the Consultant to the extent provided in the Contract. Unless the superintendent proves to be unsatisfactory to the Contractor and ceases to be in its employ, such superintendent shall not be changed without the written permission of the Consultant and the University.
- (2) When the Contractor and its superintendent are temporarily absent from the site of the work, the Contractor or its superintendent shall designate a responsible supervisory employee to receive such orders as the Consultant or its representative may give. At no time shall any work be conducted on the site in the absence of an individual present who has been so designated by the Contractor or its superintendent as having authority to receive and execute instructions given by the Consultant or its representative.

Section 2.07 Employment of Workers

The Contractor shall at all times employ competent and suitable workers and equipment which shall be sufficient to prosecute all the work to full completion in the manner and time specified. All workers engaged in specially or skilled work shall have had sufficient experience in such work to properly and satisfactorily perform the same. Should the Consultant deem any employee of the Contractor or any subcontractor incompetent, careless, insubordinate or otherwise objectionable or whose continued employment on the work is deemed by the Consultant to be contrary to the public interest, it shall so advise the Contractor and the latter shall dismiss or shall cause the subcontractor, if such employee is employed by the latter, to dismiss such employee and such employee shall not again be employed on the work to be performed under the Contract without obtaining the prior written approval of the Consultant.

Section 2.08 Detailed Drawings and Instructions

Upon timely notice by the Contractor that supplementary information is required, the Consultant shall furnish additional instructions, by means of Drawings or otherwise, necessary for the proper execution of the work. All such Drawings and instructions shall be consistent with the Contract Documents, true developments thereof and reasonably inferable therefrom. The work shall be executed in conformity therewith and the Contractor shall do no work without proper Drawings and/or instructions.

Section 2.09 Contract Documents to Be Kept at Site

The Contractor shall keep at the site of the work a copy of the Drawings and Specifications and shall at all times give the Consultant and the University access thereto.

Section 2.10 Permits and Building Codes

The Contractor shall obtain from the proper authorities all permits legally required to carry on its work, pay any and all taxes and fees legally required and shall be responsible for conducting its operations in accordance with the provisions of such permits. Except as otherwise expressly provided in the Contract Documents, all of the work covered by this Contract which is to be performed on property owned by the State University of New York is not subject to the building code of any city, county or other political subdivision of the State of New York. It is, however, subject to the provisions of the New York State Uniform Fire Prevention and Building Code and the applicable Federal and State health and labor laws and regulations. The building permit for the work shall be issued by the Campus Code Compliance Officer.

Section 2.11 Surveys

- (1) From the data shown on the Drawings and identified at the site by the Consultant, a licensed surveyor, to be designated and paid for by the University, shall establish one (1) fixed bench mark and one (1) fixed base line at the site. The Contractor shall work from the bench marks and base lines shown on the Drawings, identified at the site by the Consultant and established at the site by the aforesaid surveyor and shall establish such supplementary bench marks and base lines that are required in order for it to lay out the work. The Contractor shall be responsible for all measurements that may be required for execution of the work to the exact position and elevation as prescribed in the Specifications, shown on the Drawings, or as the same may be modified at the direction of the Consultant to meet changed conditions or as a result of modifications to the work covered by the Contract.
- (2) The Contractor shall furnish at its own expense such stakes and other required equipment, tools and materials, and all labor as may be required in laying out any part of the work. If, for any reason, monuments are disturbed, it shall be the responsibility of the Contractor to reestablish them, without cost to the University, as directed by the Consultant. The Consultant may require that construction work be suspended at any time when location and limit marks established by the Contractor are not reasonably adequate to permit checking completed work or the work in progress.

(3) In all multiple-story construction, the Contractor shall establish and maintain line marks at each floor level and grade marks four (4) feet above the finished floor at each floor level.

Section 2.12 Site Conditions

- (1) The Contractor acknowledges that it has assumed the risk and that the Contract consideration includes such provision as it deems proper for all physical conditions and subsurface conditions as it could reasonably anticipate encountering from the provisions of the Contract Documents, borings, rock cores, topographical maps and such other information as the University or the Consultant made available to it prior to the University's receipt of bids or from its own inspection and examination of the site prior to the University's receipt of bids.
- (2) In the event that the Contractor encounters subsurface physical conditions or other latent physical conditions at the site differing substantially from those shown on or described or indicated in the Contract Documents and which could not have been reasonably anticipated from the aforesaid information made available by the University or the Consultant or from the Contractor's aforesaid inspection and examination of the site, it shall give immediate notice to the Consultant of such conditions before they are disturbed. The Consultant will thereupon promptly investigate the conditions and, if it finds that they do substantially differ from that which should have been reasonably anticipated by the Contractor, it shall make such changes in the Drawings and Specifications as may be necessary and a Change Order shall be issued, the amount of which shall be determined in accordance with the provisions of Section 4.02, to reflect any increase or decrease in the cost of, or the time required for, performance of the Contract as a result of any of the aforesaid changes made by the Consultant and/or as a result of such unanticipated subsurface conditions.

Section 2.13 Right to Change Location

When additional information regarding the subsurface conditions becomes available to the University as a result of the excavation work, further testing or otherwise, it may be found desirable to change the location, alignment, dimensions or grades to conform to such conditions. The University reserves the right to make such reasonable changes in the work as, in its opinion, may be considered necessary or desirable, such changes and any adjustments in the Contract consideration as a result thereof are to be made in accordance with the provisions of Sections 2.04, 2.05 and 4.02 of the Agreement.

Section 2.14 Unforeseen Difficulties

Except as otherwise expressly provided in Section 2.12 of the Agreement and in other Sections of the Contract Documents, the Contractor acknowledges that it has assumed the risk and that the Contract consideration includes such provisions as it deems proper for any unforeseen obstacles or difficulties which it may encounter in the performance of the work.

Section 2.15 Moving Materials and Equipment

Should it become necessary, in the judgment of the Consultant, at any time during the course of the work to move materials which are stored on the site and equipment which has been temporarily placed thereon, the Contractor upon request of the Consultant shall move them or cause them to be moved at its sole cost and expense; provided, however, if materials and equipment have been stored or placed by the Contractor at a location on the site expressly approved, in writing, by the consultant and the same are moved or caused to be moved by the Contractor at the Consultant's request, such removal shall be deemed extra work and the Contractor shall be compensated therefore in accordance with the provisions of Section 4.02 of the Agreement.

Section 2.16 Other Contracts

- (1) Prior to and during the progress of the work hereunder the University reserves the right to let other contracts relating to the Project or in connection with work on sites within the Contract limit lines or adjoining or adjacent to that on which the work covered by this Contract is to be performed. In the event such other contracts are let, or have previously been let, the Contractor and such other contractors shall coordinate their work with each other, arrange the sequence of their work to conform with the progressive operation of all the work covered by such contracts and afford each other reasonable opportunities for the introduction and storage of their materials, supplies and equipment and the execution of their work. If the Contractor or such other contractors contend that their work or the progress thereof is being interfered with by the acts or omissions of the other or others or that there is a failure to coordinate or properly arrange the sequence of the work on the part of the Contractor or such other contractors, they shall, within five (5) working days of the commencement of such interference or failure of coordination or failure to perform work in proper sequence, give written notification to the University and the Consultant of such onstructions to the Contractor or such other contractors with respect thereto as it may deem proper. The Consultant shall determine the rights of the Contract in relation to the work covered by this Contract in relation to the work covered by said other contractors.
- (2) The Contractor agrees that it has and will make no claim for damages against the University by reason of any act or omission to act by any other contractor or party or in connection with the Consultant's or University's acts or omissions to act in connection with such other contractor, but the Contractor shall have a right to recover such damages from the other contractors under a provision similar to the following provision which has been or will be inserted in the Contract with such other contractors.
- (3) Should any other contractor, having or who shall hereafter have a contract with the University relating to the Project or in connection with the work on sites adjoining or adjacent to that on which the work covered by this Contract is to be performed, sustain any damage, during the progress of the work hereunder, through any act or omission of the Contractor, the Contractor agrees to reimburse such other contractor for all such damages and it further agrees to indemnify and save harmless the University and the State of New York from all claims for such damages.

(4) If the proper and accurate performance of the work covered by the Contract depends upon the proper performance and execution of work not March 2009 6 of 27 included herein or depends upon the work of any other contractor, the Contractor shall inspect and promptly report to the Consultant any defects in such work that render it unsuitable for proper execution and results. Its failure to so inspect and report shall constitute an acceptance of the other contractor's work as fit and proper for the execution of the work covered by the Contract, except as to latent defects which may be discovered thereafter.

Section 2.17 Inspection and Testing

- (1) All materials and workmanship shall be subject to inspection, examination and testing by the Consultant and the University at all times during the performance of the work and at all places where the work is carried on. Except as otherwise herein specified, the University shall pay for the cost of inspection, examination and testing by the Consultant or the University. If, however, the tests and any attendant re-inspection or re-examination prove that the materials and/or work tested do not meet the requirements of the Contract, then the entire cost of such tests is to be borne by the Contractor. The Consultant will have the right to reject defective material and workmanship furnished by the Contractor or require its correction. The Contractor, without charge therefore, shall satisfactorily and promptly correct all rejected work and replace all rejected material with proper material.
- (2) The Contractor shall promptly segregate and remove from the site of the work all rejected material and work. If the Contractor shall fail to proceed at once with the replacing of rejected material and/or correction of defective workmanship, the University may, by contract or otherwise, replace such material and/or correct such workmanship, and charge the costs thereof to the Contractor and/or it may cancel the Contract and terminate the Contractor's employment as provided in the Agreement.
- (3) The Contractor, without additional charge therefore, shall promptly furnish all reasonable facilities, labor and materials necessary for the safe and convenient inspection and testing that may be required by the Consultant or the University.
- (4) If the Contract Documents or the Consultant's instructions or the applicable laws, ordinances or regulations of any governmental authority require any part of the work covered by the Contract to be specially tested or inspected, the Contractor shall give the Consultant timely notice of its readiness for such testing or inspection or, if the same is to be performed by a governmental authority, of the date fixed therefore. If any such work, without the written permission of the Consultant, should be covered up prior to such testing or inspection, the Contractor, at its sole cost and expense, must, if directed by the Consultant, uncover the same for testing or inspection and reconstruct the same after the tests or inspection are conducted. All certificates of inspection or testing, involving the Contractor's work, required to be obtained from governmental authorities are to be secured by the Contractor at its sole cost and expense.
- (5) Should it be considered necessary or advisable by the Consultant at any time before final acceptance of the entire work to make an examination of work already completed by removing or tearing out same, the Contractor, upon request, shall furnish all necessary facilities, labor and material to perform such examination. If the work subject to such examination is found to be defective or nonconforming in any manner due to the fault of the Contractor or any of its subcontractors, such uncovering or destruction and necessary reconstruction, even though such includes work not covered in the Contract, shall be at the expense of the Contractor. If, however, such work after testing and examination is found to be satisfactory, the University will pay the Contractor the cost of such uncovering or destruction and reconstruction, such cost to be determined as in the case of extra work as provided in Section 4.02.
- (6) Inspection of material and furnished articles to be incorporated in the work may be made at the place of production, manufacture or shipment unless otherwise stated herein. The inspection of material and workmanship for final acceptance as a whole or in part will be made at the site of the work.

Section 2.18 Subcontractors

- (1) Except for subcontractors designated by the University, or required to be named at any earlier date, pursuant to the provisions of the Information for Bidders, within thirty (30) calendar days after Notice of Award, the Contractor must submit a written statement to the Consultant giving the name and address of all proposed subcontractors. Said statement must contain a description of the portion of the work and materials which the proposed subcontractors are to perform and furnish and any other information tending to prove that the proposed subcontractors have the necessary facilities, skill, integrity, past experience and financial resources to perform the work in accordance with the terms and provisions of the Contract Documents.
- (2) If the Consultant finds that the proposed subcontractors are qualified, it will so notify the Contractor within ten (10) working days after receipt of the aforesaid information. If the determination is to the contrary, however, the Consultant within such period will notify the Contractor of such determination and the latter, unless it decides to do such work itself and is qualified, in the Consultant's opinion, to do such work, must, within ten (10) working days thereafter, submit similar information with respect to other proposed subcontractors.
- (3) The Consultant's approval of a subcontractor and/or the University's designation of a subcontractor pursuant to the provisions of the Contract Documents shall not relieve the Contractor of any of its responsibilities, duties and liabilities hereunder. The Contractor shall be solely responsible to the University for the acts or defaults of such subcontractors and of such subcontractors' officers, agents and employees, each of whom shall, for this purpose, be deemed to be the agent or employee of the Contractor to the extent of its subcontract.
- (4) The Contractor shall be fully responsible for the administration, integration, coordination, direction and supervision of all of its subcontractors and of all work and it shall check all space requirements of the work and coordinate and adjust the same so that conflicts in space do not occur in the work being performed by it with its own employees and with the work being performed by its subcontractors and so that all equipment, piping, wiring, etc., can be installed, where possible, in the spaces allowed for the same.
- (5) No subcontractor shall be permitted to work at the site until (a) it has furnished satisfactory evidence to the Consultant of the insurance required by law; (b) in the case of a Project involving a federal grant, it has furnished satisfactory evidence to the Consultant of the same type and amount of liability insurance as that required of the Contractor by Section 5.06 of the Agreement; and (c) except for subcontractors designated by the University pursuant to the provisions of the Information for bidders, it has been approved by the Consultant.

- (6) Within seven (7) working days after the Contractor receives payment from the University on account of a progress payment application for the percentage of the work done, it shall pay each of its subcontractors the sum contained in said payment for the percentage of said subcontractor's work, less the same amount retained therefrom by the University under the terms of the Contract Documents or in consequence of any legal proceedings or statutory liens, and less any amounts due the Contractor under the subcontract for work not performed or not properly or timely performed by the subcontractor. In the event any subcontractor is not paid by the Contractor, the former should immediately notify the University of such fact. Not withstanding the foregoing, no retention or withholding of payment by the university shall affect the Contractor's obligation to pay all subcontractors, agents, employees or other parties for goods or services provided in connection with the work.
- (7) The Contractor shall execute with each of its subcontractors and shall require all subcontractors to execute with their sub-subcontractors a written agreement which shall bind the latter to the terms and provisions of this Contract insofar as such terms and provisions are applicable to the work to be performed by such subcontractors. The Contractor shall require all subcontractors and sub-subcontractors to promptly, upon request, file with the Consultant and the University a copy of such agreements, from which the price and terms of payment may be deleted.
- (8) If for sufficient reason, at any time during the progress of the work to be performed hereunder, the Consultant determines that any subcontractor or sub-subcontractor is incompetent, careless or uncooperative, the Consultant will notify the Contractor accordingly and immediate steps will be taken by the Contractor for cancellation of such subcontract or sub-subcontract. Such termination, however, shall not give rise to any claim by the Contractor or by such subcontractor or sub-subcontractor for loss of prospective profits on work unperformed and/or work unfurnished and a provision to that effect shall be contained in all subcontracts and sub-subcontracts.
- (9) No provisions of this Contract shall create or be construed as creating any contractual relation between the University and any subcontractor or sub-subcontractor or with any person, firm or corporation employed by, contracted with or whose services are utilized by the Contractor.

Section 2.19 Shop Drawings and Samples

- (1) The Contractor, in accordance with the approved Shop Drawing and Sample schedule and with such promptness and in such sequence as to cause no delay in the work, shall submit for the Consultant's approval all Shop Drawings and Samples called for under the Contract or requested by the Consultant.
- (2) Shop Drawings shall establish the actual detail of the work, indicate proper relation to adjoining work, amplify design details of mechanical and electrical equipment in proper relation to physical spaces in the structure, and incorporate minor changes of design or construction to suit actual conditions.
- (3) All Shop Drawings and Samples shall be thoroughly checked by the Contractor for compliance with the Contract Documents before submitting them to the Consultant for approval and all Shop Drawings shall bear the Contractor's recommendation for approval certifying that they have been so checked. Any Shop Drawings submitted without this stamp of approval and certification, and Shop Drawings which, in the Consultant's opinion, are incomplete, contain numerous errors or have not been checked or only checked superficially, will be returned unchecked by the Consultant for resubmission by the Contractor. In checking Shop Drawings, the Contractor shall verify all dimensions and field conditions and shall check and coordinate the Shop Drawings of any section or trade with the requirements of all other sections or trades whose work is related thereto, as required for proper and complete installation of the work.
- (4) Samples must be of sufficient size or number to show the quality, type, range of color, finish and texture of the material. Each Sample shall be properly labeled to show the nature of the material, trade name of manufacturer, name and location of the work where the material represented by the Sample is to be used and the name of the Contractor submitting the Sample. Transportation charges to the Consultant must be prepaid on Samples forwarded to it.
- (5) Shop Drawings and Samples, submitted by the Contractor in accordance with the approved Shop Drawing and Sample schedule, will be reviewed by the Consultant within fifteen (15) working days and if satisfactory will be approved. A Shop Drawing, when approved, will be returned to the Contractor. If not satisfactory, the Drawings and Samples will be appropriately marked and returned to the Contractor for correction thereof, in which event the Contractor shall resubmit to the Consultant a corrected copy of the Shop Drawing or a new Sample, as the case may be. The Contractor shall make any correction required by the Consultant and shall appropriately note any changes or revisions on the Shop Drawing, dated to correspond with the date of the Consultant's request for the change. Upon approval of the Shop Drawing by the Consultant, the Contractor shall promptly furnish to the Consultant as many copies thereof as the Consultant may reasonably request.
- (6) At the time of submission of a Shop Drawing or Sample, the Contractor shall inform the Consultant and the University in writing of any deviation in the Shop Drawing or Sample from the requirements of the Contract Documents. Unless such deviation is specifically noted by the Contractor with a notation that such deviation will result in extra work for which the Contractor requests payment or requires additional time, the Contractor shall be deemed to have waived any claim for extra work, additional compensation or payment or an extension of time with respect to all work shown on, described in or related to the Shop Drawing or Sample.
- (7) The Consultant's approval of Shop Drawings or Samples is for design only and is not a complete check on the method of assembly, erection or construction. Approval shall in no way be construed as: (a) permitting any departure whatsoever from the Contract Documents, except where the Contractor, in accordance with the provisions of paragraph 6 of this Section, has previously notified the University and the Consultant of such departure; (b) relieving the Contractor of full responsibility for any error in quality of materials, details, dimensions, omissions or otherwise that may exist; (c) relieving the Contractor of full responsibility for adequate field connections, erection techniques, bracing or deficiencies in strength; (d) relieving the Contractor of full responsibility for satisfactory performance of all work and coordination with the work of all subcontractors and other contractors; or (e) permitting departure from additional details or instructions previously furnished by the Consultant.
- (8) No work requiring a Shop Drawing or Sample shall be commenced until a Shop Drawing or Sample is approved in writing by the Consultant and all such work shall be: (a) in accordance with the approved Shop Drawing, provided the latter conforms in all respects to the Contract Documents or to such deviations therefrom as have been previously noted by the Contractor in accordance with the provisions of paragraph 6 of this Section; and (b) in conformance in all respects to the sample furnished to and approved by the Consultant and, unless otherwise

specified, as new and of good quality.

Section 2.20 Equivalents - Approved Equal

A. EQUIVALENTS OR APPROVALS - GENERAL

- (1) The words "similar and equal to", "or equal", "equivalent", and such other words of similar content and meaning shall, for the purposes of this Contract, be deemed to mean similar and equivalent to one of the named products. For the purposes of subdivisions A and B of this Section and for purposes of the Bidding Documents, the word "products" shall be deemed to include the words "articles", "materials", "items", "equipment" and "methods". Whenever in the Contract Documents one or more products are specified, the words "similar and equal to" shall be deemed inserted.
- (2) Whenever any product is specified in the Contract Documents by a reference to the name, trade name, make or catalog number of any manufacturer or supplier, the intent is not to limit competition, but to establish a standard of quality which the Consultant has determined is necessary for the Project. A Contractor may at its option use any product other than that specified in the Contract Documents provided the same is approved by the Consultant in accordance with the procedures set forth in subdivision B of this Section. In all cases the Consultant shall be the sole judge as to whether a proposed product is to be approved and the Contractor shall have the burden of proving, at its own cost and expense, to the satisfaction of the Consultant, that the proposed product is similar and equal to the named product. In making such determination the Consultant may establish such objective and appearance criteria as it may deem proper that the proposed product must meet in order for it to be approved.
- (3) Nothing in the Contract Document shall be construed as representing, expressly or implicitly, that the named product is available or that there is or there is not a product similar and equal to any of the named products and the Contractor shall have and make no claim by reason of the availability or lack of availability of the named product or of a product similar and equal to any named product.
- (4) The Contractor shall have and make no claim for an extension of time or for damages by reason of the time taken by the Consultant in considering a product proposed by the Contractor or by reason of the failure of the Consultant to approve a product proposed by the Contractor.
- (5) Requests for approval of proposed equivalents will be received by the Consultant only from the Contractor.

B. EQUIVALENTS OR APPROVALS AFTER BIDDING

- (1) Requests for approval of proposed equivalents will be considered by the Consultant after bidding only in the following cases: (a) the named product cannot be obtained by the Contractor because of strikes, lockouts, bankruptcies or discontinuance of manufacture and the Contractor makes a written request to the Consultant for consideration of the proposed equivalent within ten (10) calendar days of the date it ascertains it cannot obtain the named product; or (b) the proposed equivalent is superior, in the opinion of the Consultant, to the named product; or (c) the proposed equivalent, in the opinion of the Consultant, is equal to the named product and its use is to the advantage of the University, e.g., the University receives an equitable credit, acceptable to it, as a result of the estimated cost savings to the Contractor from the use of the proposed equivalent or the University determines that the Contractor has not failed to act diligently in placing the necessary purchase orders and a savings in the time required for the consultant, is equal to the named product and less than ninety (90) calendar days have elapsed since the Notice of Award of the Contract.
- (2) Where the Consultant pursuant to the provisions of the subdivision approves a product proposed by a Contractor and such proposed product requires a revision or redesign of any part of the work covered by this Contract, all such revision and redesign and all new Drawings and details required therefore shall be subject to the approval of the Consultant and shall be provided by the Contractor at its own cost and expense.
- (3) Where the Consultant pursuant to the provisions of this Section approves a product proposed by a Contractor and such proposed product requires a different quantity and/or arrangement of duct work, piping, wiring, conduit or any other part of the work from that specified, detailed or indicated in the Contract Documents, the Contractor shall provide the same at its own cost and expense.

Section 2.21 Patents, Trademarks and Copyrights

The Contractor acknowledges that the Contract consideration includes all royalties, license fees and costs arising from patents or trademarks in any way involved in the work, provided, however, that the Contract consideration shall not be deemed to have included therein any royalty, license fee or cost arising from a patent or trademark for a design prepared by the Consultant and neither the Contractor nor the University shall have any liability in connection therewith. Where the Contractor is required or desires to use any product, device, material or process covered by patent or trademark, the Contractor shall indemnify and save harmless the University and the State of New York from any and all claims, actions, causes of action or demands, for infringement by reason of the use of such patented product, device, material or process, and shall indemnify the University and the State of New York from any cost, liability, damage and expense, including reasonable attorneys' fees and court costs, which it may be obligated to incur or pay by reason of any claim or infringement at anytime both before or after the University's final acceptance of all the work to be performed under the Contract.

Section 2.22 Possession Prior to Completion

If before the final completion of all the work it shall be deemed advisable or necessary by the University to take over, use, occupy or operate any part of the completed or partly completed work or to place or install therein equipment and furnishings, the University, upon reasonable written notice to the Contractor, shall have the right to do so and the Contractor will not in any way interfere therewith or object to the same. Such action by the University shall in no way affect the obligations of the Contractor under the terms and provisions of the Contract Documents and the Contractor

acknowledges that such action by the University does not in any way evidence the completion of the work or any part thereof or in any way signify the University's acceptance of the work or any part thereof, provided, however, that the period for the Contractor's warranties and guarantees under the Contract for the work so occupied or operated shall be deemed to commence on the date said work is occupied or operated. The Contractor agrees to continue the performance of all work covered by the Contract in a manner which will not unreasonably interfere with such takeover, use, occupancy, operation, placement or installation.

Section 2.23 Completion and Acceptance

A. PARTIAL COMPLETION AND ACCEPTANCE

If before the final completion of all the work any portion of the permanent construction has been satisfactorily completed and the same will be immediately useful to the University, the latter may, by written notice, advise the Contractor that it accepts such portion of the work. Such actions by the University shall in no way affect the obligations of the Contractor under the terms and provisions of the Contract with respect to any work not so completed and accepted.

B. SUBSTANTIAL COMPLETION

When all the work covered by the Contract is substantially completed, i.e., has reached such point of completion that the Project can be fully occupied and used for the purposes for which it was intended, the Contractor shall give written notice thereof to the University and the Consultant. The latter will then promptly make an inspection of the work and, if they shall determine that all the work is substantially completed, they shall so advise the Contractor. Such action shall in no way affect the obligations of the Contractor under the terms and provisions of the Contract with respect to any uncompleted (including untested or deferred work), unaccepted or corrective work or in any way affect, limit or preclude the issuance by the Consultant, from time to time thereafter, of "Punch Lists", i.e., lists of uncompleted or corrective work which the Contractor is to promptly complete and/or correct.

C. FULL COMPLETION AND ACCEPTANCE

After the completion of all the work the Contractor shall give written notice to the University and the Consultant that all the work is ready for inspection and final acceptance. The University and the Consultant shall promptly make such inspection and, if they shall determine that all the work has been satisfactorily completed, the University shall thereupon by written notice advise the Contractor that it accepts such work.

Section 2.24 Record Drawings

- (1) Prior to acceptance by the University of all work covered by the Contract, the Contractor shall furnish to the Consultant one (1) set of current Contract Drawings on which the Contractor has recorded, using colored pencil, in a neat and workmanlike manner, all instances where actual field construction differs from work as indicated on the Contract Drawings. These "Record" Drawings shall show the following information: (a) all significant changes in plans, sections, elevations and details, such as shifts in location of walls, doors, windows, stairs and the like made during construction; (b) all significant changes in foundations, columns, beams, openings, concrete reinforcing, lintels, concealed anchorage and "knock-out" panels made during construction; (c) final location of electric panels, final arrangement of electric circuits and any significant changes made in electrical design as a result of Change Orders or job conditions; (d) final location and arrangement of all mechanical equipment and major concealed plumbing, including, but not limited to, supply and circulating mains, vent stacks, sanitary and storm water drainage; and (e) final location and arrangement of all underground utilities, connections to building and/or rerouting of existing utilities, including, but not limited to, sanitary, storm, heating, electric, signal gas, water and telephone.
- (2) Shop Drawings shall not be acceptable as "Record" Drawings.
- (3) The Contractor agrees to provide Record Drawings on "electronic media" or "hard copy" at the discretion of the University at no extra cost.

Section 2.25 Guarantees

- (1) The Contractor, at the convenience of the University, shall remove, replace and/or repair at its own cost and expense any defects in workmanship, materials, ratings, capacities or characteristics occurring in or to the work covered by the Contract within one (1) year or within such longer period as may otherwise be provided in the Contract, the period of such guarantee to commence with the University's final acceptance of all work covered under the Contract or at such other date or dates as the University may specify prior to that time, and the Contractor, upon demand, shall pay for all damage to all other work resulting from such defects and all expenses necessary to remove, replace and/or repair such other work which may be damaged in removing, replacing or repairing the said defects. The obligations of the Contractor under the provisions of this paragraph or any other guarantee provisions of the Contract Documents are not limited to the monies retained by the University under the Contract.
- (2) Unless such removal, replacement and/or repair shall be performed by the Contractor within ten (10) working days after it receives written notice from the University specifying such defect, or if such defect is of such a nature that it cannot be completely removed, repaired and/or replaced within said ten (10) day period and the Contractor shall not have diligently commenced removing, repairing and/or replacing such defect within said ten (10) day period and shall not thereafter with reasonable diligence and in good faith proceed to do such work, the University may employ such other person, firm or corporation as it may choose to perform such removal, replacement and/or repair and the Contractor agrees, upon demand, to pay to the University all amounts which it expends for such work.

Section 2.26 Default of Contractor

(1) In addition to those instances specifically referred to in other Sections hereof, the University shall have the right to declare the Contractor in default of the whole or any part of the work if:

- a. The Contractor makes an assignment for the benefit of creditors pursuant to the statutes of the State of New York; or if
- b. A voluntary or involuntary petition in bankruptcy is filed by or against the Contractor; or if
- c. A receiver or receivers are appointed to take charge of the Contractor's property or affairs; or if
- d. The Contractor shall sublet, assign, transfer, convey, or otherwise dispose of the Contract other than as herein specified; or if
- (2) Before the University shall exercise its right to declare the Contractor in default by reason of the conditions set forth in this subsection, it shall give the Contractor three (3) working days' notice of its intention to declare the Contractor in default and unless, within such three (3) day period, the Contractor shall make arrangements, satisfactory to the University, to correct and/or eliminate the conditions set forth in the University's aforesaid notice, the Contractor may be declared in default at the expiration of such three (3) day period or at the expiration of such longer period of time as the University may determine. In addition to those instances specifically referred to above, the University shall have the right to declare the Contractor in default of the whole or any part of the work if, in the sole opinion of the University:
 - a. The Contractor becomes insolvent; or if
 - b. The Contractor fails to commence work when notified to do so by the Consultant; or if
 - c. The Contractor shall abandon the work; or if
 - d. The Contractor shall refuse to proceed with the work when and as directed by the Consultant; or if
 - e. The Contractor shall without just cause reduce its working force to a number which, if maintained, would be insufficient, in the opinion of the University, to complete the work in accordance with the approved time progress schedule, and shall fail or refuse to sufficiently increase such working force when ordered to do so by the Consultant; or if
 - f. The Contractor is or has been unnecessarily or unreasonably or willfully delaying the performance and completion of the work, or the award of necessary subcontracts, or the placing of necessary material and equipment orders; or if
 - g. The work cannot be completed within the time herein provided therefore or within the time to which such completion may have been extended; provided, however, that the impossibility of timely completion is, in the University's opinion, attributable to conditions within the Contractor's control; or if
 - h. The work is not completed within the time herein provided therefore or within the time to which the Contractor may be entitled to have such completed extended; or if
 - i. The Contractor is or has been willfully or in bad faith violating any of the provisions of this Contract; or if
 - j. The Contractor is not or has not been executing the Contract in good faith and in accordance with its terms.
- (3) The right to declare in default for any of the grounds specified or referred to shall be exercised by the University sending the Contractor a written notice setting forth the ground or grounds upon which such default is declared. Upon receipt of notice that it has been declared in default, the Contractor shall immediately discontinue all further operations under the Contract and shall immediately quit the site, leaving untouched all plant, materials, equipment, tools and supplies then on site.
- (4) The University, after declaring the Contractor in default, may then have the work completed 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 such of the Contractor's plant, materials, equipment, tools and supplies remaining on the site, and also such subcontractors as it may deem advisable, or it may call upon the Contractor's surety at its own expense to do so.
- (5) In the event that the University declared the Contractor in default of the work or any part of the work, the Contractor, in addition to any other liability to the University hereunder or otherwise provided for or allowed by law, shall be liable to the University for any costs it incurs for additional architectural and engineering services necessary, in its opinion, because of the default and the total amount of liquidated damages from the date when the work should have been completed by the Contractor in accordance with the terms hereof to the date of actual completion of the work, both of which items shall be considered as expenses incurred by the University in completing the work and the amount of which may be charged against and deducted out of such monies as would have been payable to the Contractor or it surety if the work had been completed without a default.
- (6) If the University completes the work, the Consultant shall issue a certificate stating the expenses incurred in such completion, including the cost of re-letting. Such certificates shall be final, binding and conclusive upon the Contractor, its surety, and any person claiming under or through the Contractor, as to the amount thereof.
- (7) The expense of such completion, as so certified by the Consultant, shall be charged against and deducted out of such monies as would have been payable to the Contractor if it had completed the work; the balance of such monies, if any, subject to the other provisions of the Contract, to be paid to the Contractor without interest after such completion. Should the expense of such completion, so certified by the Consultant, exceed the total sum which would have been payable under the Contract if the same had been completed by the Contractor, any such excess shall be paid by the Contractor to the University upon demand.
- (8) In the event the University shall determine to complete the work without calling upon the Contractor's surety to do so, the Contractor shall not be entitled, from and after the effective date of the declaration of the default, to receive any further payment under the Contract until the said work shall be wholly completed and accepted by the University.

- (9) In case the University shall declare the Contractor in default as to a part of the work only, the Contractor shall discontinue such part, shall continue performing the remainder of the work in strict conformity with the terms of the Contract, and shall in no way hinder or interfere with any other contractors or persons whom the University may engage to complete the work as to which the Contractor was declared in default.
- (10) The provisions relating to declaring the Contractor in default as to the entire work shall be equally applicable to a declaration of partial default, except that the University shall be entitled to utilize for completion of the part of the work as to which the Contractor was declared in default only such plant, materials, equipment, tools and supplies as had been previously used by the Contractor on such part.
- (11) In completing the whole or any part of the work, the Consultant and the University shall have the power to depart from, change or vary the terms and provisions of the Contract; provided, however, that such departure, change or variation is made for the purpose of reducing the time or expense of such completion. Such departure, change or variations, even to the extent of accepting a lesser or different performance, shall not affect the conclusiveness of the Consultant's certificate of the cost of completion, nor shall it constitute a defense to any action to recover the amount by which such certificate exceeds the amount which would have been payable to the Contractor hereunder but for its default.
- (12) The provisions of this Section shall be in addition to any and all other legal or equitable remedies provided by this Agreement and otherwise available by law.

Section 2.27 Termination

- (1) The performance of work under this Contract may be terminated by the University, in whole or in part, whenever the University shall determine that such termination is in the best interest of the University; or in the event the State Finance Law Sections 139-j and 139-k certifications are found to be intentionally false or intentionally incomplete; or in the event the information provided in Sales Tax Certifications ST-220TD and/or ST-220CA is found to be false or incomplete. Any such termination shall be effected by a notice in writing to the Contractor specifying the date upon which such termination shall become effective and the extent to which performance of the Contract shall be terminated. Such termination shall be effective on the date and to the extent specified in said notice.
- (2) Upon receipt of a notice of termination, and except as otherwise directed in writing by the University, the Contractor shall:
 - a. Discontinue all work and the placing of all orders for materials and facilities otherwise required for the performance thereof;
 - Cancel all existing orders and subcontracts to the extent such orders and subcontracts relate to the performance of work terminated by the notice of termination;
 - c. Take such actions as may be necessary to secure to the University the benefits of any rights of the Contractor under orders or subcontracts which relate to the performance of work terminated by the notice of termination, including, but not limited to, the assignment to the University, in the manner and to the extent directed by the University, all the right, title and interest of the Contractor under the orders or subcontracts so terminated and canceled. In the event of such assignment, the University shall have the right, in its discretion, to settle or pay any or all claims arising out of the termination and cancellation of such orders and subcontracts;
 - d. Transfer title and deliver to the University, in accordance with the direction of the University, all materials, supplies, work in process, facilities, equipment, machines or tools produced as a part of or acquired by the Contractor in connection with the work terminated by said notice, and all plans, Drawings, Working Drawings, sketches, Specifications and information for use in connection therewith; provided, however, that the Contractor may retain any of the foregoing if it so elects and forgoes reimbursement therefore;
 - e. Take such action as may be necessary or as the Consultant or the University may prescribe for the protection and preservation of all property in the possession or control of the Contractor in which the University, under the provisions of the Contract, has or may acquire an interest.
- (3) Notwithstanding the foregoing, should the notice of termination relate to only a portion of the work covered by the Contract, the Contractor will proceed with the completion of such portions of the work as are not terminated.
- (4) The University will pay and the Contractor shall accept, in full consideration for the performance and completion of the portions of the work as are not terminated, a sum calculated by determining the percentage the portions of the work not terminated bear to the total amount of the work covered by the Contract, and by multiplying the Contract consideration by such percentage the product thereof being the amount to be paid to the Contractor. The University shall determine the amount of such consideration in accordance with the foregoing.
- (5) Upon compliance by the Contractor with the foregoing provisions of this Section and subject to deductions for payments previously made, the University, for the portions of the work terminated, shall compensate the Contractor as follows:
 - a. By reimbursing the Contractor for actual expenditures made with respect to such work, including expenditures made in connection with any portion thereof which may have been completed prior to termination, as well as expenditures made after termination in completing those portions of the work covered by the Contract which the Contractor may have been required by the notice of termination to complete. The University shall determine the allocability and amount of such expenditures.
 - b. By reimbursing the Contractor for all actual expenditures made, with the prior written approval of the University or pursuant to a court judgment, in settling or discharging any outstanding contractual obligations or commitments incurred or entered into by the Contractor in good faith with respect to the Contract and resulting from the termination thereof.
 - c. By reimbursing the Contractor for all actual expenditures made after the effective date of the notice of termination resulting from or caused by the Contractor taking necessary action or action prescribed by the Consultant or the University for the protection and preservation of all property in the possession or control of the Contractor in which the University, under the provisions of the Contract,

has or may acquire an interest.

- d. By paying the Contractor a markup, which is to be calculated in the same manner as that provided for in subdivision c of paragraph (1) of Section 4.02 for extra work, on the foregoing expenditures, which markup is to cover the Contractor's overhead and profit; provided, however, that if it appears that the Contractor would have sustained a loss on the entire Contract had it been completed, said markup shall be reduced by one-third.
- (6) The sum of all amounts payable under this Section, plus the sum of all amounts previously paid by the University under the provisions of the Contract, shall not exceed the amount of the Contract consideration. In no event shall the Contractor be entitled to any payment for loss of anticipated profits on uncompleted work and the University shall not be liable for the same.
- (7) Termination by the University under the provisions of this Section shall be without prejudice to any claims or rights which the University may have against the Contractor. The University may retain from the amount due to the Contractor under the provisions of this Section such monies as may be necessary to satisfy any claim which the University may have against the Contractor in connection with the Contract; provided, however, that the University's failure to retain such monies shall not be deemed a waiver of any of its rights or claims against the Contractor.
- (8) Notwithstanding the foregoing, where the Contractor and the Consultant can agree upon another method of determining the amount of the consideration to be paid to the Contractor under the provisions of the Section, such method, subject to the approval of the University, may, at the option of the University, be substituted for the method set forth above.

ARTICLE III

Time of Performance

Section 3.01 Commencement, Prosecution and Completion of Work

- (1) The Contractor agrees that it will begin the work herein embraced within ten (10) calendar days after the Contract approval date and that it will prosecute the same with such diligence that all work covered by the Contract shall be entirely completed and performed on or before the time specified on page A-1 of the Agreement.
- (2) The Contractor further agrees that time is of the essence in this Contract and that the work shall be prosecuted in such manner and with sufficient plant and forces to complete all the work by the specified completion date.

Section 3.02 Time Progress Schedule

- (1) Within thirty (30) calendar days after receipt of the Notice of Award, the Contractor, unless otherwise directed by the University, shall submit to the University and the Consultant for their approval its proposed working plan and schedule for its first ninety (90) calendar days of operation. The working plan and schedule shall be in the form of suitable charts, diagrams or bar graphs and shall be based on the Contractor's logic and time estimates. Such plan and schedule shall be sufficiently detailed to show clearly, in sequence, all salient features of the work of each trade including: the anticipated time of commencement and completion of such work and the interrelationship between such work, submission of Shop Drawings and Samples for approval, approval of Shop Drawings and Samples, placing of orders of materials, fabrication and delivery of materials, installation and testing of materials, contiguous or related work under other contracts, and other items pertinent to the work.
- (2) Within ninety (90) calendar days after receipt of the Notice of Award, the Contractor, unless otherwise directed by the University, shall submit to the University and the Consultant for their approval its proposed working plan and schedule for all the work covered by the Contract. Said proposed working plan and schedule shall be prepared in accordance with the form and requirements set forth in the preceding paragraph.
- (3) The aforesaid proposed working plan and schedule shall be revised by the Contractor until they are satisfactory to the University and the Consultant, and the same shall be periodically revised thereafter and submitted by the Contractor to the University and the Consultant for approval at such time or times as the University or the Consultant may request.
- (4) The proposed working plan and schedule, including any revision or revisions thereof, when approved by both the University and the Consultant shall be known as the time progress schedule. The time progress schedule, as the same may be revised from time to time by the Contractor and approved by the University and the Consultant, shall be strictly adhered to by the Contractor.
- (5) If through the fault of the Contractor or any subcontractor the Contractor shall fail to adhere to the time progress schedule, it must promptly adopt such other and additional means and methods of construction as will make up for the time lost and will assure completion in accordance with such schedule.
- (6) The University's or the Consultant's approval of the Contractor's time progress schedule or of its time, means and/or methods of construction, including any revisions thereof, and/or their failure to reject the same shall not relieve the Contractor of its obligation to accomplish the result required by the Contract, nor shall the exercise of such right to reject, create or give rise to any claim, action or cause of action, legal, equitable or otherwise, against the Consultant or the University.

Section 3.03 Time Schedule for Shop Drawings and Samples

(1) Within sixty (60) calendar days after the date specified for the commencement of the work, the Contractor, unless otherwise directed by the Consultant, shall submit to the latter for approval a proposed time schedule covering the preparation and submission of all Shop Drawings and Samples. The proposed schedule will be revised by the Contractor until it is satisfactory to the Consultant and it shall be periodically revised thereafter and submitted by the Contractor to the Consultant for approval at such time or times as the Consultant may request.

(2) The aforesaid schedule, as the same may be revised from time to time by the Contractor, after approval by the Consultant, shall be strictly adhered to by the Contractor.

Section 3.04 Notice of Conditions Causing Delay

- (1) Within ten (10) working days after the commencement of any condition which is causing or may cause delay in completion, the Contractor must notify the Consultant and the University in writing of the effect, if any, of such condition upon the time progress schedule, and must state why and in what respects, if any, the condition is causing or may cause such delay.
- (2) Failure to strictly comply with this requirement may, in the discretion of the University, be deemed sufficient cause to deny any extension of time on account of delay in completion arising out of or resulting from any change, extra work, suspension, or other condition.

Section 3.05 Extension of Time

- (1) An extension or extensions of time for the completion of the work may be granted by the University subject to the provisions of this Section, but only upon written application therefore by the Contractor to the University and the Consultant.
- (2) An application for an extension of time must set forth in detail the source and the nature of each alleged cause of delay in the completion of the work, the date upon which each such cause of delay began and ended and the number of days of delay attributable to each of such causes. It must be submitted prior to completion of the work.
- (3) If such an application is made, the Contractor shall be entitled to an extension of time for delay in completion of the work caused solely: (a) by the acts or omissions of the University, its trustees, officers, agents or employees; or (b) by the acts or omissions of other contractors, not including subcontractors of the Contractor, on this Project; or (c) by unforeseeable supervening conditions entirely beyond the control of either party hereto (such as, but not limited to, acts of God or the public enemy, war or other national emergency making performance temporarily impossible or illegal, or strikes or labor disputes).
- (4) The Contractor shall, however, be entitled to an extension of time for such causes only for the number of calendar days of delay which the University may determine to be due solely to such causes, and then only if the Contractor shall have strictly complied with all of the requirements of this Section and Section 3.04. The University shall make such determination within ninety (90) calendar days after receipt of the Contractor's application for an extension of time; provided, however, said application complies with the requirements of this Section.
- (5) The Contractor shall not be entitled to receive a separate extension of time for each one of several causes of delay operating concurrently, but, if at all, only for the actual period of delay in completion of the work as determined by the University, irrespective of the number of causes contributing to produce such delay. If one of several causes of delay operating concurrently results from any act, fault or omission of the Contractor or of its subcontractors or materialmen, and would of itself (irrespective of the concurrent causes) have delayed the work, no extension of time will be allowed for the period of delay resulting from such act, fault or omission.
- (6) The granting of an application for an extension of time for causes of delay other than those herein referred to shall be entirely within the discretion of the University.
- (7) If the Contractor shall claim to have sustained any damages by reason of delays, extraordinary or otherwise, or hindrances which it claims to be due to any action, omission, direction or order by the University or the Consultant, the Contractor shall be entitled only to an extension of time as hereinabove provided and shall not have or assert any claim or prosecute any suit, action, cause of action or proceeding against the University based upon such delays or hindrances, unless such delays or hindrances were caused by the University's bad faith or its willful, malicious, or grossly negligent conduct, or uncontemplated delays, or delays so unreasonable that they constitute an intentional abandonment of the contract by the University, or delays resulting from the University's breach of a fundamental obligation of the contract.

Section 3.06 Contractor's Progress Reports

After commencement of the work the Contractor shall furnish the Consultant with written monthly reports setting forth the condition and general progress of the work, the percentage of each part of the work that has been finished, those parts of the work which have been completed within the scheduled time and those parts of the work which have not been finished within the scheduled time, and the general progress of the work that is being performed away from the site and the approximate date when such work will be finished and delivered to the site.

ARTICLE IV

Payment

Section 4.01 Compensation to Be Paid Contractor

The University shall pay to the Contractor and the latter shall accept as full and complete payment for the performance of this Contract, subject to additions or deductions as provided herein, the sum indicated on page 1 of this Agreement which sum is the amount of the total contract compensation. The Contractor shall provide complete and accurate billing invoices to the University in order to receive payment for its services. Billing invoices submitted to the University must contain all information and supporting documentation required by the University and the Office of the State Comptroller (OSC). **Payment for invoices submitted by the Contractor shall only be rendered electronically** unless payment by paper check is expressly authorized by the Vice President for Administration or designee, in her/his sole discretion, due to extenuating circumstances. Such electronic payment shall be made in accordance with ordinary New York State procedures and practices. The Contractor shall comply with the OSC procedures to authorize electronic payments. Authorization forms are available at the OSC website at www.osc.state.ny.us/epay/index.htm, by email at epunit@osc.state.ny.us or by telephone at 518-474-4032.
The Contractor acknowledges that it will not receive payment on any invoices submitted under this contract if it does not comply with the OSC's electronic payment procedures, except where the Vice President or designee has expressly authorized payment by paper check as set forth above.

Section 4.02 Value of Omitted and Extra Work

- (1) The amount by which the Contract consideration is to be increased or decreased by any Change Order shall be determined by the University by one or more of the following methods:
 - a. By accepting an amount agreed upon by both parties, which amount is to be calculated in a manner similar to that provided in subdivision c hereof.
 - b. By applying the applicable price or prices set forth in the attached Schedule "I" of this Agreement or by applying a unit price agreed to by both parties. Subject to the provisions of Sections 4.04, this method must be used if the Contract Documents contain applicable unit prices.
 - By estimating the fair and reasonable cost of: (i) labor, including all wages, required wage supplements and insurance required by law c. (workers' compensation, social security, disability, unemployment, etc.) paid to or on behalf of foremen, workers and other employees below the rank of superintendent directly employed at the site of the Project; (ii) materials; and (iii) equipment, excluding hand tools, which, in the judgment of the University, would have been or will be employed exclusively and directly on the omitted work or extra work, as the case may be; and, in the case of extra work, where the same is performed directly by the Contractor, by adding to the total of such estimated costs a sum equal to 15 percent thereof, but, where the extra work is performed by a subcontractor, by adding a sum equal to 15 percent of said costs for the benefit of such subcontractor, and by adding, for the benefit of the Contractor (no further allowance will be made where extra work is performed by the sub-subcontractor), an additional sum equal to 10 percent of the first \$10,000 of the above-estimated costs, including the subcontractor's percentage override, plus 5 percent of the next \$90,000 of the total of said items, plus 3 percent of any sum in excess of \$100,000 of the total of said items. For the purposes of the aforesaid percentage overrides, the words "extra work" shall be defined as a complete item of added, modified or changed work as described in the Consultant's written instructions to the Contractor. Such "extra work" may include the work of one or more trades and/or subcontractors or sub-subcontractors and shall include all labor, materials, plant, equipment, tools and all incidentals directly and/or indirectly necessary, related, involved in or convenient to the successful completion of the extra work item. Where the Consultant's aforesaid written instructions to the Contractor involve both an increase and a reduction in similar or related work, the above percentage overrides will be applied only on the amount, if any, the cost of the increased work exceeds the cost of the reduced work.

All profit, overhead and expense of whatsoever kind and nature, other than those set forth above in items (i) through (iii), of the Contractor, its subcontractors and sub-subcontractors, are covered by the aforesaid percentage overrides and no additional payment therefore will be made by the University. The University may make such cost estimate either before or after the extra work is completed by the Contractor.

- d. By determining the actual cost of the extra work in the same manner as in the above subdivision c except that actual costs of the Contractor shall be utilized in lieu of estimated costs. The University shall have the option of utilizing this method provided it notifies the Contractor of its intent to do so prior to the time the Contractor commences performance of such extra work.
- (2) Irrespective of the method used or to be used by the University in determining the value of a Change Order, the Contractor, within fifteen (15) working days after a request for the same, must submit to the University and the Consultant a detailed breakdown of the Contractor's estimate of the value of the omitted and/or extra work.
- (3) For the purposes of paragraph (1) hereof, the cost of equipment shall be determined, irrespective of the actual price for any rental or actual cost associated with such equipment and irrespective of whether the equipment is or is not owned by the Contractor, as follows: (a) for the first 40 hours of use by taking the monthly rate listed in the "Green Book" (the publication of the Associated Equipment Distributors of Oakbrook, Illinois) and dividing the same by 176 hours to establish an hourly rate and then multiplying such hourly rate by the actual number of hours that the equipment was used; and (b) for any period of time in excess of the first 40 hours of use by taking 50 percent of the hourly rate established in accordance with the above for equipment used for periods of less than 40 hours, and then multiplying such rate by the actual number of hours in excess of 40 hours that the equipment was used. In the event that the "Green Book" does not list the item of equipment used, the applicable rate shall be determined in the same manner as that set forth above except that the monthly rate shall be that set forth in the "Blue Book" (published by Equipment Guidebook Co. of Palo Alto, California). If no listing or rates for an item of equipment is contained in either the "Green Book" or the "Blue Book", the University shall determine the reasonable rate of rental of the particular item of equipment by such other means as it finds appropriate. The editions of the "Green Book" and the "Blue Book" to be used shall be those in effect on the date of the receipt of bids for this Contract. None of the provisions of the "Green Book" or the "Blue Book" shall be deemed referred to or included in this Contract excepting only the aforesaid monthly rates. To the cost of equipment as determined above, there is to be added the actual cost of gasoline, oil, grease and maintenance required for operation of such equipment and, in the case of equipment utilized only for extra work when, in the opinion of the Consultant, suitable equipment therefore was not available on the site, the reasonable cost of transporting said equipment to and from the site. Notwithstanding the foregoing, if the Consultant should determine that the nature or size of the equipment used by the Contractor in connection with the extra work is larger or more elaborate, as the case may be, than the size or nature of the minimum equipment determined by the Consultant to be suitable for the extra work, the cost of equipment will not be based upon the equipment used by the Contractor but instead will be based on the smallest or least elaborate equipment determined by the Consultant to have been suitable for the performance of the extra work.
- (4) Unless otherwise specifically provided for in a Change Order, the compensation specified therein for extra work includes full payment for both the extra work covered thereby and for any damage or expense caused the Contractor by any delays to other work to be done under the Contract resulting from or on account of said extra work, and the Contractor waives all rights to any other compensation for said extra work, damage or expense.

Section 4.03 Adjustment for Bond and Insurance Premiums

Upon final acceptance of the work to be performed under this Contract, the University shall adjust the Contract consideration to reflect any changes in the cost of all required Bonds and liability and builder's risk insurance premiums which the Contractor had to pay for on all extra work and would have had to furnish and pay for on all omitted work. Unless such cost is agreed upon by the University and the Contractor, the University shall calculate and determine the amount of the adjustment in the Contract consideration by estimating such cost.

Section 4.04 Unit Prices

- (1) Except as otherwise provided in the second paragraph of this Section, the unit prices, set forth in the attached Schedule I will be binding upon both the University and the Contractor in determining the value of omitted and/or extra work, and, in the case of extra work, such unit prices shall be deemed to include all profit, overhead and expenses of whatever kind and nature of the Contractor, its subcontractors and sub-subcontractors, and the Contractor agrees that it shall make no claim for any profit, overhead, expense or percentage override in connection therewith.
- (2) Where Schedule I sets forth a unit price for added and/or deducted work, the University shall have the option, whenever it is found that the quantity of changed work varies by more than 15 percent from the quantity that is stated or that can be determined by the Contract Documents at the time of execution thereof, to accept or reject such unit price for the quantity that the changed work varies by more than 15 percent from the stated or determinable quantity. Where a quantity is not specifically stated in the Contract Documents, the University's determination of the amount of said quantity included in the Contract Documents shall determine the applicability of this paragraph. Where the University, pursuant to the foregoing provisions, exercises its aforesaid option, the amount of the increase or decrease in the Contract consideration for the quantity of work which varies by more than 15 percent from the stated or determinable quantity shall be determined in accordance with the provisions of Section 4.02 of the Agreement as if there was no unit price therefore set forth in said Proposal.

Section 4.05 Allowances

- (1) The Contractor acknowledges that the Contract consideration includes the allowances set forth in the attached Schedule I and, except for quantitative allowances, it agrees to cause the work covered thereby to be done by such contractors for such sums as the University may direct. Where cash allowances are provided, the allowances shall be deemed to include the purchase of the materials and/or equipment and the delivery of the same to the job site. Unless otherwise specified in the Contract Documents, cash allowances do not include the proper installation of the materials and/or equipment or the connection for final utilities thereto; the cost of said installation and/or connection having been included in the amount of the Contract consideration.
- (2) The Contractor acknowledges that the Contract consideration includes such sums for expenses and profit on account of cash allowances as it deems proper and that it shall make no claim for expenses or profit or any percentage override in addition thereto; said items having been included in the amount of the Contract consideration.
- (3) In the event any cash allowance listed below is either higher or lower than the cost of having the work done in accordance herewith, the Contract consideration shall be adjusted to reflect such variance, the amount of said adjustment to be the difference between the amount of the allowance and the actual cost of performing the work covered thereby.
- (4) When quantitative allowances are provided, progress payments thereof to the Contractor will be based upon the applicable unit prices set forth in the attached Schedule I, subject, however to the provisions of paragraph (2) of Section 4.04. In the event any of said quantitative allowances are more than or less than the actual quantity of work performed, the Contract consideration shall be adjusted to reflect such variance, the amount of said adjustment to be determined in accordance with the provisions of Section 4.02 and Section 4.04 of the Agreement.

Section 4.06 Deductions for Unperformed and/or Uncorrected Work

- (1) Without prejudice to any other rights, remedies or claims of the University, in the event that the Contractor at any time fails or neglects to supply working forces and materials of the proper quantity and quality necessary, in the opinion of the Consultant or the University, to comply with the approved time progress schedule, or fails in any respect to prosecute the work with promptness and diligence or causes by any action or omission the stoppage or delay of or interference with the work of any other contractor having a contract with the University, or fails in the performance of any obligations and responsibilities under this Contract, then, and in that event, the University, acting itself or through the Consultant, may, upon three (3) working days' notice to the Contractor, either itself provide or have any other contractor provide any and all labor or materials or both necessary, in its opinion, to correct any aforesaid deficiency of the Contractor, and the University will thereafter back charge the Contractor by issuing a Change Order reducing the amount of the Contract consideration for all costs and expenses it incurs in connection with the correction of such deficiency.
- (2) Notwithstanding any provisions in the Contract Documents to the contrary, if the University deems it inexpedient to correct work not done in accordance with the Contract or any work damaged as a result thereof, it shall notify the Contractor of such fact and the latter shall not remedy or correct the same. In such event, however, the amount of the Contract consideration shall be decreased by an amount, determined by the University, which is equal to the difference in value of the work as performed by the Contractor and the value of the work had it been satisfactorily performed in accordance with the Contract or which is equal to the cost of performing the corrective work, whichever shall be the higher amount.

Section 4.07 Liquidated Damages

In the event that the Contractor shall fail to substantially complete all the work within the time fixed for such completion on page A-1 of the Agreement, or within the time to which such completion may have been extended, or in the event that the Contractor abandons the work and the same is not substantially completed within the aforesaid time for such completion, the Contractor must pay to the University as damages for each March 2009 16 of 27

calendar day of delay in completing the work the amount set forth on page A-1. In view of the difficulty of accurately ascertaining the loss which the University will suffer by reason of delay in completion of the work hereunder, said sum is hereby fixed and agreed as liquidated damages which the University will suffer by reason of such delay and not as a penalty. The University may deduct and retain out of the monies which may become due hereunder to the Contractor the amount of any such liquidated damages and, in case the amount which may become due to the Contractor under the provisions of the Contract may be less than the liquidated damages suffered by the University, the Contractor shall pay the difference, upon demand, to the University.

Section 4.08 Contract Breakdown

Prior to the submission of its first application for a progress payment, the Contractor shall present to the University and the Consultant for their approval a detailed schedule showing the breakdown of the Contract consideration. Such schedule must contain the amount estimated for each part of the work and quantity survey for each part of the work. It shall also list the estimated value of the Contractor's guarantee obligations under the provisions of the Contract Documents, which is hereby fixed at \$5,000 or one-half of one percent (1/2%) of the Contract award amount, whichever is the lesser sum. Such schedule shall be revised by the Contractor until the same shall be satisfactory to the University and the Consultant and shall not be changed after the University and the Consultant have approved the same. The amounts set forth in the schedule will not be considered as fixing the basis for additions to or deductions from the Contract consideration.

Section 4.09 Prompt Payment Requirements

- (1) For the purposes of Article XI-A of the State Finance Law, the campus for which the work is being performed is the University's designated payment office. Applications for payment must contain the approval of the Consultant before being submitted to the University.
- (2) Whenever the Consultant's approval of an application for payment is required under the Contract, the Consultant shall have fifteen (15) calendar days after receipt of such application to inspect the work before acting on the application.
- (3) This Contract is subject to the approval of the Comptroller of the State of New York. Until such approval is given, the thirty (30) day period referred to in Article XI-A of the State Finance Law for the payment of invoices without interest shall not begin.

Section 4.10 Progress Payments

- (1) Unless otherwise provided in the Contract, progress payments will be made as the work progresses upon applications submitted by the Contractor and approved by the Consultant and the University. Payment of such approved applications shall be made by the University within thirty (30) days after such approval has been given.
- (2) The University shall make progress payments to the Contractor on the basis of such approved applications, less an amount equal to 5 percent thereof, plus an amount necessary, in the University's judgment, to satisfy any claims, liens or judgments against the Contractor which have not been suitably discharged, which it shall reserve from each such payment until all of the work covered by the Contract has been completed.
- (3) When the University and the Consultant have determined that all the work is substantially completed, or that a substantial portion of the permanent construction has been completed and accepted, the University shall make a progress payment to the Contractor, on the basis of an application submitted by the Contractor and approved by the Consultant and the University, which shall reduce the unpaid amount due to the Contractor under the terms of the Contract, including all monies retained by the University from previous progress payments to the Contractor, to an amount equal to two (2) times the cost, estimated by the Consultant, of performing, in accordance with the Contract, all uncompleted, unaccepted and corrective work, plus an amount necessary, in the University's judgment, to satisfy any claims, liens or judgments against the Contractor which have not been suitably discharged. As the remaining items of work are satisfactorily completed or corrected, the University and the Consultant, covering said items of work less an amount necessary, in the University's judgment, to satisfy any claims, the Contractor and approved by the Consultant, covering said items of work less an amount necessary, in the University's judgment, to satisfy any claims, the Consultant, covering said items of work less an amount necessary, in the University's judgment, to satisfy any claims, liens or judgments against the Consultant, covering said items of work less an amount necessary, in the University's judgment, to satisfy any claims, liens or judgments against the Consultant, covering said items of work less an amount necessary, in the University's judgment, to satisfy any claims, liens or judgments against the Consultant, covering said items of work less an amount necessary, in the University's judgment, to satisfy any claims, liens or judgments against the Consultant, have not been suitably discharged.

Section 4.11 Applications for Progress Payments

The Contractor shall prepare all applications for progress payments for work performed, together with supporting data and computations as are deemed necessary by the Consultant to determine the accuracy of the application. The application for payment shall be submitted on the form prescribed by the University. Failure of the Contractor to submit applications for progress payments, or lack of complete and accurate supporting data, shall be sufficient reason for withholding payment until such omissions or errors are rectified. Unless otherwise directed, such applications, signed and certified as correct by the Contractor, shall be delivered by the Contractor to the Consultant once each month showing the total value of work completed and in place on the last day of the payment period covered by the application.

Section 4.12 Progress Payments for Materials Delivered to Site

- (1) Progress payments made in accordance with Section 4.10 shall include a payment for materials and equipment to be furnished and installed under the Contract, after such materials and equipment have been delivered and accepted at the site of the work.
- (2) Materials and equipment for which such progress payment has been made shall not be removed from the site, shall be stored until incorporated into the work in a location approved by the Consultant and shall be adequately protected from fire, theft and vandalism, the effects of the elements and any other damage whatsoever, and shall at all times be available for inspection by the Consultant and the University.

Section 4.13 Transfer of Title to Materials Delivered to Site

Title to all supplies and materials to be furnished or provided by the Contractor to the University pursuant to the provisions of the Contract Documents shall immediately vest in and become the sole property of the University upon delivery of such supplies and materials to the site. Notwithstanding such transfer of title, the Contractor shall have the full continuing responsibility to install such materials and supplies, protect them, maintain them in proper condition and forthwith repair, replace and make good any damage thereto without cost to the University until such time as the work covered by the Contract is fully accepted by the University. Such transfer of title shall in no way affect any of the Contractor's obligations under the Contract. In the event that, after title has passed to the University, any of such supplies and materials are rejected as being defective or otherwise unsatisfactory, title to all such supplies and materials shall be deemed to have been transferred back to the Contractor.

Section 4.14 Progress Payments for Materials Stored Off Site

- (1) Progress payments made in accordance with Section 4.10 shall include a payment for materials and equipment which are in short and/or critical supply or have been specially fabricated for the Project. Materials and equipment, for which a progress payment is made pursuant to the preceding sentence, shall be stored by the Contractor, after fabrication, until such time as their delivery to the site is required, at a facility and location approved by the Consultant; shall be adequately protected from fire, theft and vandalism, the effects of the elements and any other damage whatsoever; and shall at all times be available for inspection by the Consultant and the University. No progress payment shall, however, be made for said materials and equipment until:
 - a. The Contractor furnishes to the University a bill of sale listing quantity and costs of said materials and equipment f.o.b. point of origin;
 - b. The Consultant shall have inspected said materials and equipment and recommended payment therefore; and
 - c. The Contractor furnishes to the University a builder's risk insurance policy, with the broad form extended coverage endorsement, for said materials and equipment, in an amount equal to 100 percent of the value thereof, which policy shall be maintained, at the sole cost and expense of the Contractor, until said materials and equipment have been incorporated into the Project. The said insurance policy shall contain a provision that the loss, if any, is to be made adjustable with and payable to the University as trustee for the insured, i.e., the University and the Contractor, and a provision that it shall not be changed or canceled and that it will be automatically renewed upon expiration and continued in force unless the University is given fifteen (15) days' written notice to the contrary.
- (2) Materials and equipment for which a progress payment has been made by the University pursuant to this Section shall be, become and remain the sole property of the University; provided, however, that the Contractor shall have the full continuing responsibility to install such materials and equipment, to deliver it to the site, to protect it, to maintain it in proper condition and to forthwith repair, replace and make good any damage thereto without cost to the University until such time as the work covered by the Contract is fully accepted by the University. Such transfer of title shall in no way affect any of the Contractor's obligations under the Contract.

Section 4.15 Withholding of Progress Payments

Notwithstanding anything contained in the Contract to the contrary, the University may withhold payment of all or any part of a progress, final or guarantee payment, in such an amount as it may deem proper to enforce the provisions of the Contract and to satisfy the claims of third parties, when:

a. The University shall learn of any claim, of whatever nature or kind, against the University or the Contractor, which in any way arises or is alleged to arise out of or as a result of or in connection with the performance by the Contractor of the work covered by the Contract or out of or in connection with the Contractor's operations or performance at or in the vicinity of the construction site, that, in the opinion of the University, may not be adequately covered by insurance.

If an action on such claim is timely commenced and the liability of the University and/or the Contractor shall have been established therein by a final judgment of a court of competent jurisdiction, or if such claim shall have been admitted by the Contractor to be valid, the University shall pay such judgment or admitted claim out of the monies retained by it under the provisions of the Contract and return the balance, if any, without interest, to the Contractor.

The University may withhold from the Contractor any payments retained by it until such time as all such claims are either satisfied or barred by law from being presented. At such time the University, upon written demand by the Contractor, shall return to the Contractor the amount so withheld, without interest.

- b. The Contractor has not complied with any lawful or proper direction of the Consultant or the University or their representatives concerning the work covered by the Contract or the performance of the Contract or the production of records as required under the provisions of the Contract.
- c. There exists any of the conditions, listed in Section 2.26, which would allow the University to declare the Contractor in default of the whole or any part of the work.
- d. The Contractor is a foreign contractor and has not furnished satisfactory proof that all taxes due by such Contractor under the provisions of the Tax Law have been paid. The Certificate of the New York State Tax Commission to the effect that all such taxes have been paid shall be conclusive proof of the payment of such taxes. The term "foreign contractor" as used herein means, in the case of an individual, a person who is not a resident of the State of New York; in the case of a partnership, one having one or more partners not a resident of the State; and in the case of a corporation, one not organized under the laws of the State of New York.
- e. The Contractor, upon request of the University at any time after the initial progress payment by the University to the Contractor, fails to furnish the University with such documentary evidence that the University may deem necessary to prove to it that material and labor paid for by the University under previous applications for payment submitted have been paid for by the Contractor and that there are no

outstanding claims or liens in connection therewith or fails to satisfy the University that the Contractor, with good cause, has sufficiently provided for the payment and/or satisfaction of claims for said material and labor.

Section 4.16 Lien Law

The attention of the Contractor is specifically called to the provisions of the Lien Law of the State of New York, wherein funds received by a Contractor for a public improvement are declared to constitute trust funds in the hands of such Contractor to be applied first to the payment of certain claims.

Section 4.17 Substitution of Securities for Retainage

Any time after 50 percent of all the work has been completed, the University, if the progress and performance of the work is satisfactory to it, on request of the Contractor, will allow the Contractor to withdraw up to 50 percent of the aforesaid amount retained by the University by depositing with the Comptroller of the State of New York government securities, of the type and kind specified in Section 139 of the State Finance Law, having a market value not exceeding par, at the time of deposit, equal to the amount so withdrawn. The Comptroller of the State of New York shall, from time to time, collect all interest or income on the obligations so deposited, and shall pay the same, when and as collected, to the Contractor. If the deposit is in the form of coupon bonds, the coupons as they respectively become due shall be delivered to the Contractor; provided, however, that the Contractor shall not be entitled to interest or coupons or income on any of the deposited securities, the proceeds of which have or will be used or applied by the University. In the event that the Contractor does not, in accordance with the terms and provisions of the Contract, comply with and fulfill all of its obligations and responsibilities thereunder, the Comptroller of the State of New York shall have the right to sell, assign, transfer or otherwise dispose of the aforesaid securities and the University shall have the right to use and apply all or any part of the monies obtained by the Comptroller of the State of New York from such a sale, assignment, transfer or disposition or from the collection of interest or income from said securities. Notwithstanding the foregoing, when the University makes a payment under Section 4.10 (3) of the Agreement, it will return to the Contractor, as part of such payment, its substituted securities, and thereafter all retention of the University shall be in funds and not in substituted securities.

Section 4.18 Final Payment

Upon acceptance of all the work, except for the Contractor's guarantee obligations under Section 2.25 of the Agreement and the Contractor's guarantee obligations under any provision of the Specifications, the contractor shall prepare and submit to the University and the Consultant, for their approval, a final application for payment, which the University, within thirty (30) days after its approval of the same, shall pay. Such application and payment shall be in an amount equal to 100 percent of the Contract consideration, excluding the Contractor's guarantee obligations (reference Section 4.08), less:

- a. All previous payments by the University to the Contractor;
- b. All deductions authorized to be made by the University under the Contract; and
- c. An amount necessary, in the University's judgment, to satisfy any claims, liens or judgments against the Contractor which have not been suitably discharged.

Section 4.19 Acceptance of Final Payment

- (1) The acceptance by the Contractor, or by anyone claiming by or through it, of the final payment shall, except with respect to the amount retained by the University pursuant to the provisions of subdivisions b and c of Section 4.18 of the Agreement, constitute and operate as a release to the University from any and all claims of any liability for anything theretofore done or furnished for or relating to or arising out of the work covered by the Contract and for any prior act, neglect or default on the part of the University or any of its trustees, officers, agents or employees in connection therewith.
- (2) Should the Contractor refuse to accept the final payment as tendered by the University or should the Contractor refuse to execute the final application for payment without protest and without reserving any rights or claims against the University, it shall constitute a waiver of any right to interest on the amount of the payment so tendered and/or on the amount set forth in said final application for payment.

Section 4.20 Guarantee Payment

- (1) Subject to the provisions of the second paragraph of this Section, at the expiration of one (1) year after the University has accepted all the work covered by the Contract, the Contractor shall prepare and submit to the University and the Consultant, for their approval, a guarantee application for payment, which the University, within thirty (30) days after its approval of the same, shall pay. Such application and payment shall be in an amount equal to the monies retained by the University for the Contractor's guarantee obligations under the Agreement, less any monies deducted by the University under this Section. The Contractor shall not be entitled to any interest on the monies retained by the University pursuant to subdivision c of Section 4.18 of the Agreement.
- (2) In the event the Contractor does not, in accordance with the terms and provisions of the Contract, complete all corrective work or comply with and fulfill its contractual obligations, the University may use and apply all or any part of the monies retained by it to have such work or obligations performed or fulfilled by a person, firm or corporation other than the Contractor. The obligations of the Contractor, under the terms and provisions of the Contract, shall not, however, be limited to the monies retained by the University pursuant to the provisions of the Contract.
- (3) No payments may be made under this agreement for work completed more than 365 days after

{Insert Contract Closing Date}

Unless the date/duration listed on page A-1, is extended in writing by the Fund, and approved by OSC.

Section 4.21 Acceptance of Guarantee Payment

The acceptance by the Contractor, or by anyone claiming by or through it, of the guarantee payment shall constitute and operate as a release to the University from any and all claims in connection with monies retained by the University. Should the Contractor refuse to accept the guarantee payment as tendered by the University or should the Contractor refuse to execute the guarantee application for payment without protest and without reserving any rights or claims against the University, it shall constitute a waiver of any right to interest on the amount of the payment so tendered and/or on the amount set forth in said guarantee application for payment.

Section 4.22 Contractor Limited to Money Damages

Inasmuch as the Contractor can be compensated adequately by money damages for any breach of the Contract which may be committed by the University, the Contractor agrees that no default, act or omission of the University shall constitute a material breach of the Contract entitling it to cancel or rescind the same or to suspend or abandon performance thereof; and it hereby waives any and all rights and remedies to which it might otherwise be or become entitled to because of any wrongful act or omission of the University or its representatives, saving only its right to money damages.

Section 4.23 No Estoppel or Waiver

- (1) The University shall not be precluded or estopped by any inspection, acceptance, application for payment or payment, final or otherwise, issued or made under the Contract or otherwise issued or made by it, the Consultant, or any trustee, officer, agent or employee of the University, from showing at any time the true amount and character of the work performed, or from showing that any such inspection, acceptance, application for payment or payment is incorrect or was improperly issued or made; and the University shall not be precluded or estopped, notwithstanding any such inspection, acceptance, application for payment, from recovering from the Contractor any damages which it may sustain by reason of any failure on its part to comply strictly with the Contract and any monies which may be paid to it or for its account in excess of those to which it is lawfully entitled.
- (2) Neither the acceptance of all or any part of the work covered by the Contract; nor any payment therefore; nor any order or application for payment issued under the Contract or otherwise issued by the University, the Consultant, or any trustee, officer, agent or employee of the University; nor any permission or direction to continue with the performance of the Contract before or after its specified completion date; nor any performance by the University of any of the Contractor's duties or obligations; nor any aid lent to the Contractor by the University in its performance of such duties or obligations; nor any delay or omission by the University to exercise any right or remedy accruing to it under the terms of the Contract or existing at law or in equity or by statute or otherwise; nor any other thing done or omitted to be done by the University, its trustees, officers, agents or employees; shall be deemed to be a release to the Contractor or its sureties from any obligations; nor remedies to which the University may be entitled because of any breach thereof, excepting only a written instrument expressly providing for such release or waiver. No cancellation, rescission or annulment hereof, in whole or as to any part of the Contract, because of any breach hereof, shall be deemed a waiver of any money damages to which the University may be entitled because of such breach. No waiver by the University of any breach of the Contract shall be deemed to be a waiver of any subsequent breach.

Section 4.24 Limitation of Actions

- (1) No action or proceeding shall be maintained by the Contractor, or anyone claiming under or through the Contractor, against the University, or its trustees, officers, agents or employees, upon any claim arising out of or based upon the Contract or any breach thereof or by reason of any act or omission or requirement of the University, or its trustees, officers agents or employees, unless:
 - a. Such action or proceeding is instituted in the Court of Claims for the State of New York;
 - b. The Contractor or the person claiming under or through it shall have strictly complied with all requirements relating to the giving of notices and information with respect to such claims; and
 - c. Such action or proceeding shall be commenced within one (1) year after the submission to the University of the final application for payment or, if the claim is based upon monies required to be retained for any period after the date of the final application for payment, such action is commenced within six (6) months after such monies become due and payable under the terms of the Contract; or
 - d. If the Contract is terminated or the Contractor declared in default by the University, such action is commenced within six (6) months after the date of such termination or declaration of default by the University.
- (2) Notwithstanding anything in the laws of the State of New York to the contrary, the Contractor, or anyone claiming under or through the Contractor, shall not be entitled to any additional time to begin anew any other action if an action commenced within the times herein specified is dismissed or discontinued for any reason whatsoever.

ARTICLE V

Protection of Rights and Property

Section 5.01 Accidents and Accident Prevention

The Contractor shall at all times take reasonable precautions for the safety of persons engaged in the performance of the work. The Contractor shall comply fully with all applicable provisions of the laws of the State of New York, OSHA, and with all valid rules and regulations adopted or promulgated by the agencies of the State of New York pursuant thereto. The Contractor's attention is specifically called to the applicable rules and regulations, codes and bulletins of the New York State Department of Labor.

Section 5.02 Adjoining Property

The Contractor shall be required to protect all the adjoining property and to repair or replace any such properties damaged or destroyed by it, its employees or subcontractors through, by reason of or as a result of activities under, for or related to the Contract.

Section 5.03 Emergencies

- (1) In case of an emergency which threatens loss or injury to persons or property, the Contractor will be allowed to act, without previous instructions from the Consultant or the University, in a diligent manner, to the extent required to avoid or limit such loss or injury, and it shall notify the Consultant and the University immediately thereafter of the action taken by it and of such emergency. Where the Contractor has not taken action but has notified the Consultant or the University of an emergency which threatens loss or injury to persons or property, it shall act in accordance with the instructions and/or authorization by the Consultant or the University.
- (2) In the event that the Contractor performs extra work in accordance with the preceding paragraph, it will be compensated therefore in accordance with the provisions of Section 4.02.

Section 5.04 Fire Safety

- (1) In the event that a municipal fire alarm box is not located within 300 feet from the site of the Project, the Contractor will be required to provide at the site of the Project, at a location approved by the Consultant, a private unlisted telephone reserved for fire calls only. The phone must be in addition to regular business phones and a rule prohibiting its use for purposes other than alarm for fire or other emergencies must be strictly enforced. The phone itself should be colored red and be located at a point quickly available to all employees, including watchmen. Clear instructions for the sending of a fire alarm should be conspicuously posted by the phone and all personnel customarily at work near the phone shall be acquainted with the procedure. If such a phone is required, the Contractor, at its sole cost and expense, must provide the same from the time the University first approves the Contract breakdown to be submitted by the Contractor pursuant to the provisions of Section 4.08 up until the time the University accepts all the work covered by the Contract.
- (2) All solid fuel salamanders and U. L. approved heaters used by the Contractor or any of its subcontractors shall be arranged in a standard manner. All other salamanders used by the Contractor or any of its subcontractors shall require constant attendance of competent persons on each floor where in use.
- (3) All temporary fabric used by the Contractor or any of its subcontractors for curtains or awnings shall be either non-combustible or flame retarded so that it will not burn or propagate flame.

Section 5.05 Risks Assumed by Contractor

- (1) The Contractor solely assumes the following distinct several risks whether they arise from acts or omissions (whether negligent or not and whether supervisory or otherwise) of the Contractor, of the University, of third persons or from any other cause, including unforeseen obstacles and difficulties which may be encountered in the prosecution of the work covered by the Contract, whether such risks are within or beyond the control of the Contractor and whether such risks involve a legal duty, primary or otherwise, imposed upon the State University Construction Fund, the Dormitory Authority of the State of New York, the State of New York or the State University of New York, excepting only risks which arise from defects in maps, plans, designs or Specifications prepared, acquired or used by the Consultant or the University, from the negligence of the University, its agents or employees or from affirmative acts of the State University Construction Fund, the Dormitory Authority of the State of New York or the State University Construction Fund, the medligence of the University, its agents or employees or from affirmative acts of the State University Construction Fund, the Dormitory Authority of the State of New York or the State University of State University Construction Fund, the Dormitory Authority of the State of New York or the State University of State State of New York, the State Oniversity of New York or their trustees, officers, agents or employees committed with intent to cause the loss, damage and injuries herein below set forth:
 - a. The risk of loss or damage, direct or indirect, to the work covered by the Contract or to any plant, equipment, tools, materials or property furnished, used, installed or received by the University or by the Contractor or any subcontractor, materialman or worker performing services or furnishing materials for the work covered hereunder.

The Contractor shall bear such risk of loss or damage until the work covered by the Contract has been fully accepted by the University or until completion of removal of such plant, equipment, tools, materials or property from the construction site and the vicinity thereof, whichever event occurs last. In the event of such loss or damage, the Contractor shall forthwith repair, replace and/or make good any such loss or damage without cost to the University.

b. The risk of claims, just or unjust, by third persons against the Contractor, the State University Construction Fund, the Dormitory Authority of the State of New York, the State of New York, or the State University of New York on account of wrongful death, bodily injuries and property damage, direct or consequential, loss or damage of any kind whatsoever arising or alleged to arise out of or as a result of or in connection with the performance by the Contractor of the work covered by the Contract (whether actually caused by or resulting from the performance of the Contract) or out of or in connection with the Contractor's operations or presence at or in the vicinity of the construction site. The Contractor shall bear such risk for all such deaths, injuries, damages or losses sustained or alleged to have been sustained prior to the final acceptance by the University of all work covered by the Contract. The Contractor shall also bear the risk of claims for wrongful death or curring subsequent to said final acceptance provided such death is caused, contributed to or is a consequence of bodily injuries sustained or alleged to have been sustained prior to said final acceptance.

- (2) The Contractor shall indemnify and save harmless the State University Construction Fund, the Dormitory Authority of the State of New York, the State of New York, and the State University of New York, their trustees, officers, agents or employees against all claims described above and for all costs and expenses incurred by them in the defense, settlement or satisfaction thereof, including attorneys' fees and court costs. If so directed, the Contractor shall at its own expense defend against such claims, in which event it shall not, without obtaining express advance permission from Counsel of the University, raise any defense involving in any way jurisdiction of the tribunal over the University, governmental nature of the University or the provisions of any statutes respecting suits against the University.
- (3) Neither the University's final acceptance of the work to be performed hereunder nor the making of any payment shall release the Contractor from its obligations under this Section. The enumeration elsewhere in the Contract of particular risks assumed by the Contractor or of particular claims for which it is responsible shall not be deemed to limit the effect of the provision of this Section or to imply that it assumes or is responsible for only risks or claims of the type enumerated.

Section 5.06 Compensation and Liability Insurance

- (1) The Contractor shall procure and maintain, at its own cost and expense, until final acceptance by the University of all the work covered by this Contract, the following kinds of insurance:
 - a. Workers' Compensation Insurance.

A policy complying with the requirements of the laws of the State of New York.

b. General Liability and Property Damage Insurance.

A standard general comprehensive liability insurance policy or a commercial general liability insurance policy issued to and covering the liability of the Contractor for all work and operations under this Contract, including, but not limited to, contractual and completed operations coverage. Such policy shall be written by a company licensed or approved as an excess line liability company by the New York State Department of Insurance. The coverage under such policy shall not be less than the following limits:

Bodily Injury and Property Damage Liability \$ 1,000,000 Each Occurrence \$ 2,000,000 Aggregate

The aforesaid insurance requirements will be deemed met by the Contractor's procurement and maintenance of either of the aforesaid policies and, in addition thereto, an umbrella policy providing similar coverage; provided, however, that the total amount of insurance coverage is at least equal to the requirements above set forth.

c. Automobile Liability and Property Damage Insurance.

A policy covering the use in connection with the work covered by the Contract Documents of all owned, non-owned and hired vehicles bearing, or, under the circumstances under which they are being used, required by the Motor Vehicle Laws of the State of New York to bear license plates. The coverage under such policy shall not be less than the following limit:

Bodily Injury and Property Damage Liability \$ 1,000,000 Each Occurrence

d. Owner's Protective Liability Insurance.

A policy issued to and covering the liability for damages imposed by law upon the State University Construction Fund, the Dormitory Authority of the State of New York, the State of New York and the State University of New York, their trustees, officers, agents or employees, with respect to all operations under the Contract by the Contractor and its subcontractors, and/or their interest in the Project and the property upon which work under the Contract is to be performed, including omissions and supervisory acts of the former. Said insurance shall be in the same amounts as that required under subdivision b above and shall be written by a company licensed or approved as an excess line liability company by the New York State Department of Insurance.

e. Asbestos Abatement Insurance.

A liability insurance policy issued to and covering the liability, of the Contractor and/or subcontractor engaged in the removal, handling or wrapping of asbestos, if any of such work is to be performed under the Contract, for bodily injury, illness, sickness or property damage caused by exposure to asbestos in an amount not less than \$1,000,000 per occurrence and \$2,000,000 aggregate. The Contractor and/or its aforesaid subcontractor shall either obtain an endorsement to the aforesaid required insurance policy adding the State University Construction Fund, the Dormitory Authority of the State of New York, the State of New York and the State University of New York, their trustees, officers, agents or employees, as additional parties insured thereunder or shall obtain a separate owner's protective liability insurance policy for such parties with coverage similar to that required by the first sentence of this subdivision. In addition, any Contractor or subcontractor engaged in the removal, handling, or wrapping of asbestos shall hold harmless and indemnify the State University Construction Fund, the Dormitory Authority of the State of New York, the State of New York and the State University Construction in subcontractor engaged in the removal, handling, or wrapping of asbestos shall hold harmless and indemnify the State University Construction Fund, the Dormitory Authority of the State of New York, the State of New York and the State University of New York, for any claims or liabilities in connection with illness or sickness arising from work performed, not performed, or which should have been performed. The Contractor shall have said hold-harmless and indemnification conditions stipulated in all Contracts with subcontractors.

- (2) The aggregate insurance limit set forth above shall apply separately to each project for which a certificate of insurance and/or policy is issued.
- (3) Before commencing the performance of any work covered by the Contract, the Contractor shall furnish to the University a certificate or certificates in duplicate of the insurance required under the foregoing provisions. Such certificates shall be on a form prescribed by the University, shall list the various coverages and shall contain, in addition to any provisions hereinbefore required, a provision that the policy

shall not be changed or canceled and that it will be automatically renewed upon expiration and continued in force until final acceptance by the University of all the work covered by the Contract, unless the University is given fifteen (15) days' written notice to the contrary. Upon request, the Contractor shall furnish the University with a certified copy of each policy. The State University reserves the right to receive a copy of the I insurance policy which was based on the Certificate of Insurance issued.

- (4) All insurance required to be procured and maintained as aforesaid must be procured from insurance companies approved by the University and authorized to do business in the State of New York. The State University is to be cited as a named insured on all policies and certificates of insurance and shall be notified if a policy is canceled, terminated or modified.
- (5) If at any time any of the above-required insurance policies should be canceled, terminated or modified so that insurance is not in effect as above required, then, if the University shall so direct, the Contractor shall suspend performance of the work covered in the Contract. If the said work is so suspended, no extension of time shall be due on account thereof. If said work is not suspended, then the University may, at its option, obtain insurance affording coverage equal to that above required, the cost of such insurance to be payable by the Contractor to the University.

Section 5.07 Builder's Risk Insurance

- (1) The Contractor shall procure and maintain, at its own cost and expense, until final acceptance of all work covered by this Contract or until the Project has been turned over for use by the State University of New York, whichever event occurs earlier, a builder's risk insurance policy with fire, extended coverage, vandalism and malicious mischief coverage.
- (2) The policy shall be in an amount equal to the Project's insurable value, i.e., the Contract consideration less the cost of the Contractor's Performance and Labor and Material Bonds; the cost of trees, shrubbery, lawn grass, plants and the maintenance of the same; the cost of demolition; the cost of excavation; the cost of foundations, piers or other supports which are below the undersurface of the lowest basement floor, or where there is no basement, which are below the surface of the ground, concrete and masonry work; the cost of underground flues, pipes or wiring; the cost of earthmoving, grading and the cost of paving, roads, walks, parking lots or athletic fields; and the cost of bridges, tunnels, dams, piers, wharves, docks, retaining walls and radio and/or television towers and antennas.
- (3) The policy may contain a provision for a \$500 deductible for each loss to a Project having an insurable value of less than \$1,500,000 and a \$1,000 deductible for each loss to a Project having an insurable value of \$1,500,000 or more.
- (4) The University, the Contractor and its subcontractors, as their interests may appear, will be named as the parties insured under said policy.
- (5) The Contractor shall have the sole responsibility to promptly report any loss to the insurer and/or its representatives and to furnish the latter with all necessary details relating to the occurrence of the loss and the amount thereof. The University, the Contractor and all subcontractors of the Contractor waive all rights, each against the others, for damages caused by fire or other perils covered by insurance provided under the terms of this Section, except such rights as they may have to the proceeds of insurance received; provided, however, this waiver shall not apply to any manufacturer, supplier or similar agent under any guarantee or warranty.
- (6) The Contractor shall not violate or permit to be violated any condition of such policy and shall at all times satisfy the fire safety requirements of the University and the insurance company issuing the same.
- (7) The procurement and maintenance of said policy shall in no way be construed or be deemed to relieve the Contractor from any of the obligations and risks imposed upon it by this Contract or to be a limitation on the nature or extent of such obligations and risks.
- (8) Such policy shall contain a provision that it shall not be changed or canceled and that it will be automatically renewed upon expiration and continue in force until final acceptance by the University of all the work covered by the Contract, unless the University is given fifteen (15) days' written notice to the contrary. Before the Contractor shall be entitled to have any progress payment rendered on account of the work which is to be insured pursuant to this Section, it shall furnish to the University a certificate in duplicate of the insurance herein required. Such insurance must be procured from an insurance company approved by the University and authorized to do business in the State of New York.

Section 5.08 Effect of Procurement of Insurance

Neither the procurement nor the maintenance of any type of insurance by the University or the Contractor shall in any way be construed or be deemed to limit, discharge, waive or release the Contractor from any of the obligations and risks imposed upon it by the Contract or to be a limitation on the nature or extent of such obligations and risks.

Section 5.09 No Third Party Rights

Nothing in the Contract shall create or give to third parties, except the State University Construction Fund, the Dormitory Authority of the State of New York, the State of New York, the State of New York and the State University of New York, any claim or right of action against the Contractor, the Consultant, the State University Construction Fund, the Dormitory Authority of the State of New York, the State of New York or the State University of New York beyond such as may legally exist irrespective of the Contract.

ARTICLE VI

Affirmative Action

The State University's requirements for affirmative action are set forth in "Exhibit A-1" which is attached hereto and made a part hereof, and shall be deemed to be inserted herein and the Contract shall be read and enforced as though it were included herein and, in the event any such provision is not inserted or is not correctly inserted, then, upon the application of either party, this Contract shall forthwith be physically amended to make such

insertion or correction.

ARTICLE VII

Provisions Required by Law

Section 7.01 Provisions Deemed Inserted

Each and every provision required by law to be inserted in the Contract, including, but not limited to, the provisions set forth in Exhibit "A" which is attached hereto and made a part hereof, shall be deemed to be inserted herein and the Contract shall be read and enforced as though it were included herein and, in the event any such provision is not inserted or is not correctly inserted, then, upon the application of either party, this Contract shall forthwith be physically amended to make such insertion or correction.

Section 7.02 Entire Agreement

This Agreement consists of 1) the IFB; 2) the contractor's proposal; and 3) Exhibits A and A-1. This Agreement supersedes all previous understandings and agreements with respect to the Project or any of the provisions thereof. No statement, promise, condition, understanding, inducement, or representation, oral or written, expressed or implied, which is not contained herein shall be binding or valid and this Agreement shall not be changed, modified or altered in any manner except by an instrument in writing executed by the parties hereto.

Section 7.03 Hierarchy of Precedent

In the event of any controversy regarding the provisions of this Agreement, the terms of Exhibits A and A1 shall take precedence followed by this Agreement, the IFB and the contractor's proposal.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

Section 7.04 Wage Rates

The Contractor shall post the appropriate prevailing wage schedules in a conspicuous place at the construction site. The Department of Labor shall provide the Contractor with posters relating to prevailing wage rates and the same shall be displayed by the Contractor in a conspicuous place at the construction site. The Contractor shall also distribute wallet cards, to be provided by the Department of Labor, to all workers engaged at the construction site containing information relating to wage rates and telephone numbers to call if a worker believes his or her rights are being violated. The Contractor shall provide each worker with a written notice, informing them of the applicable prevailing wage requirements, and the Contractor must obtain a signed statement or declaration from such worker attesting to the fact that he or she has been given this information. Further, the Contractor is required to keep certified copies of its payrolls at the construction site.

Section 7.05 Contractor Responsibility

The State University of New York at Purchase College will undertake an affirmative review of the proposed Contractor's responsibility in accordance with the standards outlined in Comptroller's Bulletin G 221, and based upon such review, will determine if it is reasonably assured that the proposed Contractor is responsible.

Agency Certification: "In addition to the acceptance of this Contract, it is certified that an originally executed copy of this signature page will be attached to an exact copy of the Contract Documents, and forwarded to the Contractor".

STATE UNIVERSITY OF NEW YORK

By: (campus official)	Date/	/	Agency Code28260
CONTRACTOR			(If Corporation, Affix Seal)
Ву:	Date/	/	

(If Corporation, Affix Seal)

ACKNOWLEDGMENTS

(ACKNOWLEDGMENT BY AN INDIVIDUAL)

STATE OF NEW YORK)		
COUNTY OF) SS.:)		
On this day of	f	, 20	_, before me personally came
			, to me known and known to me to be the person(s) described in and who executed
the foregoing instrument a	and he/she acknow	edged to me th	hat he/she executed the same.
			Notary Public
		(ACKNOWI	EDGMENT BY A PARTNERSHIP)
STATE OF NEW YORK)		
COUNTY OF) ss.:)		
On this day o	f	, 20	, before me personally came
		. to me know	wn and known to me to be the person who executed the above instrument.
who, being duly sworn by	me, did for themse	f depose and s	say that they are a member of the firm of
the, soing day enerity			consisting of themself and
		that ha/aha ay	
		that he/she ex	
that he/she executed the	same as the act and	, and the a	hat he/she had authority to sign the same, and that he/she did duly acknowledge to me forementioned firm for the purposes mentioned therein.
			Notary Public
		(ACKNOWL	EDGMENT BY A CORPORATION)
STATE OF)		
COUNTY OF) ss.:)		
On this day o	f	, 20	_, before me personally came
		, to n	ne known, who, being duly sworn, did depose and say that he/she reside in; that he/she is the
of the			, the corporation described in and which
executed the foregoing in that if was affixed by the o	strument; that he/sh order of the Board o	e knows the se f Directors of s	eal of said corporation; that the seal affixed to said instrument was such corporate seal; aid corporation, and that he/she signed their name thereto by like order.

Notary Public

SCHEDULE I

The following Unit Prices shall apply for additional work authorized by Change Order:

UNIT PRICES

Description of Unit Price

Amount of Unit Price

NONE

The total bid includes the following Allowances:

ALLOWANCES

Standard Contract Clauses State University of New York

EXHIBIT A

March 17th,2014

The parties to the attached contract, license, lease, amendment or other agreement of any kind (hereinafter, "contract") agree to be bound by the following clauses which are hereby made a part of the contract (the word "Contractor" herein refers to any party other than the State, whether a Contractor, licensor, licensee, lessor, lessee or any other party):

1. **EXECUTORY CLAUSE.** In accordance with Section 41 of the State Finance Law, the State shall have no liability under this contract to the Contractor or to anyone else beyond funds appropriated and available for this contract.

2. PROHIBITION AGAINST ASSIGNMENT Except for the assignment of its right to receive payments subject to Article 5-A of the State Finance Law, the Contractor selected to perform the services herein are prohibited in accordance with Section 138 of the State Finance Law from assigning, transferring, conveying, subletting or otherwise disposing of its rights, title or interest in the contract without the prior written consent of SUNY and attempts to do so are null and void. Notwithstanding the foregoing, SUNY may, with the concurrence of the New York Office of State Comptroller, waive prior written consent of the assignment, transfer, conveyance, sublease or other disposition of a contract let pursuant to Article XI of the State Finance Law if the assignment, transfer, conveyance, sublease or other disposition is due to a reorganization, merger or consolidation of Contractor's its business entity or enterprise and Contractor so certifies to SUNY. SUNY retains the right, as provided in Section 138 of the State Finance Law, to accept or reject an assignment, transfer, conveyance, sublease or other disposition of the contract, and to require that any Contractor demonstrate its responsibility to do business with SUNY.

3. **COMPTROLLER'S APPROVAL.** (a) In accordance with Section 112 of the State Finance Law, Section 355 of New York State Education Law, and 8 NYCRR 316, Comptroller's approval is not required for the following contracts: (i) materials; (ii) equipment and supplies, including computer equipment; (iii) motor vehicles; (iv) construction; (v) construction-related services; (vi) printing; and (vii) goods for State University health care facilities, including contracts for goods made with joint or group purchasing arrangements.

(b) Comptroller's approval is required for the following contracts: (i) contracts for services not listed in Paragraph (3)(a) above made by a State University campus or health care facility certified by the Vice Chancellor and Chief Financial Officer, if the contract value exceeds \$250,000; (ii) contracts for services not listed in Paragraph (3)(a) above made by a State University campus not certified by the Vice Chancellor and Chief Financial Officer, if the contract value exceeds \$50,000; (iii) contracts for services not listed in Paragraph (3)(a) above made by health care facilities not certified by the Vice Chancellor and Chief Financial Officer, if the contract value exceeds \$75,000; (iv) contracts whereby the State University agrees to give something other than money, when the value or reasonably estimated value of such consideration exceeds \$10,000; (v) contracts for real transactions if the contract value property exceeds \$50,000; (vi) all other contract value exceeds Paragraph 3(a) above, if the contract value exceeds \$50,000, e.g. SUNY acquisition of a business and New York State Finance Article 11-B contracts and (vii) amendments for any amount to contracts not listed in Paragraph (3)(a) above, when as so amended, the contract exceeds the threshold amounts stated in Paragraph (b) herein. However, such pre-approval shall not be required for any contract established as a centralized contract through the Office of General Services or for a purchase order or other transaction issued

under such centralized contract.

(c) Any contract that requires Comptroller approval shall not be valid, effective or binding upon the State University until it has been approved by the Comptroller and filed in the Comptroller's office.

4. WORKERS' COMPENSATION BENEFITS. In accordance with Section 142 of the State Finance Law, this contract shall be void and of no force and effect unless the Contractor shall provide and maintain coverage during the life of this contract for the benefit of such employees as are required to be covered by the provisions of the Workers' Compensation Law.

NON-DISCRIMINATION REQUIREMENTS. To the extent required by Article 15 of the Executive Law (also known as the Human Rights Law) and all other State and Federal statutory and constitutional non-discrimination provisions, the Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, sex, (including gender identity or expression), national origin, sexual orientation, military status, age, disability, predisposing genetic characteristics, marital status or domestic violence victim status. Furthermore, in accordance with Section 220-e of the Labor Law, Furthermore, in if this is a contract for the construction, alteration or repair of any public building or public work or for the manufacture, sale or distribution of materials, equipment or supplies, and to the extent that this contract shall be performed within the State of New York, Contractor agrees that neither it nor its subcontractors shall, by reason of race, creed, color, disability, sex, or national origin: (a) discriminate in hiring against any New York State citizen who is qualified and available to perform the work; or (b) discriminate against or intimidate any employee hired for the performance of work under this contract. If this is a building service contract as defined in Section 230 of the Labor Law, then, in accordance with Section 239 thereof, Contractor agrees that neither it nor its subcontractors shall by reason of race, creed, color, national origin, age, sex or disability: (a) discriminate in hiring against any New York State citizen who is qualified and available to perform the work; or (b) discriminate against or intimidate any employee hired for the performance of work under this contract. Contractor is subject to fines of \$50.00 per person per day for any violation of Section 220-e or Section 239 as well as possible termination of this contract and forfeiture of all moneys due hereunder for a second or subsequent violation

6. WAGE AND HOURS PROVISIONS. If this is a public work contract covered by Article 8 of the Labor Law or a building service contract covered by Article 9 thereof, neither Contractor's its employees nor the employees of subcontractors may be required or permitted to work more than the number of hours or days stated in said statutes, except as otherwise provided in the Labor Law and as set forth in prevailing wage and supplement schedules issued by the State Labor Department. Furthermore, Contractor and its subcontractors must pay at least the prevailing wage rate and pay or provide the prevailing supplements, including the premium rates for overtime pay, as determined by the State Labor Department in accordance with the Labor Law. Additionally, effective April 28, 2008, if this is a public work contract covered by Article 8 of the Labor Law, the Contractor understands and agrees that the

filing of payrolls in a manner consistent with Subdivision 3-a of Section 220 of the Labor Law shall be a condition precedent to payment by SUNY of any SUNY-approved sums due and owing for work done upon the project.

7. NON-COLLUSIVE BIDDING CERTIFICATION. In accordance with Section 139-d of the State Finance Law, if this contract was awarded based on the submission of competitive bids, Contractor affirms, under penalty of perjury, and each person signing on behalf of Contractor, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that its bid was arrived at independently and without collusion aimed at restricting competition. Contractor further affirms that, at the time Contractor submitted its bid, an authorized and responsible person executed and delivered it to SUNY a non-collusive bidding certification on Contractor's behalf.

8. INTERNATIONAL BOYCOTT PROHIBITION. In accordance with Section 220-f of the Labor Law and Section 139-h of the State Finance Law, if this contract exceeds \$5,000, the Contractor agrees, as a material condition of the contract, that neither the Contractor nor any substantially owned or affiliated person, firm, partnership or corporation has participated, is participating, or shall participate in an international boycott in violation of the federal Export Administration Act of 1979 (50 USC App. Sections 2401 et seq.) or regulations thereunder. If such Contractor, or any of the aforesaid affiliates of Contractor, is convicted or is otherwise found to have violated said laws or regulations upon the final determination of the United States Commerce Department or any other appropriate agency of the United States subsequent to the contract's execution, such contract, amendment or modification thereto shall be rendered forfeit and void. The Contractor shall so notify the State Comptroller within five (5) business days of such conviction, determination or disposition of appeal (2 NYCRR 105.4).

9. SET-OFF RIGHTS. The State shall have all of its common law, equitable and statutory rights of set-off. These rights shall include, but not be limited to, the State 's option to withhold for the purposes of set-off any moneys due to the Contractor under this contract up to any amounts due and owing to the State with regard to this contract, any other contract with any State department or agency, including any contract for a term commencing prior to the term of this contract, plus any amounts due and owing to the State for any other reason including, without limitation, tax delinguencies or monetary penalties relative thereto. The State shall exercise its setoff rights in accordance with normal State practices including, in cases of set-off pursuant to an audit, the finalization of such audit by the State, its representatives, or the Comptroller.

10. **RECORDS.** The Contractor shall establish and maintain complete and accurate books, records, documents, accounts and other evidence directly pertinent to performance under this contract (hereinafter, collectively, "the Records"). The Records must be kept for the balance of the calendar year in which they were made and for six (6) additional years thereafter. The State Comptroller, the Attorney General and any other person or entity authorized to conduct an exami-

nation, as SUNY and its representatives and entities involved in this contract, shall have access to the Records during normal business hours at an office of the Contractor within the State of New York or, if no such office is available, at a mutually agreeable and reasonable venue within the State, for the term specified above for the purposes of inspection, auditing and copying. SUNY shall take reasonable steps to protect from public disclosure any of the Records which are exempt from disclosure under Section 87 of the Public Officers Law (the "Statute") provided that: (i) the Contractor shall timely inform an appropriate SUNY official, in writing, that said Records should not be disclosed; and (ii) said Records shall be sufficiently identified; and (iii) designation of said Records as exempt under the Statute is reasonable. Nothing contained herein shall diminish, or in any way adversely affect, SUNY's or the State's right to discovery in any pending or future litigation.

11. IDENTIFYING INFORMATION AND PRIVACY NOTIFICATION.

Identification Number(s). Every invoice or New York State Claim for Payment submitted to the State University of New York by a payee, for payment for the sale of goods or services or for transactions (e.g., leases, easements, licenses, etc.) related to real or personal property must include the payee's identification number. The number is any or all of the following: (i) the payee's Federal employer identification number, (ii) the payee's Federal social security number, and/or (iii) the payee's Vendor Identification Number assigned by the Statewide Financial System. Failure to include such number or numbers may delay payment. Where the payee does not have such number or numbers, the payee, on its invoice or Claim for Payment, must give the reason or reasons why the payee does not have such number or numbers.

(b) Privacy Notification. (1) The authority to request the above personal information from a seller of goods or services or a lessor of real or personal property, and the authority to maintain such information, is found in Section 5 of the State Tax Law. Disclosure of this information by the seller or lessor to the State University of New York is mandatory. The principal purpose for which the information is collected is to enable the State to identify individuals, businesses and others who have been delinquent in filing tax returns or may have understated their tax liabilities and to generally identify persons affected by the taxes administered by the Commissioner of Taxation and Finance. The information will be used for tax administration purposes and for any other purpose authorized by law. (2) The personal information is requested by the purchasing unit of the State University of New York contracting to purchase the goods or services or lease the real or personal property covered by this contract or lease. The information is maintained in the Statewide Financial System by the Vendor Management Unit within the Bureau of State Expenditures, Office of the State Comptroller, 110 State Street, Albany, New York 12236.

12. EQUAL EMPLOYMENT OPPORTUNITIES FOR MINORITIES AND WOMEN.

(a) In accordance with Section 312 of the Executive Law and 5 NYCRR 143, if this contract is: (i) a written agreement or purchase order instrument, providing for a total expenditure in excess of \$25,000.00, whereby a contracting agency is committed to expend or does expend funds in return for labor, services, supplies, equipment, materials or any combination of the foregoing, to be performed for, or rendered or furnished to the contracting agency; or (ii) a written agreement in excess of \$100,000.00 whereby a contracting agency is committed to expend or does expend funds for the acquisition, construction, demoliton, replacement, major repair or renovation of real property and improvements thereon; or (iii) a written agreement

in excess of \$100,000.00 whereby the owner of a State assisted housing project is committed to expend or does expend funds for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereon for such project, then the following shall apply and by signing this agreement the Contractor certifies and affirms that it is Contractor's equal employment opportunity policy that:

(1) The Contractor will not discriminate against employees or applicants for employment because of race, creed, color, national origin, sex, age, disability or marital status, and will undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination. Affirmative action shall mean recruitment, employment, job assignment, promotion, upgradings, demotion, transfer, layoff, or termination and rates of pay or other forms of compensation;

(2) at SUNY's request, Contractor shall request each employment agency, labor union, or authorized representative of workers with which it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, labor union or representative will not discriminate on the basis of race, creed, color, national origin, sex, age, disability or marital status and that such union or representative will affirmatively cooperate in the implementation of the Contractor's obligations herein: and

(3) Contractor shall state, in all solicitations or advertisements for employees, that, in the performance of the State contract, all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color, national origin, sex, age, disability or marital status.

(b) Contractor will include the provisions of "1", "2" and "3", above, in every subcontract over \$25,000.00 for the construction, demolition, replacement, major repair, renovation, planning or design of real property and improvements thereon (the "Work") except where the Work is for the beneficial use of the Contractor. Section 312 does not apply to: (i) work, goods or services unrelated to this contract; or (ii) employment outside New York State. The State shall consider compliance by a Contractor or sub-contractor with the requirements of any federal law concerning equal employment opportunity which effectuates SUNY shall the purpose of this section. determine whether the imposition of the requirements of the provisions hereof duplicate or conflict with any such federal law and if such duplication or conflict exists, SUNY shall waive the applicability of Section 312 to the extent of such duplication or conflict. Contractor will comply with all duly promulgated and lawful rules and regulations of the Department of Economic Development's Division of Minority and Women's Business Development pertaining hereto.

13. **CONFLICTING TERMS.** In the event of a conflict between the terms of the contract (including any and all attachments thereto and amendments thereof) and the terms of this Exhibit A shall control.

14. **GOVERNING LAW.** This contract shall be governed by the laws of the State of New York except where the Federal supremacy clause requires otherwise.

15. LATE PAYMENT. Timeliness of payment and any interest to be paid to Contractor for late payment shall be governed by Article 11-A of the State Finance Law to the extent required by law.

16. **NO ARBITRATION.** Disputes involving this contract, including the breach or alleged breach thereof, may not be submitted to binding arbitration (except where statutorily authorized) but must, instead, be heard in a court of

competent jurisdiction of the State of New York.

17. SERVICE OF PROCESS. In addition to the methods of service allowed by the State Civil Practice Law & Rules ("CPLR"), Contractor hereby consents to service of process upon it by registered or certified mail, return receipt requested. Service hereunder shall be complete upon Contractor's actual receipt of process or upon the State's receipt of the return thereof by the United States Postal Service as refused or undeliverable. Contractor must promptly notify the State, in writing, of each and every change of address to which service of process can be made. Service by the State to the last known address shall be sufficient. Contractor will have thirty (30) calendar days after service hereunder is complete in which to respond.

18. PROHIBITION ON PURCHASE OF TROPICAL HARDWOODS. The Contractor certifies and warrants that all wood products to be used under this contract award will be in accordance with, but not limited to, the specifications and provisions of State Finance Law §165 (Use of Tropical Hardwoods), which prohibits purchase and use of tropical hardwoods, unless specifically exempted, by the State or any governmental agency or political subdivision or public benefit corporation. Qualification for an exemption under this law will be the responsibility of the contractor to establish to meet with the approval of the State. In addition, when any portion of this contract involving the use of woods, whether supply or installation, is to be performed by any subcontactor, the prime Contractor will indicate and certify in the submitted bid proposal that the subcontractor has been informed and is in compliance with specifications and provisions regarding use of tropical hardwoods as detailed in Section 165 of the State Finance Law. Any such use must meet with the approval of the State, otherwise, the bid may not be considered responsive. Under bidder certification, proof of qualification for exemption will be the responsibility of the Contractor to meet with the approval of the State.

MacBRIDE FAIR EMPLOYMENT PRIN-CIPLES. In accordance with the MacBride Fair Employment Principles (Chapter 807 of the Laws of 1992), the Contractor hereby stipulates that Contractor and any individual or legal entity in which the Contractor holds a ten percent or greater ownership interest and any individual or legal entity that holds a ten percent or greater ownership interest in the Contractor either (a) have no business operations in Northern Ireland, or (b) shall take lawful steps in good faith to conduct any business operations in Northern Ireland in accordance with the MacBride Fair Employment Principles (as described in Section 165(5) of the State Finance Law), and shall permit independent monitoring of compliance with such principles.

20. OMNIBUS PROCUREMENT ACT OF 1992.

It is the policy of New York State to maximize opportunities for the participation of New York State business enterprises, including minority and women-owned business enterprises as bidders, subcontractors and suppliers on its procurement contracts.

Information on the availability of New York State subcontractors and suppliers is available from: NYS Department of Economic Development

NYS Department of Economic Development Division for Small Business 30 South Pearl St., 7th Floor Albany, NY 12245 Tel: 518-292-5100 Fax: 518-292-5884 email: opa@esd.ny.gov

A directory of certified minority and womenowned business enterprises is available from:

NYS Department of Economic Development

Division of Minority and Women's Business Development 633 Third Avenue New York, NY 10017 212-803-2414

email: mwbecertification@esd.ny.gov https://ny.newnycontracts.com/FrontEnd/Ven dorSearchPublic.asp

The Omnibus Procurement Act of 1992 requires that by signing this bid proposal or contract, as applicable, Contractors certify that whenever the total bid amount is greater than \$1 million:

(a) The Contractor has made reasonable efforts to encourage the participation of New York State Business Enterprises as suppliers and subcontractors, including certified minority and women-owned business enterprises, on this project, and has retained the documentation of these efforts to be provided upon request to SUNY;

(b) The Contractor has complied with the Federal Equal Employment Opportunity Act of 1972 (P.L. 92-261), as amended;

(c) The Contractor agrees to make reasonable efforts to provide notification to New York State residents of employment opportunities on this project through listing any such positions with the Job Search Division of the New York State Department of Labor, or providing such notification in such manner as is consistent with existing collective bargaining contracts or agreements. The contractor agrees to document these efforts and to provide said documentation to the State upon request; and

(d) The Contractor acknowledges notice that SUNY may seek to obtain offset credits from foreign countries as a result of this contract and agrees to cooperate with SUNY in these efforts.

21. RECIPROCITY AND SANCTIONS

PROVISIONS. Bidders are hereby notified that if their principal place of business is located in a country, nation, province, state or political subdivision that penalizes New York State vendors, and if the goods or services they offer will be substantially produced or performed outside New York State, the Omnibus Procurement Act of 1994 and 2000 amendments (Chapter 684 and Chapter 383, respectively) require that they be denied contracts which they would otherwise obtain. Contact the NYS Department of Economic Development, Division for Small Business, 30 South Pearl Street, Albany, New York 12245, for a current list of jurisdictions subject to this provision.

22. COMPLIANCE WITH NEW YORK STATE INFORMATION SECURITY BREACH AND NOTIFICATION ACT. Contractor shall comply with the provisions of the New York State Information Security Breach and Notification Act (General Business Law Section 899-aa; State Technology Law Section 208).

23. COMPLIANCE WITH CONSULTANT DISCLOSURE LAW If this is a contract for consulting services, defined for purposes of this requirement to include analysis, evaluation, research, training, data processing, computer programming, engineering, environmental health and mental health services, accounting, auditing, paralegal, legal or similar services, then in accordance with Section 163(4-g) of the State Finance Law, the Contractor shall timely, accurately and properly comply with the requirement to submit an annual employment report for the contract to SUNY, the Department of Civil Service and the State Comptroller.

24. PURCHASES OF APPAREL AND SPORTS EQUIPMENT. In accordance with State Finance Law Section 165(7), SUNY may determine that a bidder on a contract for the purchase of apparel or sports equipment is not a responsible bidder as defined in State Finance Law Section 163 based on (a) the labor standards applicable to the manufacture of the apparel or equipment, includina sports emplovee compensation, working conditions, emplovee rights to form unions and the use of child labor; or (b) bidder's failure to provide information sufficient for SUNY to determine the labor conditions applicable to the manufacture of the apparel or sports equipment.

25. PROCUREMENT LOBBYING. To the extent

this agreement is a "procurement contract" as defined by State Finance Law Sections 139-j and 139-k, by signing this agreement the contractor certifies and affirms that all disclosures made in accordance with State Finance Law Sections 139j and 139-k are complete, true and accurate. In the event such certification is found to be intentionally false or intentionally incomplete, the State may terminate the agreement by providing written notification to the Contractor in accordance with the terms of the agreement.

26. CERTIFICATION OF REGISTRATION TO COLLECT SALES AND COMPENSATING USE TAX BY CERTAIN STATE CONTRACTORS, AFFILIATES AND SUBCONTRACTORS. To the extent this agreement is a contract as defined by Tax Law Section 5-a, if the Contractor fails to

make the certification required by Tax Law Section 5-a or if during the term of the contract, the Department of Taxation and Finance or SUNY discovers that the certification, made under penalty of perjury, is false, then such failure to file or false certification shall be a material breach of this contract and this contract may be terminated, by providing written notification to the Contractor in accordance with the terms of the agreement, if SUNY determines that such action is in the best interests of the State.

27. **IRAN DIVESTMENT ACT**. By entering into this Agreement, Contractor certifies in accordance with State Finance Law §165-a that it is not on the "Entities Determined to be Non-Responsive Bidders/Offerers pursuant to the New York State Iran Divestment Act of 2012" ("Prohibited Entities List") posted at:

http://www.ogs.ny.gov/about/regs/docs/ListofEntities.pdf

Contractor further certifies that it will not utilize on this Contract any subcontractor that is identified on the Prohibited Entities List. Contractor agrees that should it seek to renew or extend this Contract, it must provide the same certification at the time the Contract is renewed or extended. Contractor also agrees that any proposed Assignee of this Contract will be required to certify that it is not on the Prohibited Entities List before the contract assignment will be approved by the State.

During the term of the Contract, should the state agency receive information that a person (as defined in State Finance Law §165-a) is in violation of the above-referenced certifications, the state agency will review such information and offer the person an opportunity to respond. If the person fails to demonstrate that it has ceased its engagement in the investment activity which is in violation of the Act within 90 days after the determination of such violation, then the state agency shall take such action as may be appropriate and provided for by law, rule, or contract, including, but not limited to, imposing seeking compliance, sanctions. recovering damages, or declaring the Contractor in default.

The state agency reserves the right to reject any bid, request for assignment, renewal or extension for an entity that appears on the Prohibited Entities List prior to the award, assignment, renewal or extension of a contract, and to pursue a responsibility review with respect to any entity that is awarded a contract and appears on the Prohibited Entities list after contract award.

THE FOLLOWING PROVISIONS SHALL APPLY ONLY TO THOSE CONTRACTS TO WHICH A HOSPITAL OR OTHER HEALTH SERVICE FACILITY IS A PARTY

28. Notwithstanding any other provision in this contract, the hospital or other health service facility remains responsible for insuring that any service provided pursuant to this contract complies with all pertinent provisions of Federal, state and local statutes, rules and regulations. In the foregoing sentence, the word "service" shall be construed to refer to the health care service rendered by the hospital or other health service facility.

29. (a) In accordance with the 1980 Omnibus Reconciliation Act (Public Law 96-499), Contractor hereby agrees that until the expiration of four years after the furnishing of services under this agreement, Contractor shall make available upon written request to the Secretary of Health and Human Services, or upon request, to the Comptroller General of the United States or any of their duly authorized representatives, copies of this contract, books, documents and records of the Contractor that are necessary to certify the nature and extent of the costs hereunder.

(b) If Contractor carries out any of the duties of the contract hereunder, through a subcontract having a value or cost of \$10,000 or more over a twelve-month period, such subcontract shall contain a clause to the effect that, until the expiration of four years after the furnishing of such services pursuant to such subcontract, the subcontractor shall make available upon written request to the Secretary of Health and Human Services or upon request to the Comptroller General of the United States, or any of their duly authorized representatives, copies of the subcontract and books, documents and records of the subcontractor that are necessary to verify the nature and extent of the costs of such subcontract.

(c) The provisions of this section shall apply only to such contracts as are within the definition established by the Health Care Financing Administration, as may be amended or modified from time to time.

Affirmative Action Clauses

State University of New York

1. DEFINITIONS. The following terms shall be defined in accordance with Section 310 of the Executive Law:

STATE CONTRACT herein referred to as "State Contract", shall mean: (a) a written agreement or purchase order instrument, providing for a total expenditure in excess of twenty-five thousand dollars (\$25,000,00). whereby the State University of New York ("University") is committed to expend or does expend funds in return for labor, services including but not limited to legal, financial and other professional services, supplies, equipment, materials or an combination of the foregoing, to be performed for, or rendered or furnished to the University; (b) a written agreement in excess of one hundred thousand dollars (\$100,000.00) whereby the University is committed to expend or does expend funds for the acquisition, construction, demolition, replacement, major repair or renovation real property of and improvements thereon; and (c) a written agreement in excess of one hundred thousand dollars (\$100,000.00) whereby the University as an owner of a state assisted housing project is committed to expend or does expend funds for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereon for such project.

SUBCONTRACT herein referred to as "Subcontract", shall mean any agreement for a total expenditure in excess of \$25,000 providing for services, including non-staffing expenditures, supplies or materials of any kind between a State agency and a prime contractor, in which a portion of the prime contractor's obligation under the State contract is undertaken or assumed by a business enterprise not controlled by the prime contractor.

WOMEN-OWNED BUSINESS ENTERPRISE herein referred to as "WBE", shall mean a business enterprise, including a sole proprietorship, partnership or corporation that is: (a) at least fifty-one percent (51%) owned by one or more United States citizens or permanent resident aliens who are women; (b) an enterprise in which the ownership interest of such women is real, substantial and continuing; (c) an enterprise in which such women ownership has and exercises the authority to control independently the day-today business decisions of the enterprise; (d) an enterprise authorized to do business in state and independently owned and this operated; (e) an enterprise owned by an individual or individuals, whose ownership, control and operation are relied upon for certification, with a personal net worth that does not exceed three million five hundred thousand dollars (\$3,500,000), as adjusted annually on the first of January for inflation according to the consumer price index of the previous year; and (f) an enterprise that is a small business pursuant to subdivision twenty of this section.

A firm owned by a minority group member who is also a woman may be certified as a minority-owned business enterprise, a

EXHIBIT A-1

women-owned business enterprise, or both, and may be counted towards either a minority-owned business enterprise goal or a women-owned business enterprise goal, in regard to any Contract or any goal, set by an agency or authority, but such participation may not be counted towards both such goals. Such an enterprise's participation in a Contract may not be divided between the minorityowned business enterprise goal and the women-owned business enterprise goal.

MINORITY-OWNED BUSINESS ENTER-PRISE herein referred to as "MBE", shall mean a business enterprise, including a sole proprietorship, partnership or corporation that is: (a) at least fifty-one percent (51%) owned by one or more minority group members; (b) an enterprise in which such minority ownership is real, substantial and continuing, (c) an enterprise in which such minority ownership has and exercises the authority to control independently the day-today business decisions of the enterprise; (d) an enterprise authorized to do business in this state and independently owned and operated; (e) an enterprise owned by an individual or individuals, whose ownership, control and operation are relied upon for certification, with a personal net worth that does not exceed three million five hundred thousand dollars (\$3,500,000.00), as adjusted annually on the first of January for inflation according to the consumer price index of the previous year; and (f) an enterprise that is a small business pursuant to subdivision twenty of this section.

MINORITY GROUP MEMBER shall mean a United States citizen or permanent resident alien who is and can demonstrate membership in one of the following groups: (a) Black persons having origins in any of the Black African racial groups; (b) Hispanic persons of Mexican, Puerto Rican, Dominican, Cuban, Central or South American of either Indian or Hispanic origin, regardless of race; (c) Native American or Alaskan native persons having origins in any of the original peoples of North America. (d) Asian and Pacific Islander persons having origins in any of the Far East countries, South East Asia, the Indian Subcontinent or Pacific Islands.

CERTIFIED ENTERPRISE OR BUSINESS shall mean a business verified as a minority or women- owned business enterprise pursuant to section 314 of the Executive Law. A business enterprise which has been approved by the New York Division of Minority & Women Business Development ("DMWBD") for minority or women-owned enterprise status subsequent to verification that the business enterprise is owned, operated, and controlled by minority group members or women, and that also meets the financial requirements set forth in the regulations.

2. TERMS. The parties to the attached State Contract agree to be bound by the following provisions which are made a part hereof (the word "Contractor" herein refers to any party other than the University:

1(a) Contractor and its Subcontractors shall undertake or continue existing programs of affirmative action to ensure that minority group

March 17th, 2014

members and women are afforded equal employment opportunities without discrimination. For these purposes, affirmative action shall apply in the areas of recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff, or termination and rates of pay or other forms of compensation.

(b) Prior to the award of a State Contract, the Contractor shall submit an equal employment opportunity (EEO) policy statement to the University within the time frame established by the University.

(c) As part of the Contractor's EEO policy statement, the Contractor, as a precondition to entering into a valid and binding State Contract, shall agree to the following in the performance of the State Contract: (i) The Contractor will not discriminate against any employee or applicant for employment, will undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination, and shall make and document its conscientious and active efforts to employ and utilize minority group members and women in its work force on State Contracts:(ii) The Contractor shall state in all solicitations or advertisements for employees that, in the performance of the State Contract, all qualified applicants will be afforded equal employment opportunities without discrimination; (iii) At the request of the University the Contractor shall request each employment agency, labor union, or authorized representative of workers with which it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, labor union, or representative will not discriminate, and that such union or representative will affirmatively cooperate in the implementation of the Contractor's obligations herein.

(d) Except for construction contracts, prior to an award of a State Contract, the Contractor shall submit to the contracting agency a staffing plan of the anticipated work force to be utilized on the State Contract or. information where required, on the Contractor's total work force, including apprentices, broken down by specified ethnic gender, and Federal background, occupational categories or other appropriate categories specified by the contracting agency. The form of the staffing plan shall be supplied by the contracting agency. If Contractor fails to provide a staffing plan, or in the alternative, a description of its entire work force, the University may reject Contractor's bid, unless Contractor either commits to provide such information at a later date or provides a reasonable justification in writing for its failure to provide the same.

(e) After an award of a State Contract, the Contractor shall submit to the University a workforce utilization report, in a form and manner required by the agency, of the work force actually utilized on the State Contract, broken down by specified ethnic background, gender, and Federal occupational categories or other appropriate categories specified by the University.

(f) The Contractor shall include the provisions of this section in every Subcontract

in such a manner that the requirements of the provisions will be binding upon each Subcontractor as to work in connection with the State Contract, including the requirement that Subcontractors shall undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination, and, when requested, provide to the Contractor information on the ethnic background, gender, and Federal occupational categories of the employees to be utilized on the State Contract.

(g) To ensure compliance with the requirements of this paragraph, the University shall inquire of a Contractor whether the work force to be utilized in the performance of the State Contract can be separated out from the Contractor's and/or Subcontractors' total work force and where the work of the State Contract is to be performed. For Contractors who are unable to separate the portion of their work force which will be utilized for the performance of this State Contract, Contractor shall provide reports describing its entire work force by the specified ethnic background, gender, and Federal Occupational Categories, or other appropriate categories which the agency may specify.

(h) The University may require the Contractor and any Subcontractor to submit compliance reports, pursuant to the regulations relating to their operations and implementation of their affirmative action or equal employment opportunity program in effect as of the date the State Contract is executed.

(i) If a Contractor or Subcontractor does not have an existing affirmative action program, the University may provide to the Contractor or Subcontractor a model plan of an affirmative action program. Upon request, the Director of DMWBD shall provide a contracting agency with a model plan of an affirmative action program.

(j) Upon request, DMWBD shall provide the University with information on specific recruitment sources for minority group members and woman, and contracting agencies shall make such information available to Contractors

2. Contractor must provide the names, addresses and federal identification numbers of certified minority- and women-owned business enterprises which the Contractor intends to use to perform the State Contract and a description of the Contract scope of work which the Contractor intends to structure to increase the participation by Certified minorityand/or women-owned business enterprises on the State Contract, and the estimated or, if known, actual dollar amounts to be paid to and performance dates of each component of a State Contract which the Contractor intends to be performed by a certified minority- or woman-owned business enterprise. In the event the Contractor responding to University solicitation is joint venture, teaming agreement, or other similar arrangement that includes a minority-and women owned business enterprise, the Contractor must submit for review and approval: i. the name, address, telephone number and federal identification of each partner or party to the agreement; ii. the federal identification number of the joint venture or entity established to respond to the solicitation, if applicable; iii. A copy of the joint venture, teaming or other similar arrangement which describes the percentage of interest owned by each party to the agreement and the value added by each party; iv. A copy of the mentor-protégé agreement between the parties, if applicable, and if not described in the joint venture, teaming agreement, or other similar arrangement.

3. PARTICIPATION BY MINORITY GROUP MEMBERS AND WOMEN. The University shall determine whether Contractor has made conscientious and active efforts to employ and utilize minority group members and women to perform this State Contract based upon an analysis of the following factors:

(a) Whether Contractor established and maintained a current list of recruitment sources for minority group members and women, and whether Contractor provided written notification to such recruitment sources that contractor had employment opportunities at the time such opportunities became available.

(b) Whether Contractor sent letters to recruiting sources, labor unions, or authorized representatives of workers with which contractor has a collective bargaining or other agreement or understanding requesting assistance in locating minority group members and women for employment.

(c) Whether Contractor disseminated its EEO policy by including it in any advertising in the news media, and in particular, in minority and women news media.

(d) Whether Contractor has attempted to provide information concerning its EEO policy to Subcontractors with which it does business or had anticipated doing business.

(e) Whether internal procedures exist for, at a minimum, annual dissemination of the EEO policy to employees, specifically to employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions. Such dissemination may occur through distribution of employee policy manuals and handbooks, annual reports, staff meetings and public postings.

(f) Whether Contractor encourages and utilizes minority group members and women employees to assist in recruiting other employees.

(g) Whether Contractor has apprentice training programs approved by the N.Y.S. Department of Labor which provides for training and hiring of minority group members and women.

(h) Whether the terms of this section have been incorporated into each Subcontract which is entered into by the Contractor.

4. PARTICIPATION BY MINORITY AND WOMEN-OWNED BUSINESS EN-TERPRISES. Based upon an analysis of the following factors, the University shall determine whether Contractor has made good faith efforts to provide for meaningful participation by minority-owned and womenowned business enterprises which have been certified by DMWBD:

(a) Whether Contractor has actively solicited bids for Subcontracts from qualified M/WBEs, including those firms listed on the Directory of Certified Minority and Women-Owned Business Enterprises, and has documented its good faith efforts towards meeting minority and women owned business enterprise utilization plans by providing, copies of solicitations, copies of any advertisements for participation by certified minority- and women-owned business enterprises timely published in appropriate general circulation, trade and minority- or women-oriented publications, together with the listing(s) and date(s) of the publications of such advertisements; dates of attendance at any pre-bid, pre-award, or other meetings, if any, scheduled by the University, with certified minority- and women-owned business enterprises, and the reasons why any such firm was not selected to participate on the project.

(b) Whether Contractor has attempted to make project plans and specifications available to firms who are not members of associations with plan rooms and reduce fees for firms who are disadvantaged.

(c) Whether Contractor has utilized the services of organizations which provide technical assistance in connection with M/WBE participation.

(d) Whether Contractor has structured its Subcontracts so that opportunities exist to complete smaller portions of work.

e) Whether Contractor has encouraged the formation of joint ventures, partnerships, or other similar arrangements among Subcontractors.

(f) Whether Contractor has requested the services of the Department of Economic Development (DED) to assist Subcontractors' efforts to satisfy bonding requirement.

(g) Whether Contractor has made progress payments promptly to its Subcontractors.

(h) Whether the terms of this section have been incorporated into each Subcontract which is entered into by the Contractor. It shall be the responsibility of Con- tractor to ensure compliance by every Subcontractor with these provisions.

5. GOALS. (a) GOALS FOR MINORITY AND WOMEN WORK FORCE PARTICIPATION. (i) The University shall include relevant work force availability data, which is provided by the DMWBD, in all documents which solicit bids for State Contracts and shall make efforts to assist Contractors in utilizing such data to determine expected levels of participation for minority group members and women on State Contracts.

(ii) Contractor shall exert good faith efforts to achieve such goals for minority and women's participation. To successfully achieve such goals, the employment of minority group members and women by Contractor must be substantially uniform during the entire term of this State Contract. In addition, Contractor should not participate in the transfer of employees from one employer or project to another for the sole purpose of achieving goals for minority and women's participation.

(b) GOALS FOR MINORITY AND WOMEN-OWNED BUSINESS ENTER-PRISES PARTICIPATION. For all State Contracts in excess of \$25,000.00 whereby the University is committed to expend or does expend funds in return for labor, services including but not limited to legal, financial and other professional services, supplies, equipment, materials or an combination of the foregoing or all State Contracts in excess of \$100,000.00 whereby the University is committed to expend or does expend funds for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereon, Contractor shall exert good faith efforts to

achieve a	particip	ation goal	of percent
(%)	for	Certified	Minority-Owned
Business	Enterp	rises and	percent
(%)	for	Certified	Women-Owned
Business Enterprises.			

6. ENFORCEMENT. The University will be responsible for enforcement of each Contractor's compliance with these provisions. Contractor, and each Subcontractor, shall permit the University access to its books, records and accounts for the purpose of investigating and determining whether Contractor or Subcontractor is in compliance with the requirements of Article 15-A of the Executive Law. If the University determines that a Contractor or Subcontractor may not be in compliance with these provisions, the University may make every reasonable effort to resolve the issue and assist the Contractor or Subcontractor in its efforts to comply with these provisions. If the University is unable to

resolve the issue of noncompliance, the University may file a complaint with the DMWBD.

7. DAMAGES FOR NON COMPLIANCE.

Where the University determines that Contractor is not in compliance with the requirements of the Contract and Contractor refuses to comply with such requirements, or if Contractor is found to have willfully and intentionally failed to comply with the MWBE participation goals, Contractor shall be obligated to pay liquidated damages to the University. Such liquidated damages shall be calculated as an amount equaling the difference between:

a. All sums identified for payment to MWBEs had the Contractor achieved the contractual MWBE goals; and

b. All sums actually paid to MWBEs for work performed or materials supplied under the Contract.

In the event a determination has been made which requires the payment of liquidated damages and such identified sums have not been withheld by the University, Contractor shall pay such liquidated damages to the University within sixty (60) days after such damages are assessed, unless prior to the expiration of such sixtieth day, the Contractor has filed a complaint with the Director of the Division of Minority and Woman Business Development pursuant to Subdivision 8 of Section 313 of the Executive Law in which event the liquidated damages shall be payable if Director renders a decision in favor of the University.

Division 1 - General Requirements **SECTION A - Description of Work**

1. Work to be Done

The work to be done under the Contract, in accordance with the Contract Documents, consists of performing, installing, furnishing and supplying all materials, equipment, labor and incidentals necessary or convenient for the construction of Proposal Number SU-030114 titled Renovation of the Purchase College Natural Science Biology Labs, 014 & 0033 and carry out all of the duties and obligations imposed upon the Contractor by the Contract Documents.

The main features of the work shall include, but not be limited to the following:

Natural Science Biology Labs, 014

- Asbestos abatement and hazardous materials removal as outlined in attached Quest report
- Renovation of existing laboratories and support spaces (roughly 610 square feet) in the Campus' Natural Science Building.
- Demolition and removal of all existing cabinetry & counter tops
- The scope of work includes new plumbing, electrical, and finishes(must follow specifications)
- Contractor is required to do all prep work
- Furnishing and installing new epoxy resin sinks (see attached specification)
- Furnishing and installing of new drying racks
- Furnishing and installation of new eye wash stations
- Provide new painted steel laboratory casework with wood and/or glass doors and drawer fronts and
- Prepare sub floor and provide new specified chemical resistant resilient flooring and wall base
- Patch & Paint all walls, ceiling and doors
- Preparing and painting of existing fume hood, using on-site electrostatic process
- Furnishing and installing new epoxy resin countertops (see specification)
- Replace existing door levers with ADA compliant levers see specification)
- Furnishing & Installation of new under cabinet lighting(please see specs)
- Furnishing & Installation of new 120vac outlets on existing base cabinets (where possible use existing circuitry)
- Furnishing & Installation of new 120vac wall outlets as indicated on dwgs. (where possible reuse existing circuitry)
- Replace existing wall mounted power outlet strips with new.

Natural Science Biology Labs, 033

- Asbestos abatement and hazardous materials removal as outlined in attached Quest report
- Renovation of existing laboratories and support spaces (roughly 232 square feet) in the Campus' Natural Science Building.
- Demolition and removal of all existing cabinetry
- The scope of work includes new plumbing, electrical, and finishes(must follow specifications)
- Contractor is required to do all prep work
- Furnishing and installing new epoxy resin sinks (see attached specification)
- Furnishing and installing of new drying racks
- Furnishing and installation of new eye wash stations
- Provide new painted steel laboratory casework with Stainless Steel and/or glass doors and drawer fronts
- Prepare sub floor and provide new specified chemical resistant resilient flooring and wall base
- Patch & Paint all walls, ceiling and doors
- Preparing and painting of existing book case and two cabinets as indicated on dwg., using on-site electrostatic process
- Furnishing and installing new epoxy resin countertops (see specification)
- Furnishing and installing new distilled water faucet

- Furnish and install plumbing lines from main distilled water line to the sink(See sketch(Contractor to verify proposed route in field))
- Furnishing & Installation of new adjustable wall shelving, etc, as indicated on the drawings.
- Replace existing door levers with ADA compliant levers see specification)
- Furnishing & Installation of new under cabinet lighting(please see specs)
- Furnishing & Installation of new 120vac GFCI outlets on existing base cabinets (where possible reuse existing circuitry)
- Furnishing & Installation of new 120vac wall outlets as indicated on dwgs. (where possible reuse existing circuitry)
- Replace existing wall mounted power outlet strips with new.

Both Labs needs to be operational for the Fall 2014 Semester. The work needs to be done during the College's Summer Recess. The work can start May 19th and completed no later than August 8th, 2014. Close coordination with the College will be required. Contractor is advised to coordinate appropriate timing with the college during loud demolition and/or excessively noisy work to minimize disturbance to the ongoing summer classes

2. Work Not Included:

Work not included in the work of the Contract are those items marked "N.I.C"; movable furnishings, except those specifically specified or indicated on the Drawings; and items marked "by others".

SECTION B - Alternates

1. General

- a. Refer to Proposal Form. State thereon the amount to be added to or deducted from the Total Bid for the Alternates described herein.
- b. Extent and details of the Alternates are indicated on the Drawings, and described in the Specifications.
- c. Where reference is made in the description of the Alternate to products, materials, or workmanship, the specification requirements applicable to similar products, materials or workmanship in the Total Bid shall govern the products, materials, and workmanship of the Alternate as if these specification requirements were included in full in the description of the Alternates.

2. Alternates

Alternate #1:	Provide deduct credit for not electrostatically painting the existing fume hoods in
	both labs 0014 & 0033.
Alternate #2:	Furnish & install new fume hoods in labs 0014 & 033.
	Hemo Laboratory Planning Solutions - <u>http://hemcocorp.com/sefh.html</u>
	UniFlow SE AireStream Laboratory or approved equal

SECTION C - Special Conditions

1. Cutting and Patching

a. The Contractor shall do all cutting, fitting, and patching of its work that may be required to make its several parts come together properly and fitted as shown upon or reasonably implied

from the Drawings and Specifications for the completed project.

- b. Any cost caused by defective or ill-timed work shall be borne by the Contractor. Except as otherwise expressly provided in the Contract Documents, the Contractor shall not cut or alter the work of any other Contractor or existing work without the consent of the University.
- c. Existing construction, finishes, equipment, wiring, etc., that is to remain and which is damaged or defaced by reason of work done under this contract shall be restored by the Contractor to a condition satisfactory to the University, or replaced with new, at no additional cost.
- d. Existing surfaces, materials, and work shall be prepared as necessary to receive the new installations. Such preparatory work shall be as required by the conditions and in each case shall be subject to approval by the University.
- e. Newly exposed work or surfaces which are presently concealed shall be made to match existing corresponding or adjoining new surfaces as directed, and the materials and methods to be employed shall be subject to approval by the University.
- f. All new, altered, or restored work in the building shall match existing corresponding work in the material, construction finish, etc., unless otherwise specified or required by the drawings.

2. Clean-Up

- a. Periodic Cleaning: The Contractor shall at all times during the progress of the work keep the Site free from accumulation of waste matter or rubbish and shall confine its apparatus, materials and operations of its workmen to limits prescribed by law or by the Contract Limit Lines, except as the latter may be extended with the approval of the University. Cleaning of the structure(s), once enclosed, must be performed daily and removal of waste matter or rubbish must be performed at least once a week.
- b. Final Clean Up: Upon completion of the work covered by the Contract, the Contractor shall leave the completed project ready for use without the need of further cleaning of any kind and with all work in new condition and perfect order. In addition, upon completion of all work, the Contractor shall remove from the vicinity of the work and from the property owned or occupied by the State of New York, the State University of New York or the University, all plant, buildings, rubbish, unused materials, concrete forms and other materials belonging to it or used under its direction during construction or impairing the use or appearance of the property and shall restore such areas affected by the work to their original condition, and, in the event of its failure to do so, the same shall be removed by the University at the expense of the Contractor, and it and its surety shall be liable therefor.

3. Temporary Access and Parking

See Supplemental Special Conditions for Construction.

4. Field Meetings

Periodic job meetings will be scheduled by the Consultant and the University during the course of construction. The Contractor, and, upon request of the Consultant and the University, its principal subcontractors and manufacturer's representatives, shall attend such meetings and be prepared to furnish answers to questions on progress, workmanship, or any other subject on which the Consultant and the University might reasonably require information.

5. Operating Instructions and Manuals

The Contractor shall furnish three (3) complete sets of operating instructions and manuals which shall include definite and specific instructions on all mechanical and electrical systems involved in the Project.

Said instructions and manuals should set forth: (1) the manner of operation; (2) the necessary precautions and care to be followed: (3) periodic prevention maintenance requirements; and (4) a complete set of spare parts lists, catalogs, service manuals and manufacturing data on said systems. Said instructions and manuals are to be made available by the Contractor for review and comment by the University a minimum of six (6) weeks prior to the scheduled completion of the Project.

6. Utility Shutdowns and Cut Overs

- a. Except as otherwise expressly provided in the Contract Documents, the Contractor shall be responsible for submitting to the University, for its approval, a proposed schedule of all utility shutdowns and Cut-overs of all types which will be required to complete the Project; said schedule should contain a minimum of two (2) week's advance notice prior to the time of the proposed shutdown and cut over. Most campuses of the State University of New York are in full operation 12 months of the year, and shutdowns and Cut-overs, depending upon their type, generally must be scheduled on weekends, at night, or during holiday periods. The contract consideration is deemed to include all necessary overtime and all premium time, if any, that is required by the Contractor to complete the shutdowns or Cut-overs.
- b. Temporary Connections: In the event the Contractor shall disrupt any existing services, the Contractor shall immediately make temporary connection to place such service back into operation and maintain the temporary connection until the Contractor makes the permanent connection. All work must be acceptable to the University.

7. Temporary Power for Construction Activities

Electrical energy will be available at no cost to the Contractor from existing outlets or panels from locations approved by the College. This power may be used for small power tools (not exceeding 1/2 HP), etc., and the Contractor shall not exceed the capacity of the existing circuits being used. The Contractor shall be responsible for providing all necessary connections, cables, etc. and removal of the same at completion of construction with approval from the University. The Contractor shall in no way modify the existing circuits at the panel boards to increase capacities of the circuits. If the required power load exceeds the capacities of the available power sources, the Contractor shall be responsible and pay for furnishing and installing all necessary temporary power poles, cables, fused disconnect switches, transformers and electric meters necessary to provide a temporary power system for the project, and remove the same at completion. Install all temporary wiring and equipment and make all connections in conformity with the National Electrical Code. Make all replacements required by temporary use of the permanent wiring system. Provide ground fault protection.

8. Sanitary Facilities

The Contractor will be permitted to use existing toilet and janitor closet facilities as designated by the College provided the existing facilities are not misused, defaced, or left in an unsanitary condition. If the University deems that the existing facilities have been subject to misuse or left unsanitary, the Contractor shall be informed and caused to install and maintain (at its own cost) temporary, sanitary facilities at approved locations. The Contractor shall also be held responsible for the cost of cleaning and repair of any damage to said existing facilities and adherence to health and sanitary codes of the State of New York.

9. Temporary Heat

a. In those locations where it is required by the conditions of the work, the Contractor shall provide and pay for all temporary heating, coverings and enclosures necessary to properly protect all work and materials against damage by dampness and cold, dry out the work, and facilitate the completion thereof. Fuel, equipment, materials, operating personnel and the

methods used therefor shall be at all times satisfactory to the University and adequate for the purpose intended. The Contractor shall maintain the critical installation temperatures, provided in the technical provisions of the specifications hereof, for all work in those areas where the same is being performed.

- b. Maintenance of proper heating, ventilation and adequate drying out of the work is the responsibility of the Contractor. Any work damaged by dampness, insufficient or abnormal heating shall be replaced to the satisfaction of the University by and at the sole cost and expense of the Contractor.
- c. The Contractor shall provide all necessary, temporary heating for the efficient and effective work by itself and all trades engaged in the work. Unless otherwise specified, the minimum temperature shall be 50 degrees F at all places where work is actually being performed within the project (where enclosed). Before and during the placing of wood finish and the application of other interior finishing, varnishing, painting, etc., and until final acceptance by the University of all work covered by the Contract, the Contractor shall, unless otherwise specified in the Contract Documents, provide sufficient heat to produce a temperature of not less than 68 degrees F nor more than 78 degrees F.

10. Temporary Light

The contractor shall install, maintain and remove Underwriter's Label temporary lighting sockets, light bulbs, and intermittent power sockets as approved by the University. The minimum temporary lighting to be provided is at the rate of 1/4 watt per square foot and be maintained for 24 hours, 7 days per week at stairs and exit corridors; in all other spaces, temporary lighting is to be maintained during working hours. Installation shall be in accordance with the National Electric Code.

11. Temporary Water for Construction Purposes

Water for construction is available through the campus system without charge to the Contractor from location designated by the College. The Contractor shall obtain the necessary permission, make all connections, as required, furnish and install all pipes and fittings, and remove the same at completion of work. The Contractor must provide for waste water discharge and shall take due care to prevent damage to existing structures or site and the waste of water. All pipes and fittings must be maintained in perfect condition at all times.

12. Conducting Work

- a. All work is to be conducted in such a manner as to cause a minimum degree of interference with the College's operation and academic schedule.
- b. Safe and direct entrance to and exiting from the existing buildings shall be maintained at all times during regular hours while construction is in progress.
- c. No construction work will start in any area until the Contractor has all the required materials on-site.
- d. The Contractor and its employees shall comply with College regulations governing conduct, access to the premises, and operation of equipment.
- e. The building shall not be left "open" overnight or during any period of inclement weather. Temporary weather tight closures shall be provided for/by the Contractor to protect the structure and its contents.

13. Safety and Protective Facilities

- a. The Contractor shall provide the necessary safeguards to prevent accidents, to avoid all necessary hazards and protect the public, the Staff, students, the work and property at all times, including Saturdays, Sundays, holidays and other times when no work is being done.
- b. The Contractor shall erect, maintain and remove appropriate barriers or other devices, including mechanical ventilation systems, as required by the conditions of the work for the protection of users of the project area, the protection of the work being done, or the containment of dust and debris. All such barriers or devices shall be provided in conformance with all applicable codes, laws and regulations, including OSHA and National Fire Prevention Association 241, for safeguarding of structures during construction.
- c. Where construction vehicular traffic crosses paths, roads, or parking lots where there is pedestrian usage, Contractor must submit a request, in written form, to the Campus for review and approval. If granted approval by the Campus, Contractor must provide trained flagmen at all times vehicles are in pedestrian usage areas.

14. Protection of Existing Structures, Vegetation and Utilities

The Contractor, during the course of its work, shall not damage any buildings, structures and utilities, public or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains and electric power and lighting and telephone cables, lawns, curbs, plants and other improvements. Any damage resulting from the Contractor's operations shall be repaired or replaced at its expense.

15. Abbreviations and References

The following abbreviations may be used in these Specifications:

N.A.Not ApplicableN.I.CNot in Contract.Fed. Spec. or F.S.Federal SpecificationsSUCFState University Construction FundUniversity or SUNYState University of New YorkCollegeA Campus of the State University of New York

16. Use of Elevators

The Contractor shall be permitted to make temporary use of elevators designated by the University and provided such use does not interfere with the normal activities of the College. Large and heavy items shall not be placed in elevators, and suitable padding shall be provided whenever a cab is used for construction purposes. Elevator pits shall be kept free of debris and dust by frequent cleaning out. The elevators shall be restored to original condition satisfactory to the University at the end of construction activities. Use of the top of the elevator may be permitted after obtaining approval of the University.

17. Salvage of Materials

Remove and legally dispose of all debris and other materials resulting from the alterations to State University property. The following items shall remain the property of the University and shall be stored at the site as directed by the University:

- Any doors or door hardware indicated to be returned to Campus as noted in the construction documents.
- Window treatments.
- Misc. Items. College Representative will walk site with Contractor and tag all items that are to be returned to Campus prior to beginning of demolition.

18. Storage of Materials

- a. The Contractor shall store materials and equipment within the contract limits in areas on the site as designated by the University.
- b. All materials shall be stored in a neat and orderly manner, and shall be protected against the weather by raised floored weatherproof temporary storage facility or trailer.
- c. Security for stored materials shall be the responsibility of the Contractor.
- d. Storage of materials is not permitted on the roof of any building.

19. Shop Drawings and Samples - (Refer to Section 2.19 of the Agreement)

a. The Contractor shall submit to the University for its approval five (5) sets of prints of all shop drawings required by the specifications. Those marked:

"REJECTED" are not in accordance with the Contract Documents and shall be resubmitted.

"REVISE AND RESUBMIT" Contractor shall correct and resubmit.

"MAKE CORRECTIONS NOTED": The contractor shall comply with corrections and may proceed.

Resubmittal is not required.

"APPROVED - NO EXCEPTIONS TAKEN": The contractor may proceed.

- b. All shop drawings and/or submittals used on the construction site must bear the impression of the consultant's review stamp as well as the General Contractor's review stamp, indicating the status of review and the date of review.
- c. All shop drawings shall reflect actual site conditions and accurate field dimensions. Dimensioned shop drawings shall be submitted for all fabricated items. Incomplete submittals will be rejected without review.
- d. All shop drawings, submittals and samples shall include:
 - 1). Date and revision dates.
 - 2). Project title and number.
 - 3). Names of:
 - a). Contractor
 - b). Subcontractor
 - c). Supplier
 - d). Manufacturer
 - 4). Identification of products or materials: Include Department of State (DOS) file number, manufacturers' name and market name of all covered products and applicable materials in accordance with Part 1120 of the Code. This information may be obtained by contacting the DOS, Office of Fire Prevention and Control: 518 474-6746 [voice] and 518 474-3240 [FAX])

20. U.S. Steel

All structural steel, reinforcing steel, or other major steel items to be incorporated in the work shall, if this Contract is in excess of \$100,000, be produced or made in whole or substantial part in the United States, its territories or possessions.

21. Non-Asbestos Products

a. All materials specified herein shall contain no asbestos.

b. Provide "Contains No Asbestos" permanent labels applied to the exterior jacket of all pipe insulation at 20 foot intervals with a minimum of one (1) label for each service in each work area.

22. Material Safety Data Sheet

The contractor shall submit MSDS (Material Safety Data Sheet) for all chemicals, solvents, and materials specified or proposed to be used on this project.

23. Architect's/Engineer's Seal

In accordance with Rules and Regulations of the New York State Education Law, Title 8, Part 69.5(b), to all plans, specifications and reports to which the seal of an architect has been applied, there shall also be applied a stamp with appropriate wording warning that it is a violation of the law for any person, unless acting under the direction of a licensed architect, to alter an item in any way. If an item bearing the seal of an architect is altered, the altering architect shall affix to his item the seal and the notation "altered by" followed by his signature and the date of such alteration, and a specific description of the alteration.

24. Construction Permit

The Code Compliance Manager for the State University Campus will, as required by law, issue a Construction Permit for this Project. The project is not subject to any local building code or permit requirements, except for work that the Contractor is to perform on property located outside of the boundaries of the campuses of the State University of New York.

25. Other Contracts

There may be other contracts let for work to be done in adjacent areas and, as such, this Contractor and such other contractors shall coordinate their work to conform with progressive operation of all the work covered by such contracts, and afford each other reasonable opportunities for the introduction and storage of their supplies, materials, equipment, and the execution of their work.

26. Asbestos

If the work to be done under this contract contains the abatement of asbestos the following shall apply:

- a. Applicable Regulations -All work to be done under this Contract shall be in compliance with Part 56 of Title 12 of the Official Compilation of Codes, Rules and Regulations of the State of New York (cited as 12 NYCRR Part 56) as amended effective November 9, 1994.
- b. Applicable Variance The abatement contractor is responsible for obtaining any variance not issued to date that he feels may be applicable to the policies/procedures as set forth in 12 NYCRR Part 56.
- c. Owner Project Fact Sheet -The Contractor shall complete and submit as much information as possible on the Asbestos Material Fact Sheet to the University in triplicate prior to the project startup. Completion of the Fact Sheet shall be submitted prior to acceptance.
- d. Patent Infringement The State University of New York and the State University Construction Fund have been given notice by a law firm representing GPAC, Inc. that the use of its process/procedure for asbestos containment and removal constitutes a patent infringement. All potential contractors are hereby notified that they may have to obtain a license to use certain patented Negative Air Containment systems, and that any liability of the University

0100-8

in connection therewith is covered by Section 2.21 of the Agreement. Therefore, all potential contractors are hereby notified that after opening of the bids they must advise the University as to the system they intend to use for Negative Air Containment and provide the University with either a copy of their license to use the same or written documentation, signed by an authorized officer of their surety, that their performance bond guarantees the Contractor's indemnification covering patent claims.

- e. Air Monitoring The abatement contractor shall be responsible for hiring and paying an independent third party firm to perform the requirements of air monitoring as called for in Subpart 56-17 of 12 NYCRR Part 56.
- f. Testing The University and Campus reserve the right to employ an independent testing laboratory to perform testing on the work and air sampling. The Contractor shall be required to cooperate with the testing laboratory.
- g. Disposal Procedures It is the responsibility of the asbestos contractor to determine current waste handling, transportation and disposal regulations for the work site and for each waste disposal landfill. The asbestos contractor must comply fully with these regulations, all appropriate U.S. Department of Transportation, EPA and Federal, State and local entities' regulations, and all other then current legal requirements. Submit originals or copies of all pertinent manifests in triplicate to the University.
- h. Submittals Prior to commencement of the work on this project, the Contractor must submit the following to the University:
 - 1). Copy of original insurance policy.
 - 2). Copy of Department of Labor notification.
 - 3). Owner Fact Sheet.
 - 4). Copy of EPA notification.
- i. Special Requirements -. 1) Size, location, and quantities of all pipes, joints, ducts, valves, tees, etc. must be field verified by all prospective bidders. Information given on the drawings and specifications is for general orientation and information only.
 - 2) The Contractor shall have at least one English-speaking supervisor on the ob site at all times while the project is in progress.
 - 3) Prior to the commencement of work involving asbestos demolition, removal, renovation, the Contractor must submit to the University the name of its on-site asbestos supervisor responsible for such operations, together with documentation that such supervisor has completed an Environmental Protection Agency-approved training course for asbestos supervisors.

27. Wage Rates and Supplements

The rates of wages and supplements determined by the Industrial Commissioner of the State of New York as Prevailing in the locality of the site at which the work will be performed can be found at: http://wpp.labor.state.ny.us/wpp/doFindProject.do?method=dolt&prcNumber=2011007009

The Prevailing Wage Case Number (PRC#) assigned to this project is 2014002036

Section D Special Conditions for Construction

Part 1 – Use of Premise

1.1 General

- A. Contractor shall confine operations at the site to areas permitted by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with materials or equipment. *For purposes of this provision, "site" shall include all existing structures.*
- B. The Building in which the Work is to be performed is currently occupied by residential areas, offices and/or classrooms. Each Contractor shall have limited use of premises for construction operations, including use of Project site, during the construction period. Each Contractor's use of premises is limited only as outlined in this section and/or any other section of the specifications, or at the College's discretion, to perform work or to retain other contractors on portions of Project.
- C. Coordination with Other Contractors:
 - 1). The Contractor will need to have their portion of the Work coordinated with other Contractors working on the site so that their work conforms to the progressive operation of all the work covered under other contracts that the College has let on this site.
 - 2). Each Contractor shall afford other Contractors reasonable opportunities for the introduction and storage of their supplies, materials, equipment, and execution of their work.
 - 3). If the Contractor or such other contractors contend that their work of the progress thereof is being interfered with by the acts or omissions of the others or that there is a failure to coordinate or properly arrange the sequence of the work on the part of the Contractor or such other contractors, they shall, within five (5) working days of the commencement of such interference or failure of coordination or failure to perform work in proper sequence, give written notification to the College of such contention. Upon receipt of such notification or on its own initiative, the College shall investigate the situation and issue such instructions to the Contractor or such other contractors with respect thereto as it may deem proper. The College shall determine the rights of the Contractor and of such other contractors and the sequence of work necessary to expedite the completion of the work covered by said other contracts.
- D. All work is to be conducted in such a manner as to cause a minimum degree of interference with the College's operations and academic schedule. Contractor is to coordinate their work with the College's classroom schedule.
- E. The Contractor and its employees shall comply with all College regulations governing conduct, access to the premises, and operation of equipment.
- F. Maintain all paths of egress and keep clear of all materials and debris.
- G. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, and other adjacent occupied or used facilities without written permission from College.
- H. Should it become necessary, in the judgment of the College, at any time during the course of the Work to move materials which are stored on the site and equipment which has been temporarily placed thereon, the Contractor upon request of the College shall move them or cause them to be moved at its sole cost and expense; provided, however, if materials and equipment that have been stored or placed by the Contractor at a location on the site expressly approved, in writing, by the College and the same are moved or caused to be moved by the Contractor at the College's request, such removal shall be deemed extra work and the Contractor shall be compensated.

1.2 Campus Regulations

A. The contractor and his/her employees, subcontractors, etc., will not fraternize with any building or campus occupants. This includes but is not limited to students, faculty, and employees of the State other than those designated, visitors and guests. At no time will it be appropriate to say anything derogatory to the above referenced individuals. Harassment, verbal or otherwise, of the above referenced individuals will <u>not</u> be tolerated. If an incident arises, the Contractor will be directed to <u>permanently remove</u> the employee from the site.

- B. No drugs are permitted on campus.
- C. No smoking is permitted in the buildings.
- D. The contractor, employees and sub-contractors are required to stay within the construction boundary lines at all times.
- E. The contractor, employees, and sub-contractors must recognize the fact that this is an institute for learning. Flexibility will be required during certain times of the academic year.

1.3 Use of Permanent Utilities

- A. As the building is still under construction, when each permanent utility is operational, it may be used for construction purposes, if acceptable, in writing, by the College. The written request for permission for use of the system from the College shall include, as a minimum, the conditions and reasons for use and provisions for and effect on equipment warranties. In the event that the College accepts the Contractors use of the permanent utility for the balance of the Work, the Contractor shall be fully responsible for it, and shall pay all costs for operation, power, restoration and maintenance of same.
- B. If the existing facilities are not adequate for the Contractor, locate temporary facilities where they will serve Project adequately and result in minimum interference with performance of the Work and disruption to the College. Any temporary facilities location is to be reviewed and approved by College's Representative.

1.4 Storage and Staging of Materials

- A. The following shall apply to this project
 - 1). The Contractor shall store materials and equipment within areas designated by the College.
 - 2). Security for stored equipment and materials shall be the responsibility of the Contractor.
 - 3. No vehicles will be permitted on the Plaza. Any and all materials and/or equipment brought or stored on the Plaza shall not exceed the maximum weight limit of 150 psf.
 - 4). Access to the construction site for delivery of materials and equipment is limited. Temporary parking for the loading and unloading of the same shall be arranged only with prior approval of the College.
 - 5). The Contractor shall at all times keep access routes, and parking and staging areas clean of debris and other obstructions resulting from the work.

1.5 Temporary Power for Construction Activities

A. Electrical energy, as it exists within the work area, will be available at <u>no</u> cost to the Contractor from existing outlets or panels from locations approved by the College. As this site is still under construction, if electrical power is not available in the area of work, it is the Contractor's responsibility to provide necessary power to perform the Work. Typically available power may be used for small power tools (not exceeding ½ HP).

1.6 Temporary Lighting / Heating & Cooling / Water

A. Electrical lighting, as it exists within the work area, is available to the contractor at <u>no</u> cost. As this site is still under construction, if electrical lighting is not available in the area of work, it is the Contractor's responsibility to provide necessary temporary equipment to perform the Work at its cost.

1.7 Temporary Sanitary Facilities

A. Toilet, Water, and Drinking Water Facilities: The Contractor shall make arrangements with the College for use of the existing toilet, water, and drinking water facilities. It is the Contractor's responsibility to maintain the facility during the construction and restore to original state upon completion of the project.

1.8 Temporary Parking

- A. Contractor is to abide to the following:
 - 1). The Contractor and its employees shall be subject to all the rules and regulations of the College, including parking regulations. The College is regulated by New York State Vehicle and Traffic Laws.
 - 2). The Contractor and its employees shall only park in the designated areas in Lot #W-2. There shall be no parking in other areas of the campus (unless prior written authorization is provided by the College Chief of Police).
 - 3). Parking violations are subject to fines and are the sole responsibility of the Contractor or its employees. Vehicles that are parked illegally may be towed at the expense of the owner/driver.
 - 4). All vehicles are required at all times to register with the College's Public Safety Unit.
 - 5). There is \$35.00 fee for parking permits. The fee is per vehicle and permits need to be display whenever the vehicle is parked on campus.

1.9 Temporary Support Facilities

- A. Construction Aids: Provide all items, such as lifting devices, all scaffolding, staging, platforms, runways, ladders; and all temporary flooring, as required by the various trades for the proper execution of the Work. Provide such construction aids with proper guys, bracing, guards, railings and other safety devices as required by the governing authorities and OSHA.
- B. Elevator and Loading Dock Usage: The Contractor shall make all arrangements with the College's Representative for the use of elevators as required for transporting material and workmen to the work areas and for the disposal of rubbish and waste materials.

1.10 Safety and Protection of Facilities

- A. The Contractor shall provide the necessary safeguards to prevent accidents, to avoid all necessary hazards and protect the public, the Faculty and Staff, students, the work, and the property at all times, including Saturdays, Sundays, holidays, and other times when no work is being done. The Contractor shall submit a safety plan which shall be certified by a Certified Safety Professional from the Board of Certified Safety Professionals (www.bcsp.org).
- B. The Contractor shall erect, maintain and remove appropriate barriers or other devices, including mechanical ventilation systems, as required by the conditions of the work for the protection of the users of the project area, adjoining areas, the protection of the work being done, or the containment of dust and debris. All such barriers or devices shall be provided in conformance with all applicable codes, laws and regulations, including OSHA and National Fire Prevention Association 241, for safeguarding of structures during construction.
- C. Fire safety during construction:
 - 1). The Contractor shall provide all temporary equipment, labor and materials required for compliance with the applicable provisions of Chapter 14, Fire Safety during Construction and Demolition, of the Fire Code of New York State.
 - 2). For areas and spaces under their control, the Contractor shall comply with Chapter 14 of the Fire Code of New York State, titled "Fire Safety during Construction and Demolition". Subject to approval by the College's Consultant and the College, the Contractor shall designate one person as the **fire prevention program superintendent**. This superintendent shall be responsible for the fire prevention program required by Section 1408 of the Fire Code of New York State and implementing the minimum safeguards for construction, alteration, and demolition operations that provide reasonable safety to life and property from fire during the Contractor's operations. Responsibilities also include developing and maintaining pre-fire plans per 1408.2, the training of the Contractor's workforce per 1408.3, maintenance of the fire protection equipment per 1408.4, supervising hot work operations per 1408.5, and implementing temporary impairment to existing fire protection systems per 1408.6 & 1408.7. This superintendent shall also provide periodic written reports at the field meetings and respond to questions raised concerning compliance with Chapter 14 of the Fire Code of New York State.
- D. Contractor shall comply with Labor Law Section 220-h; provide workers certified as having successfully completed the OSHA 10-hour construction safety and health course; and comply with applicable NYS DOL rules and regulations for monitoring and reporting compliance.
- E. Temporary Fire Protection:
 - 1). If the existing building is to be partially occupied during the course of the project, all existing exits and fire protection systems shall be continuously maintained in the occupied spaces/phases, or other measures must be taken which in the opinion of the College's Consultant and/or College will provide equal safety. Those portions occupied by the College must be available for their use 24hours a day, seven days a week during the contract period unless otherwise scheduled in these documents. Comply with all applicable State and Federal codes and regulations. The cost of all labor, fire watches, variances, materials, installations, maintenance and removal of such temporary fire protection systems or modifications to the existing systems are the responsibility of the Contractor.

F. Fire Watch Requirements:

- 1). If any of the work of the Contractor;
 - a) Disables any fire suppression systems, standpipes systems, fire alarm systems, fire detection systems, smoke control systems and/or smoke vents as defined in Chapter 9 of the Fire Code of New York State (FCNYS).
 - b) Involves welding, cutting, open torches and other hot work as defined in Chapter 26 of the FCNYS and/or involves demolition activities that are hazardous in nature as defined in Chapter 14 of the FCNYS.

Then the Contractor shall provide a fire watch or perform the work during the hours where the building is scheduled by the College to be closed, in accordance with Section 901.7 of the FCNYS, for structures that have campus occupancy.

- 2). If a fire watch is required, the Contractor shall provide all labor that is required. The Contractor shall:
 - a) Contact the New York State Department of State Office of Fire Prevention and Control (OFPC)at 41 State Street, Albany, NY 12231-0001, Phone: (518) 474-6746, Fax: (518) 474-3240, e-mail: <u>fire@dos.state.ny.us</u> and obtain its currently amended recommendation for fire watch procedures. Review the OFPC recommendations and notify the College's Consultant and/or College Representative if there are significant discrepancies with the requirements of this section.
 - b) Review the fire watch procedures with the College's alarm monitoring staff (University Police 914-251-6900) and the fire department prior to disabling a fire protection system. Submit a plan for the fire watch for approval by the College's Consultant and/or College Representative, and schedule a pre-system shutdown meeting with the College's Consultant and/or College Representative.
 - c) Employ, instruct and maintain competent fire watch personnel. Provide the sufficient number of dedicated personnel that are required to patrol all portions of the means of egress system in the facility in the period of time required.
 - d) Notify University Police (UPD) prior to and at the conclusion of the fire watch.
 - e) Employ competent personnel to fix the fire protection system (see section 1.11 below).
- 3). Fire Watch Duties: Personnel serving as a fire watch have the following duties:
 - a) Conduct periodic patrols of the entire facility as specified below.
 - b) Identify any fire, life or property hazards.
 - c) Notify the UPD if a fire is discovered by call (914-251-6911), with the exact address and type of emergency.
 - d) Notify occupants of the facility of the need to evacuate. If sirens or public address function of the alarm system are still functional, use them to assist with evacuation of the building.
 - e) Have access to at least one means of direct communication with UPD. A cell phone is acceptable.
 - f) Maintain a written log of fire watch activities.

- g) Have knowledge of the location and use of fire protection equipment, such as fire extinguishers. (Note: The fire watch will not perform fire-fighting duties beyond the scope of the ordinary citizen).
- h) Perform no other duties that are not directly part of the fire watch duties.
- 4). Frequency of Inspections: Fire watch personnel should patrol the entire facility patrol every 30 minutes except in the following situations, where patrols shall be every 15 minutes:
 - a) The facility has people sleeping.
- 5). Record Keeping: A fire watch log should be maintained at the facility. The log should show the following:
 - a) Address of the facility.
 - b) Times that the patrol has completed each tour of the facility.
 - c) Name of the person(s) conducting the fire watch.
 - d) Records of communication(s) to the University Police.
 - e) Record of other information directed by the College's Consultant and/of the College Representative.

1.11 Modifications / Alterations to Campus Existing Fire Alarm Systems

- A. The Campus standard for its fire alarm is the Edwards Fire Alarm System. Any contractor working on the Campus fire alarm system must be a licensed fire alarm installer. Any contractor working on adding to or modifying the existing fire alarm system's programming, must be certified to work on an Edwards Fire Alarm System and provide proof of that certification.
- B. A Pre-Fire Alarm construction meeting will be required between the Contractor, their fire alarm sub-contractors, and the College's Representative prior to any fire alarm work occurring.
- C. Contractor shall coordinate all modifications and/or alternations to the existing building's fire alarm systems with the College's Representative. If the work shall affect the existing fire alarm system in adjoining areas, the contractor must submit, in writing, their plan to protect and maintain the systems in the adjoining spaces, to the College's Representative for the College's review and approval, at least 72 hours in advance.
- D. Where demolition and dust may impact existing fire alarm smoke heads, the contractor shall protect these heads prior to beginning any work and follow the College's protocol listed below. If smoke heads are protected during the day, while work is occurring, the Contractor must uncover these heads at the end of each work day before leaving the site. The area protected by covered smoke heads must be continuously monitored while the heads are covered. The fire alarm systems must be operational at all times during construction. In the event that there is a need to shut down the system, the Contractor must notify the College in writing at least 72 hours in advance and provide a Fire Watch for all of the areas affected by the shutdown during the times the systems are non-operational.
- E. Where work will impact the existing fire alarm system, the contractor's site supervisor must follow the following protocol:
 - 1) Contractor Supervisor to contact the College's University Police (251-6900) prior to beginning work for the day and let them know where work is occurring and which smoke heads are being covered or device made inoperable.
 - 2) Cover smoke heads and make scheduled devices inoperable. Call University Police once heads are covered.
 - 3) Contractor to perform scheduled work. The area must be continuously monitored while the smoke heads are covered.
 - 4) At the end of the work day, Contractor Supervisor to College's University Police and let them know smoke head covers are being removed. It's strongly recommended that Contractor let's day's dust settle and clean around the devices prior to removing protective covers to avoid unintended activation.

Part 2 – Party Responsibilities

2.1 Information and Services Required of the College

- A. <u>Furnished Information</u>: College shall furnish (if available) surveys, existing plans, or other required information describing physical characteristics, legal limitation and utility locations for the site of the Project, and a legal description of the site. These documents are for information purposes only. They are to be field verified by the Contractor for accuracy. The College will <u>not</u> be responsible if actual conditions vary from what is indicated on the documents. Plans will be released to awarded Bidder in PDF electronic format.
- B. <u>College's Right to Stop the Work</u>: If Contractor fails to correct Work which is not in accordance with the requirements outlined, or fails to carry out Work in accordance with the Contract Documents, the College, by written order signed personally or by an agent specifically so empowered by the College in writing, may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the College to stop the Work shall not give rise to a duty on the part of the College to exercise this right for the benefit of Contractor or any other person or entity.
- C. <u>College's Right to Carry Out the Work</u>: If Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten (10) business-day period after receipt of written notice from College to commence and continue correction of such default or neglect with diligence and promptness, College may, without prejudice to other remedies College may have, correct such deficiencies. *College may offset* from payments then or thereafter due Contractor the cost of correcting such default, neglect or failure. If payments then or thereafter due Contractor are not sufficient to cover such amounts, Contractor shall pay the difference to the College.

2.2 Information and Services Required of the Contractor

- A. <u>Review of Contract Documents</u>: Contractor shall carefully study and compare the Contract Documents with each other and with the information furnished by the College, and shall at once report to the College Representative errors, inconsistencies or omissions discovered.
- B. <u>Review of Field Conditions</u>: Contractor shall, *sufficiently in advance of undertaking the Work*, take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to Contractor with the Contract Documents. Errors, inconsistencies or omissions discovered shall be reported to the College Representative at once. *If Contractor performs any construction activity which involves an error, inconsistency or omission which Contractor knew of or should reasonably have known of, without notice to College, Contractor shall assume responsibility for such performance and shall bear all costs of correction.*
- C. <u>Construction Schedule</u>: Contractor, promptly after being awarded the Contract, shall prepare and submit for College Representative, a Contractor's construction schedule for the Work.
- D. <u>Supervision</u>:
 - 1). Contractor shall supervise and direct the Work, using Contractor's best skill and attention. Contractor shall be solely responsible for and have control over *construction means*, methods, techniques, sequences and procedures *including safety programs and procedures*, and for coordinating all portions of the Work under the Contract.
 - 2). Contractor shall enforce strict discipline and good order among Contractor's employees and other persons carrying out the Contract. Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.
 - 3). Contractor shall be responsible for inspection of related portions of Work already performed, *as well as existing conditions*, to determine that such are in proper condition to receive subsequent Work.
- E. Contractor shall be responsible to College for acts and omissions of Contractor's employees, Subcontractors and their agents and employees, and other *persons or entities directly or indirectly employed by them* performing portions of the Work under a contract with Contractor

F. <u>Cutting and Patchwork</u>:

- 1). Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly.
- 2). Structural Elements: Do not cut and patch structural elements in a manner that could change their loadcarrying or load-deflection ratio.
- 3). Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety (i.e., mechanical systems, plumbing, fire alarm, etc.).
- 4). Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
- 5). Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
- 6). Dispose of demolished items and materials promptly.
- 7). Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.
- 8). Existing utilities services to the College <u>must</u> be maintained at all times. If the Contractor is required to affect these services in order to complete the Work, Contractor must obtain written permission from the College prior to this work (also see Special Requirements Section). Any damage or disruption of services shall need to be repaired immediately and at the Contractor's expense.

G. Hot Work Permits:

 If the work requires any Hot Work (including cutting, welding, Thermit welding, brazing, soldering (except soldering electronics or electrical components with an electric soldering iron or gun), grinding, thermal spraying, thawing pipe, installation of torch-applied roof systems or any other similar situation), the Contractor shall be required to obtain a Hot Work Permit issued by the College. The Contractor shall request this through the College Representative, and be given a copy of the College's "Hot Work Guidelines and Permit Process" and the permit forms to be filled out. The Contractor must request, submit, and be given a permit before any Hot Work begins.

H. <u>Cleaning Up</u>:

- 1). Contractor shall *at all times* keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work Contractor shall remove from and about Project waste materials, rubbish, Contractor's tools, construction equipment, machinery and surplus materials.
- 2). If Contractor fails to clean up as provided in the Contract Documents, College may do so and the cost thereof shall be charged to Contractor.
- 3). If a dispute arises among Contractor, separate contractors and College as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish as described above, College may clean up and allocate the cost among those responsible
- I. <u>Access to Work</u>: Contractor shall provide College access to *all portions of* the Work in preparation and progress wherever located.

2.3 Communications Protocol for Contract Administration

A. Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, Contractor shall communicate through the College Representative to the College. Communications by and with College's consultants shall be through College Representative. Communications by and with Subcontractors and material suppliers shall be through Contractor.

Technical Specifications

Purchase College State University of New York Invitation For Bid

TECHNICAL SPECIFICATIONS:

SECTION 01 33 00 SUBMITTAL REQUIREMENTS

(Coordinate with Section 2.19 of the Agreement and Articles 20, 24 and 27 of Section C of the General Requirements)

NOTES:

- SUBMISSIONS CAN BE MADE ELECTRONICALLY PROVIDED THAT SAID SUBMISSIONS FOLLOWS THE CRITERIA OUTLINED HEREIN AND BOTH THE FORMAT FOR THE OVERALL PROCESS IS AGREED TO BETWEEN ALL PARTIES PRIOR TO INITIAL START OF THE PROJECT.
- ALL SUBMITTALS SHALL BE MADE THROUGH THE SUBMITTAL EXCHANGE PROCESS – EMAIL TRANSMITTAL OF SAME WILL NOT BE ACCEPTED AND WILL BE RETURNED WITHOUT REVIEW

1.01 GENERAL

- A. Requirements set forth herein are in addition to and shall be considered as complementary to the Conditions of the Contract and the balance of Division #1 and Technical Specifications.
- B. All Contractors, Subcontractors, Sub-subcontractors, Vendors and the like shall be required to familiarize themselves with said provisions.
- C. Where practical, submittals shall be made in groupings where installations are complimentary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; etc. Failure to comply with this requirement will be cause for rejection of any oral submittals.
- 1.02 REQUIREMENTS INCLUDED
- A. Approved Equal Clause/Substitutions/Options
- B. Certification
- C. Manufacturer's Instructions
- D. Shop Drawings
- E. Samples
- F. Material Safety Data Sheet (MSDS) Submittals
- G. Design Responsibilities
- H. Coordination Drawings
- I. J. Certificates
- K. Construction Waste Management Procedures and Certifications See
- Section 01 74 19.
- L. V.O.C. Compliance certification See individual technical
- sections.
- M. Project Management And Coordination Environmental
- 1.03 APPROVED EQUAL CLAUSE/SUBSTITUTIONS/OPTIONS Section 2.20 of the Agreement

1.04 CERTIFICATION

- A. Certification of compliance with specification performance standards and manufacturers' specifications and directions shall be furnished for any portion of this work for which specific performance requirements and/or manufacturers' specifications are listed. It shall be the responsibility of the Contractor to secure two (2) copies of each certification when required and transmit same to the Architect and Owner's Representative.
- B. Sample Certification Form (2 pages) Section 01 33 06 as an exhibit at the close of this Section. Each item requiring certification shall be so noted and affidavits shall be filed singly to cover each specified material,

installation, application and the like.CERTIFICATIONS SHALL BE SUBMITTED AS PART OF THE CLOSE OUT DOCUMENT REQUIREMENTS SET FORTH IN SECTION 01 77 00.

- C. Decorations, Furnishings and Interior Finish The Contractor's attention is directed to the New York State Fire Codes as it relates to regulations controlling decoration, furnishings and interior finishes as they affect the work of this Contract. It is deemed the sole responsibility of the vendors furnishing fabrics, floor coverings, ceiling finishes, wall coverings and finishes and the like as covered by the regulations to submit applications and obtain approvals for same without additional charges to the Owner.Failure to obtain, and submit, approvals in accordance with requirements of this section will result in rejection of any submittal for this phase of the work.
- D. Packaged Equipment: Where packaged (factory assembled) mechanical and electrical equipment is furnished, a certificate shall be included with the submission of shop drawings or catalog data stating that the equipment complies with OSHA, National Electric Code, and applicable Underwriters Laboratories Standards in respect to motor protection, grounding and protection against hazards, and is approved by all Regulatory Agencies.

1.05 MANUFACTURER'S INSTRUCTIONS

A. Where in these specifications an item is called for to be installed in accordance with the manufacturer's directions, specifications or recommendations, the Contractor shall furnish the Architect with two (2) printed copies of said directions, specifications or recommendations, before the item is installed.

1.06 SHOP DRAWINGS

4.

g.

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally
 responsible material. Every effort will be made by the Design Professional Team to approve these materials; the
 substitution request procedure shall still be enforced.
- A. The following serves as a further definition of the requirements for shop drawing submittals as covered in the General Requirements:
 - 1. The Contractor shall submit to the Architect with such promptness as to cause no delay in the work, layout, detail, schedule, setting, product data and shop drawings for each part of the work as specified or required.
 - a. Submission of data for review by the Structural and Mechanical/Electrical Engineers shall be sent directly to those Engineers with duplicate transmittals sent to the Architect.
 - 2. BEFORE SUBMITTING ANY DATA FOR APPROVAL, THE CONTRACTOR SHALL CHECK THE SUBMITTALS OF ALL SUBCONTRACTORS FOR ACCURACY AND CONTRACT COMPLIANCE. ALL SUBMITTALS SHALL BE UNDER THE COVER SHEET ATTACHED HERETO. SUBMITTALS NOT COMPLYING WITH THE ABOVE SHALL BE RETURNED TO THE SUBMITTING CONTRACTOR WITHOUT EXAMINATION BY THE ARCHITECT. Contractor shall see that all work contiguous with and having bearing on work indicated on drawings is accurately and distinctly illustrated and that work shown is in conformity with contract requirements.
 - 3. Shop drawings shall be numbered consecutively and shall represent:
 - a. All working and erection dimensions.
 - b. Arrangement and sectional views.
 - c. Necessary details, including information for making connections to other work.
 - d. Kinds of materials and finishes. Colors, where applicable
 - Shop drawings shall be dated, and shall generally contain:
 - a. Name and Number of project.
 - b. Name, address and telephone number of submitting Contractor.
 - c. Description of required equipment, materials, and classification item numbers.
 - d. Locations at which materials or equipment are to be installed in the Work.
 - e. Identification of drawings, schedules, notes and/or details and specification sections and related paragraphs/articles to which they apply.
 - f. Equipment or fixture identification corresponding to that used in Contract Documents.
 - Accessories and special or non-standard features and materials which are being furnished.
 - h. Properly marked with external connection identifications related to the project where they consist of standard factory assembly or field installation drawings.

In addition to the general data required above, mechanical and electrical submissions shall contain:

- a. Manufacturer's specifications including materials of construction, metal gauge, thickness and finish.
- b. Certified dimensional drawings including clearances required for maintenance or access (coordinate with Section 01 31 14)
- c. Performance data, ratings, operating characteristics, and operating limits.
- d. Electrical ratings and characteristics.
- e. Wiring and control diagrams, where applicable.
- f. Certifications requested, including UL label or listing.
- g. List of accessories which are required but are NOT being provided by the product manufacturer or are NOT being furnished under this Section. Identify the Section(s) under which the accessories are being furnished.
- 5. Submission of data for approval shall be accompanied by letter of transmittal, in duplicate, containing the name of the project, Contractor's name, number of drawings, titles and other pertinent data.
- 6. Procedure for Submitting Shop Drawings and Product Data: The contractor shall submit five (5) copies of data, for standard manufactured items, in the form of manufacturer's catalog sheets, showing illustrated cuts of the items to be furnished, scale details, sizes, dimensions, performance characteristics, operating clearances, capacities, wiring diagrams and all other pertinent information. Two copies of reviewed submissions will be returned to the contractor. For all other shop drawings, Contractor shall submit one transparency for each drawing until final approval is obtained. Each drawing transparency shall have a clear space approximately 4 inches by 10 inches on the right hand side for stamps showing "Date Received" and disposition of submittal. In addition to the transparency, three (3) prints shall be required.
 - a. After completion of checking, the Architect, and Engineer (as appropriate) will retain one print for his record and return the transparencies to the submitting Contractor.

The average "turn around time" of any one in-house submittal by the Architect shall not exceed 15 business days for review.

b. For drawings returned "Resubmit", "Amend & Resubmit", "Disapproved" or "Rejected-Resubmit", the original drawings shall be corrected, a new transparency made, and resubmitted until final approval. c. For drawings returned "Approved", "No ExceptionsTaken", "Approved as Noted", and "Make Corrections

Noted", the Contractor shall obtain and provide sufficient prints as required for the field. NOTE: It is the responsibility of the contractor to confirm all dimensions, quantities, and the coordination of materials and products supplied by him with other trades. Approval of shop drawings containing errors does not relieve the contractor from making corrections at his expense.

- 7. No work as called for by shop drawings shall be done until Architect's approval.
- 8. IF SUBMITTALS SHOW VARIATIONS FROM CONTRACT REQUIREMENTS BECAUSE OF STANDARD SHOP PRACTICES, OR OTHER REASONS, CONTRACTOR SHALL MAKE SPECIFIC MENTION OF SUCH VARIATION IN HIS LETTER OF TRANSMITTAL.
- 9. APPROVAL OF SHOP DRAWINGS IS GENERAL. IT SHALL NOT RELIEVE CONTRACTOR OF THE RESPONSIBILITY FOR ACCURACY OF SUCH DRAWINGS, NOR FOR THE FURNISHING OF MATERIALS OR PROVISION OF WORK REQUIRED BY THE CONTRACT AND NOT SHOWN ON THE SHOP DRAWINGS. Unless it is an interpretation of design intent, approval of shop drawings shall not be construed as approval of departures from Contract.
- 10. If the Contractor should alter any information on previous submittals, besides the notations called for by the Architect, he must circle this new information to bring it to the Architect's attention.
- 11. Where practical, in submitting data for approval, all associated drawings, product data and the like, relating to a complete assembly shall be submitted at one and the same time so that each may be checked in relation to the entire proposed assembly. PARTIAL SUBMISSIONS WILL BE RETURNED WITHOUT ACTION TAKEN. EXTRANEOUS MATERIAL ON PRODUCT DATA SHEETS SHALL BE STRUCK PRIOR TO SUBMITTAL.
- 12. Contractor shall have copies of all approved shop drawings as listed in Paragraph 1.06.A.6 above on the job at all times and shall make them available to the Architect or the Owner's representatives.

1.07 SAMPLES

Α.

The following serves as a further definition of the requirements for sample submittals as covered in the General Requirements:

1. Names of proposed manufacturers, materialsmen and dealers who are to furnish materials, fixtures, appliances or other fittings shall, where practical, be submitted to the Architect for early approval to afford proper investigationand check.

- 2. No manufacturer will be approved for any materials to be furnished under this contract unless he shall be of good reputation and shall have plant of ample capacity and shall have successfully produced similar products.
- 3. All transactions with manufacturers and subcontractors shall be through the General Contractor.
- 4. Unless otherwise specified, samples shall be in duplicate (2) and of adequate size to show quality, type, color, range, finish, texture, etc.

INTERRELATED COLOR SELECTIONS WILL NOT BE MADE UNTIL ALL PERTINENT SAMPLES ARE MADE AVAILABLE TO ARCHITECT.

Deliver one (1) sample to field office and one (1) sample to Architect's office unless otherwise directed.

5. Each sample shall be labeled, bearing material and quality=names, submitting Contractor's name, and project name, and other pertinent data.

In accordance with OSHA regulation Number 1910.1200, a Manufacturers Material Safety Data Sheet (MSDS) shall be submitted for each product to be incorporated in the work. The sole purpose for requiring submittal of MSDS sheets as outlined herein and respective technical sections is to advise the General Contractor that health and safety is of primary importance to the execution of the work and for the future occupants of the project under construction. It is to be assumed, and will be enforced, that the submission of MSDS sheets be made as a separate package, covered by it's own transmittal and marked "for evidence of legal compliance". This submission will be noted and returned with a stamp indicating "SUBMITTED INFORMATION ONLY, NOT REVIEWED".

Failure to observe these submittal requirements will be cause for rejection of the entire submittal. The safe handling of products by the applicator according to MSDS warnings is a safety issue, like any other, entirely within the purview of the General Contractor.

- 6. Where Specifications require manufacturer's printed installation directions, such directions and diagrams shall accompany samples. Coordinate with Paragraph 1.05 herein
- 7. A duplicate letter of transmittal from the submitting Contractor requesting approval of the sample shall accompany the samples.
- 8. Transportation charges to designated locations must be prepaid on all samples.
- 9. Materials shall not be ordered until approval is received in writing from the Architect. All materials shall be furnished equal in all respects to the samples which were approved.

1.08 MATERIAL SAFETY DATA SHEET (MSDS) SUBMITTALS

- A. As specified in Paragraph 1.07 of this Section and within the technical sections forming this Specification, the Contractor is directed to the following requirements concerning "MSDS" submissions.
 - 1. Submit MSDS's for all products used during construction whether incorporated within the work or used in the performance of the work.
 - 2. Identify which products may be harmful to construction workers or other building occupants.
 - 3. Develop means and methods for protection of construction workers and other building occupants from potentially harmful products. Submit said means and methods to the Owner for review and approval.
- B. Further, the General Contractor with assistance from each individual contractor shall maintain a "MSDS" file on site, accessible to workers and otherwise in compliance with jurisdiction's "Right To Know" legislation.
- C. Attention is directed Section 01 77 00, Article 1.04.A.12 for finalcloseout submittal of MSDS compilation to the Owner.

1.09 DESIGN RESPONSIBILITES

- A. In accordance with the General Requirements, attention is directed to the following areas (if any) in which professional certification and/or design requirements are outlined within the technical specifications.
 - 1. 02 41 19 Demolition Shoring
 - 2. 03 30 00 Formwork and Shoring for Concrete
 - 3. 05 12 00 Structural steel
 - 4. 05 30 00 Metal decking
 - 5. 05 40 00 Cold formed metal framing
 - 6. 05 51 00 Steel Stairs
 - 7. 05 50 00/05 51 00 Stair and Guard Railings
 - 8. 07 44 00 Composite Metal Panel System (Rain Screen Design) ACP; Support Systems
 - 9. 07 44 10 Preformed Laminated Insulated Metal Panel System IMP; Support and Suspension Systems

- 10. 08 40 00 Curtain walls
- 11. 08 40 00 Entrances and Storefronts
- 12. 08 63 00 Skylight, Metal Framed and Custom
- 13. 08 90 00 Louvers and Vents
- 14. 09 29 00 Gypsum Drywall framing)
- 15. 11 24 00 Façade Maintenance Anchor Systems/Tie downs
- 16. 31 51 00 Excavation Shoring

However, if included, is to be considered as partial only with the burden placed on the Contractor to provide all certifications and/or design information as may be specified and/or required by these Contract Documents in accordance with the applicable laws of the jurisdiction.

1.10 COORDINATION DRAWINGS

A. Each Contractor's attention is directed to Section 01 31 14 for required coordination drawings and the responsibility therefore.

1.11 CERTIFICATES

- A. Submit a Summary of Solid Wastes Generated, manifests, weight tickets, and the like in accordance with requirements of Section 0174 19 Construction Waste Management.
- B. Submit, as required by each technical section a certification for V.O.C. compliance.
- 1.12 PROJECT MANAGEMENT AND COORDINATION ENVIRONMENTAL
 - A. Contractor's Environmental Manager: Designate an on-site party responsible for overseeing the Contractor's conformance to environmental goals for the project and implementing procedures for environmental protection.
 - 1. Qualifications: Minimum **5** years construction experience on projects of similar size and scope; minimum **3** years experience with environmental procedures similar to those of this project; familiarity with environmental regulations applicable to construction operations.
 - 2. Responsibilities: Responsibilities shall include:
 - a. Compliance with applicable Federal, State, and local environmental regulations, Including maintaining required documentation.
 - b. Implementation of the Waste Management Plan.
 - c. Training for Contractor personnel in accordance with their position requirements.
 - d. Monitoring and documentation of environmental procedures.
 - B. Perform project quality control in accordance with requirements specified in Related Sections, including:
 1. 01 74 19 Construction Waste Management

SUBMITTAL COVER SHEET

Contractor:_____

Address:_____ Telephone: ()_____

TYPE OF SUBMITTAL:

Shop Drawings Technical Data Test Report Schedule Certificate Warranty Physical Sample Color Sample

Submission #: 1st , 2nd, 3rd, 4th (circle one)

Contractor Remarks:

Contractor Submittal Review Stamp

THE ATTACHED MATERIAL HAS BEEN REVIEWED BY THE UNDERSIGNED AND IS BELIEVED TO COMPLY WITH ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS. THE UNDERSIGNED UNDERSTANDS VERIFICATION OF FIELD DIMENSIONS, AND COORDINATION WITH OTHER TRADES, REMAINS THE RESPONSIBILITY OF THE CONTRACTOR. DATE: _____ BY (SIGN): _____

Consultant use below this line:

Architect Submittal Review Stamp

NO EXCEPTIONS MAKE CORRECTIONS NOTED REJECTED REVISE AND RESUBMIT EXAMINED SUBMIT SPECIFIED ITEM CHECKING IS ONLY FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS &

SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS WHICH SHALL BE CONFIRMED & CORRELATED AT THE JOB SITE; FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION; COORDINATION OF HIS WORK WITH THAT OF ALL OTHER TRADES & THE SATISFACTORY PERFORMANCE OF HIS WORK PURCHASE COLLEGE (SUNY)

DATE_____ BY_____

SECTION 01 42 19

CODES AND STANDARDS (Coordinate with Section 2.10 of the Agreement)

Part 1 – GENERAL

1.01 REFERENCE STANDARDS

The abbreviations, which may be used in the construction specifications, refer to the organizations and specifications of the organizations listed below.

- AABC Associated Air Balance Council
- AAN American Association of Nurserymen
- AI Asphalt Institute
- ADC Air Diffusion Council
- ALSC American Lumber Standards Committee
- AMCA Air Movement and Control Association
- ASC Adhesive and Sealant Council
- AWI Architectural Woodwork Institute
- CBM Certified Ballast Manufacturers
- CLFMI Chain Link Fence Manufacturers Institute
- CRI Carpet and Rug Institute
- CS Commercial Standard of NBS
- FS Federal Specifications (General Services Administration), Specifications Unit (WFSIS)
- GANA Glass Association of North America
- IEEE The Institute of Electrical and Electronics Engineers
- IES Illuminating Engineering Society of North America
- IGCC Insulating Glass Certification Council
- ILI Indiana Limestone Institute of America
- LSGA Laminators Safety Glass Association
- MIA Marble Institute of America
- NEII National Elevator Industry Inc.
- NELMA Northeastern Lumber Manufacturers' Association
- NEMA National Electrical Manufacturers Association
- NPCA National Paint and Coatings Association
- NPA National Particleboard Association
- NTMA The National Terrazzo and Mosiac Association
- PS Product Standard of NBS (U.S. Department of Commerce)
- RFCI Resilient Floor Covering Institute
- SFPA Southern Forest Products Association
- SIGMA Sealed Insulating Glass Manufacturers Association
- SPC Southern Pine Inspection Bureau (Grading Rules)
- SSPC Steel Structures Painting Council
- TIMA Thermal Insulation Manufacturers Association
- WRI Wire Reinforcement Institute, Inc.
- WSFI Wood and Synthetic Flooring Institute
- WWPA Woven Wire Products Association

NOTE: Further attention is directed to industry guide complied by Sweet's division of McGraw-Hill denoted as "SOURCES OF INFORMATION" as well as in theweb site www.4specs.com wherein a comprehensive list of international organizations representing building product manufacturers, associations, institutes, governmental agencies and testing bureaus is put forth..Fa2309/kgd2011-1107 01 42 19 - 2 Codes and Standards

1.02 APPLICABLE CODES: The following is a listing of applicable codes within the jurisdiction of the Work as embodied within the 2010 New York State

Building Code.

- A. 2006 International Building Code
- B. 2006 International Energy Conservation Code
- C. 2006 International Fire Code
- D. 2006 International Fuel Gas Code
- E. 2006 International Mechanical Code
- F. 2006 International Plumbing Code
- G. 2006 International Property Maintenance Code
- H. 2006 International Residential Code
- I. Accessibility Code ANSI A117.1 New York State Building Code
- J. Elevator Code ASME A17.1-2006 New York State Building Code
- K. Boiler Code ASME Boiler & Pressure Vessel Code; NBIC

Part 2 - PRODUCTS - NOT USED

Part 3 - EXECUTION - NOT USED

SECTION 01 43 26 TESTING LABORATORY SERVICES (Coordinate with Section 2.17 of the Agreement)

1.01 GENERAL

- A. Requirements set forth herein are in addition to and shall be considered as complementary to the Conditions of the Contract and the balance of Division #1 and Technical Specifications.
- B. All Contractors, Subcontractors, Sub-subcontractors, Vendors and thelike shall be required to familiarize themselves with said provisions.
- C. Definitions as apply to "Contractors" involved with the work of this Project shall be as set forth in Section 01 15 00.
- D. Pursuant to the provisions of Section 01 33 00, Submittal Requirements, it is further required that unless otherwise specified, tests called for in the Specifications applicable to the work and/or required to implement the work shall be paid for by the Owner.
- E. Where tests are required by the Architect to substantiate conformance to the specifications the Owner will pay all costs of such tests and engineering services unless said tests indicate that the workmanship or materials used by the Contractor are not in conformance with the Drawings, Specifications, Approved Shop Drawings or the approved materials. In such event, the Contractor shall pay for the tests, remove all work and material so failing to conform, REPLACE with work and materials which are in full conformity.
- F. Requirements related to testing services and specified elsewhere in these documents include:
 - 1. Inspections and testing as required by laws, ordinances, rules, regulations or orders of public authorities having jurisdiction over the work.
 - 2. Certification of compliance as required by individual specification sections.
 - 3. Testing, adjusting and balancing of mechanical equipment and systems.
 - 4. Project record documents, including operation and maintenance manuals, record drawings and the like.
 - 5. Tests and standards governing work and/or materials as may be specified throughout these specifications and/or as shown on the drawings.
- G. The Owner will employ, and pay for, the services of an Independent Testing Laboratory to perform all specified services other than mechanical equipment and system balancing.
- H. Inspection, sampling and testing burden is placed on the Contractor to advise, and the Laboratory to provide, all such inspections, sampling and testing as may be specified and/or required by these Contract Documents and the applicable laws and ordinances of the jurisdiction.
- I. Employment of the Testing Laboratory shall not relieve the Contractor of his obligation to perform Work in accordance with the

1.02 REQUIREMENTS INCLUDED

- A. Laboratory Qualifications
- B. Laboratory Duties
- C. Contractor's Responsibilities
- D. Tests Required

1.03 LABORATORY QUALIFICATIONS

A. Laboratory shall meet -

1. The "Recommended Requirements for Independent Laboratory Qualifications", latest edition as published by the American Council of Independent Laboratories.

2. Basic requirements of ASTM E 329, latest edition, governing"Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction".

- B. Laboratory shall submit copy of inspection of facilities as made by Materials Reference Laboratory of the National Bureau of Standards during most recent tour of inspection; with memorandum of remedies of any deficiencies reported by inspection.
- C. Testing equipment shall be calibrated at maximum 12 month intervals by devices of accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants; submit copy of certificate of calibration as executed by an accredited calibration agency.

1.04 LABORATORY DUTIES

A. Cooperate with Architect and Contractor; provide qualified personnel promptly on notice.

- B. Perform specified inspections, sampling and testing of materials and methods of construction in conformance with specified standards, recognized authorities and the like so as to ascertain compliance with the requirements of the Contract Documents.
- C. Promptly notify Architect and Contractor of irregularities or deficiencies of Work which are observed during performance of services.
- D. Promptly submit sufficient copies (minimum 5) of reports and tests to Architect for distribution. Reports shall contain -
 - 1. Issue date
 - 2. Project title and number
 - 3. Testing laboratory name and address
 - 4. Name and signature of inspector
 - 5. Date of inspection or sampling
 - 6. Temperature and weather observations
 - 7. Test date
 - 8. Identification of product and specification section
 - 9. Location in project
 - 10. Type of inspection or test
 - 11. Observations regarding Contract Document compliance.
- E. Perform additional services as required by the Owner and/or Architect.
- F. The laboratory is not authorized to release, revoke, alter or

1.05 COTRACTOR'S RESPOSIBILITY

- A. The Contractor shall to the best of his ability -
 - 1. Cooperate with laboratory personnel, provide access to the Work and to Manufacturer's operations as may be necessary.
 - 2. Provide to the laboratory preliminary representative samples of materials to be tested in required quantities.
 - 3. Furnish copies of mill test reports.
 - 4. Provide casual labor and facilities as required to provide access to Work to be tested; to obtain and handle samples at the Site; to facilitate inspections and tests; for laboratory's exclusive use for storage and curing of test samples.
 - 5. Notify laboratory sufficiently in advance of operations to allow for his assignment of personnel and scheduling of tests.
 - 6. Arrange with laboratory and PAY FOR, additional sampling and testing required for the Contractor's convenience.
 - 7. Employ, AND PAY FOR, services of a separate, equally qualified Independent Testing Laboratory to perform additional inspections, sampling and testing required *when initial tests indicate Work does not comply with Contract Documents*. Coordinate with Paragraph 1.05.A.4 above.

1.06 TESTS REQUIRED – As applicable to particular Project

- A. General Tests: More detailed testing requirements are given in individual Specification Sections. The Owner shall retain the right to make any additional tests the Architect deem necessary or appropriate. The Contractor is responsible for providing his own tests to determine that materials meet specified requirements.
- B. Plumbing: At least the following tests will be performed. Conform to requirements specified in individual Division 22 Specification Sections. The test shall be performed and paid for by the subcontractor and witnessed by the Contractor and Owner's on-site representative:
 - 1. Water supply piping hydrostatic pressure test.
 - 2. Sanitary piping test before fixture installation: Cap pipes and fill to highest point in system.
 - 3. Plumbing fixture operation.
- C. Fire Protection System: At least the following tests will be performed. Conform to requirements specified in individual Division 21 Specification Sections. The test shall be performed and paid for by the subcontractor and witnessed by the Contractor and Owner's onsite representative:
 - 1. Fire protection system flushed and pressure tested.
- D. HVAC Testing All HVAC work shall be tested by an independent testing and balancing agency. Conform to requirements specified in individual Division 23 Specification Sections. All costs of these tests will be paid by the subcontractor. Adjustments shall be made by the subcontractor as directed by the Owner. At least the following tests will be performed:

- 1. Piping hydrostatic tests.
- 2. Air and water balancing.
- 3. Thermostat control monitoring and testing.
- 4. Boiler efficiency testing.
- 5. Fume hood face velocity testing. Certification sticker shall be placed on sash.
- Electrical Power System Testing: At least the following tests will

be performed. Conform to requirements specified in individual Division 26 Specification Sections. The test shall be performed and paid for by the subcontractor and witnessed by the Contractor and Owner's on-site representative:

1. Polarity tests.

Ε.

- 2. Operation of all circuits.
- 3. Testing of emergency system.
- 4. Security systems.
- 5. Generation system.
- 6. Grounding systems.

F. Electrical Lighting System Testing: Conform to requirements specified in individual Division 26 Specification Sections. At least the following tests shall be performed and paid for by the subcontractor.

1. Operation of every component of entire system.

G. Fire Alarm System Testing: At least the following tests will be performed. Conform to requirements specified in individual Division16 Specification Sections. The test shall be performed and paid for by the subcontractor and witnessed by the Contractor and Owner's onsite representative:

1. All smoke and heat detectors.

2. Proper operation as required by authorities having jurisdiction.

H. Contractor's Responsibilities: The Contractor shall notify theOwner, Architect, and Testing Laboratory personnel at least 48 hours prior to performance of work requiring testing. The Contractor shall fully cooperate with testing agencies and permit free access to all areas at all times. The Contractor shall permit taking samples at any time during construction, either before or after installation. Prior to notice to proceed with construction, the Contractor shall submit a Testing Log of planned tests and scheduled test dates. Tests shall be numbered based on type of work, type of test, and sequence. The Testing Log shall be maintained by the Contractor and updated weekly.

1. Coordination: The Contractor shall coordinate all testing, including all testing and inspections to be paid for by the Owner. The Contractor will arrange testing and sampling performed by the Owner's testing agency and will have prepared test record forms. Upon receipt of test results, the Owner will distribute two (2) copies to the Contractor and two (2) copies to the Architect with test results.

I. Follow-up and Corrective Action: The Contractor and the Owner will note the test record on the Testing Log to acknowledge test procedures and results. If the follow-up or corrective action is needed, the Contractor shall submit to the Owner two (2) written copies of proposed follow-up or corrective plans and obtain the Owner's written approval before proceeding.

1. Cost of Testing: If tests indicate that materials or work do not comply with requirements, the contractor shall pay for all retesting, and shall remove and replace non-complying work at no additional cost to the Owner.

J. Local Owner Inspections: The Contractor is also responsible for coordinating and cooperating with local requirements forinspections.

SECTION 01 61 00 MATERIAL AND EQUIPMENT (Coordinate with Article 4 of Section C of the General Requirements)

1.01 GENERAL

- A. Requirements set forth herein are in addition to and shall be considered as complementary to the General Conditions of the Contract and the balance of Division #1 and Technical Specifications.
- B. All Contractors, Subcontractors, Sub-subcontractors, Vendors and the like shall be required to familiarize themselves with said provisions.
- C. Definitions as apply to "Contractors" involved with the work of this Project shall be as set forth in Section 01 15 00.

1.02 REQUIREMENTS INCLUDED

- A. General Standards
- B. Sustainability
- C. Transportation and Handling
- D. Storage and Protection

1.03 GENERAL STANDARDS APPLICABLE TO ALL SPECIFICATION SECTIONS

- A. These provisions, standards, and tolerances shall apply to all work under this Contract. Where stricter standards and tolerances are specified elsewhere in these Specifications or in references specified in these Specifications, they shall take precedence over these standards and tolerances.
- B. Build and install parts of the Work level, plumb, square, and in correct position unless specifically shown or specified otherwise.
 - 1. No part shall be out of plumb, level, square, or correct position so much as to impair the proper functioning of the part or the Work as judged by the Architect.
 - 2. No part shall be out of plumb, level, square, or correct position so much as to impair the aesthetic effect of the part or the Work as judged by the Architect.
- C. Make joints tight and neat. Provide uniform joints in exposed work. Arrange joints to achieve the best visual effect. Refer choices of questionable visual effect to the Architect.
- D. Under potentially damp conditions, provide galvanic insulation between different metals which are not adjacent on the galvanic scale.
- E. Manufacturers, subcontractors, and workmen shall be experienced and skillful in performing the work assigned to them; coordinate with applicable provisions of the General Conditions.
- F. All paint used on all products shall conform to ANSI Z66.1, Specifications for Paints and Coatings Accessible to Children to Minimize Dry Film Toxicity.
- G. The Drawings do not attempt to show every item of existing work to be demolished and every item of repair required to existing surfaces. Perform work required to remove existing materials which are not to be saved and to restore existing surfaces to condition equivalent to new as judged by Architect. If possible, repairs shall be indistinguishable from adjacent sound surfaces. Where it is impossible to achieve repairs which are indistinguishable from adjacent sound surfaces to remain, notify Architect, and proceed according to his instructions; coordinate with Section 01120.

1.04 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or postindustrial waste.

1.05 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of materials in accordance with construction schedules in order to avoid delay in, conflict with, or the impeding of the progress of the Work and conditions at the site. Deliveriesshall be made during regular work hours, unless approved otherwise by the Owner.
- B. Deliver materials in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.

1.06 STORAGE AND PROTECTION - See Section 01 15 00

- A. Store materials in accordance with manufacturer's instructions, with seals and labels accessible for inspection.
- B. Materials stored on the Site shall be neatly arranged and protected, and shall be stored in an orderly fashion in locations that shall not interfere with the progress of the Work or with the daily functioning of the existing facility.
- C. Interior Storage: Maintain temperature and humidity within the ranges required by manufacturer's instructions.

NOTE - If approval is given to store materials in any part of the building area, they shall be so stored as to cause no overloading of the existing structure.

D. Exterior Storage:

- 1. Store products subject to damage by the elements in weathertight enclosures.
- 2. Store fabricated products above the ground, on blocking or skids; prevent soiling or staining. Cover products subject to damage or deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.
- 3. Store loose granular materials in a well drained area on solid surfaces to prevent mixing with foreign matter. Locate away from drainage or areas subject to flooding or storm washes.

NOTE - Should it become necessary during the course of the Work to move materials or equipment stored on the Site, the Contractor, at the direction of the Architect, shall move such material or equipment.

E. If it becomes necessary to remove and restack materials to avoid impeding the progress of any part of the Work or interfering with the work to be done by any other contractor employed on the Work, or interfering with the Owner's activities, the Contractor shall remove and restack such materials at no additional cost to the Owner. F. Protection After Installation

- 1. Provide adequate coverings to protect installed materials from damage resulting from natural elements, traffic, and subsequent construction.
- 2. Remove when no longer needed.

SECTION 01 74 19 CONSTRUCTION WASTE MANAGEMENT

Part 1 - GENERAL

- 1.01 GENERAL
 - A. Requirements set forth herein are in addition to and shall be considered as complementary to the Conditions of the Contract and the balance of Division #1 and Technical Specifications.
 - B. All Contractors, Subcontractors, Sub-subcontractors, Vendors and the like shall be required to familiarize themselves with said provisions.
 - C. Definitions as apply to "Contractors" involved with the work of this Project shall be as set forth in Section 01 15 00, Article 1.01.

1.02 DESCRIPTION OF WORK

A. This Section specifies requirements for a complete program for implementation of waste management controls and systems for the duration of the Work.

1.03 INTENT

- A. The Owner has established that this Project shall generate the least amount of waste practical and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors shall be employed.
- B. Of the waste that is generated, as many of the waste materials as economically feasible shall be reused, salvaged, or recycled. Waste disposal in landfills shall be minimized to the greatest mextent practical. With regard to these goals the Contractor shall develop, for Owner's Representative's review and Architect's review, a Waste Management Plan for this Project. Each Contractor shall be responsible for segregating their own waste into different dumpsters as directed by the Architect and/or Owner. The Contractor shall be responsible for ensuring that debris will be disposed of at appropriately designated licensed solid waste disposal facilities, as defined by governing laws of the jurisdiction of the Work.

1.04 WASTE MANAGEMENT PLAN

- A. Waste Management Plan: The General Contractor shall provide a plan containing the following:
 - 1. Analysis of the proposed jobsite waste to be generated, including types and rough quantities.
 - 2. Landfill Options: The name of the landfills where trash and building debris will be disposed of, the applicable landfill tipping fees, and the projected cost of disposing of all Project waste in the landfills.
 - Landfill Certification: Contractor's statement of verification that landfills proposed for use are licensed for types of waste to be deposited and have sufficient capacity to receive waste from this project.
 - 4. Alternatives to Landfilling: A list of each material proposed to be salvaged or recycled during the course of the Project. Include the following and any additional items proposed:
 - a. Cardboard.
 - b. Clean dimensional wood.
 - c. Beverage containers.
 - d. Land clearing debris.
 - e. Concrete.
 - f. Bricks and masonry.
 - g. Asphalt.
 - h. Gypsum boards.
 - i. Acoustical ceiling material (grid separate).
 - j. Metals from framing, banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - 5. Meetings: A description of the regular meetings to be held to address waste management.
 - 6. Materials Handling Procedures: A description of the means by which any waste materials Identified above will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.
 - 7. Transportation: A description of the means oftransportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site) and destination of materials.

3.01 RECYCLING

- A. Metal, including but not limited to aluminum stairs, structural beams and sections, and reinforcing steel shall be recycled.
- B. Wood that is not painted and does not contain preservatives (i.e.creosote, arsenic, and chromiumcontaining preservatives) shall be segregated and recycled.
- 3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION All sorting will be done "off site" by a recognized construction and demolition processing facility who will be responsible for provision of all documentation as to where loads were processed and the recycling rate achieved.

SECTION 02 41 20 SELECTIVE REMOVALS, CUTTING AND PATCHING

Part 1 - GENERAL

- 1.01 GENERAL
 - A. Requirements set forth herein are in addition to and shall be considered as complementary to the Conditions of the Contract and the balance of Division #1 and Technical Specifications.
 - B. All Contractors, Subcontractors, Sub-subcontractors, Vendors and the like shall be required to familiarize themselves with said provisions.
- 1.02 RELATED WORK SPECIFIED ELSEWHERE
 - A. 01 74 19 Construction Waste Management
 - B. 02 82 00 Asbestos Abatement
- 1.03 PROJECT CONDITIONS
 - A. Existing Conditions: Do not disturb existing structures, construction, materials or equipment unless required by the Contract.
 - B. Items to Remain the Property of the Owner: The items indicated on the drawings to remain shall remain the property of the Owner and shall be stored at the site where directed and be reset in new locations as required.

Part 2 - PRODUCTS

2.01 MATERIALS

A. Match the appearance and performance of existing corresponding materials as closely as practicable, unless otherwise indicated.

Part 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to cutting, drilling or removal, investigate both sides of the surface involved. Determine the exact location of structural members.
- B. If unforeseen obstructions are encountered, take precautions necessary to prevent damage and obtain on site, followed by written, instructions from the Architect and/or Owner's Representative before proceeding with the Work.

3.02 PREPARATION

- A. Provide temporary shoring and other supports necessary to prevent settlement or other damage to existing construction which is to remain.
- B. Prepare existing surfaces properly to receive and, where required, bond with the Work.

3.03 REMOVALS, CUTTING, AND ALTERING

Cutting and Patching

- A. In addition to the items indicated to be removed on the Drawings, remove existing construction superseded by the Work except items such as pipes, conduits, recessed boxes, and ducts which are built into existing construction that is to remain. Cut off and conceal such items at face of remaining construction. Provide cover plates on recessed boxes.
- B. Remove and alter existing construction as required to install and connect the Work to adjacent construction in an approved manner.
- C. Cut and alter existing materials as required to perform the Work. Limit cutting to the smallest amount necessary. Core drill round holes and saw cut other openings where possible.
- D. Perform cutting, drilling, and removals in a manner which will prevent damage to construction which is to remain.
- E. Perform removal of items to remain the property of the Owner with such care as necessary to prevent damage to these items.

3.04 PATCHING

- A. Patch existing construction and finishes defaced, damaged, or left incomplete due to alterations and removals. Patching, except as otherwise indicated, shall be limited to the areas which have been cut or altered.
- B. Perform patching around items penetrating existing construction in a manner that will maintain the water and fire resistive capability of the existing construction. Where new work and existing work of the same kind will be present in the finished construction in a room or space, the new work shall match the existing unless otherwise approved by the Architect. **THE NEW AND OLD SHALL BE TOTALLY REPAINTED.**
- C. Where surfaces exposed by removals are to remain as exposed surfaces, patch and paint such areas to match existing adjacent surfaces.
- D. Workmanship and materials shall be at least equal to the existing construction which has been repaired, refinished, and otherwise renewed.

3.05 REINSTALLATION

A. Where reinstallation of removed items is indicated, reinstall them to a condition equal to or better than their condition before removal.

SECTION 03 54 00 FLOOR FILL/UNDERLAYMENT SYSTEMS

Part 1 – GENERAL

1.01 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.02 DESCRIPTION OF WORK

A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all gypsum based floor fill/underlayment system work for this project as required by the schedules, keynotes and drawings. After removal of existing flooring, and prior to the placement of the new flooring systems, contractor shall provide a self-leveling fill application to the entire affected work area scheduled to receive new floor finish – this work is to be accomplished in consort with Section 09 65 00.

1.03 RELATED WORK SPECIFIED ELSEWHERE - Entire Project Specification with specific reference to those sections noted above.

1.04 QUALITY ASSURANCE

A. All work of a nature conducive to high humidity conditions shall have been completed and be thoroughly dry. This contractor shall be held responsible for the cost of replacing all work of this Section damaged due to his failure to take the above precautions.

1.05 SUBMITTALS – Coordinate with Section 01 33 00

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirementwill be cause for rejection of any or all submittals.
- As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings
 are critical to the proper execution of the Work and failure to honor these requirements may become the basis for
 denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally
 responsible material. Every effort will be made by the Design Professional Team to approve these materials; the
 substitution request procedure shall still be enforced.
 - A. All materials, if requested, to make up floor fill system.
 - B. Product Data Sheets indicating test performance, composition,
 - C. Certification of specification compliance.
 - D. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each product.
- 1.06 DELIVERY, STORAGE, AND HANDLING
 - A. General Requirements: Materials shall be delivered in their original, unopened packages, and protected from exposure to the elements. Damaged or deteriorated materials shall be removed from the premises.

1.07 SITE CONDITIONS

 A. Environmental Requirements: Building interior shall be enclosed and maintained at a temperature above 50 degrees F (10 degrees C).for 72 hours before installation through drying of product as identified in Section 3.2

1.08 SUSTAINABILITY

Α.

- In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in

the lower atmosphere.

- 9. Do not contain methylene-chloride.
- 10. Do not contain chlorinated hydrocarbons.
- 11. Contains the least possible of post-consumer or postindustrial waste.
- Part 2 PRODUCTS
- 2.01 FLOOR FILL SYSTEM non combustible, high density poured gypsum mixture which, after hardening, will comply with the following performance characteristics. Material shall be similar and equal to "Maxxon Corporation" installed by an authorized representative of the manufacturer.

2.02 MATERIALS

- A. Gypsum Cement "Gyp-Crete" underlayment compound.
- B. Sealer "Gyp-Crete" floor primer and sealer or other approved sealer.
- C. Sand 1/16 inch or less washed mason sand, mortar sand, or plaster sand.
- D. Water Potable free from impurities that affect the setting of gypsum.

2.03 MIXING PROPORTIONS

A. +/- 8 gallons water: 1.8 cu.ft. sand: one (1) 80 lb. bag of "Gyp10 Crete". Do not over water, water amount may vary with condition of sand.

2.04 PHYSICAL PROPERTIES

- A. Density, pcf 105 (ASTM C 472)
- B. Compressive strength, psi 1,550 (ASTM C 472)
- C. Shrinkage (Slight expansion when unrestricted) less than 0.11%

2.05 TECHNICAL DATA

- A. Indentation Test
 - 1. Static load of 1,250 pounds on 1 inch disc: No indentation.
- B. Fire Resistance
 - 1. One hour, U.L. designs L 512 and L 514 U.S.G.
- C. Sound Tests
 - 1. FSTC 55 (ASTM E 336)
 - 2. IIC 75 (ASTM E 492)
- Part 3 EXECUTION

3.01 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.02 INSTALLATION

- A. Clean floor surfaces and other construction prior to placement of fill material.
- B. Mixing of primers, if required, and fill materials shall be done in accordance with manufacturer's printed instructions.
- C. Prior to installation of system, an approved bonding agent approved by the manufacturer of the fill system shall be applied over the entire sub-strata.
- D. Place fill on prepared stratas to a minimum thickness as required by field conditions.
- E. Place in a continuous operation so as to avoid seams or layers and to insure a monolithic, homogeneous product.
- F. Screed to a smooth and level surface ready for application of applied finishes.

3.03 ENVIRONMENTAL CONSIDERATIONS

- A. Provide adequate ventilation after placement of fill to insure complete drying.
- 3.04 WASTE MANAGEMENT Coordinate with Section 01570 (01 74 19)
 - A. Before concrete pours, designate locations or uses for excess concrete. Options include:
 - 1. Additional paving
 - 2. Post footing anchorage
 - 3. Swale, riprap reinforcing
 - 4. Flowable fill

- 5. Footing bottom, retaining wall footing ballast
- 6. Storm structure covers
- 7. Underground utility pipe kickers
- 8. Storm pipe flared end section
- 9. Toe wash protection, and shoulder and toe outfall restraints
- for temporary erosion pipes
- B. Before concrete pours, designate a location for cleaning out concrete trucks. Options include:
- Company-owned site for that purpose (meeting environmental 1.
- standards)
- 2. 3. On-site area to be paved later in Project
- Collect reinforcing steel and place in designated area for recycling.

SECTION 05 50 00

METAL FABRICATIONS – MISCELLANEOUS/ORNAMENTAL METALS

Part 1 - GENERAL

- 1.01 Applicable provisions of the Conditions of the Contract and Division #1,
- General Requirements, govern work in this Section.
- 1.02 DESCRIPTION OF WORK
 - A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all miscellaneous and ornamental metal work for this project.
- 1.03 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification.
- 1.04 QUALITY ASSURANCE
 - A. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure steady progress of all work under Contract.
 - B. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.05 SUBMITTALS - Coordinate with Section 01 33 00

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings
 are critical to the proper execution of the Work and failure to honor these requirements may become the basis for
 denial of any and all claimsfor either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally
 responsible material. Every effort will be made by the Design Professional Team to approve these materials; the
 substitution request procedure shall still be enforced.
 - A. Shop drawings of all items to be fabricated and installed. Show dimensions and details of all items. Verify dimensions and correlate metal work with adjoining work. Obtain approval of shop drawings before fabrication.
 - B. Samples of all manufactured items.
 - C. Certification of Specification Compliance.

D. This Contractor shall take all necessary field measurements prior to fabrication and installation of work and shall assume completeresponsibility for accuracy of same.

E. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product. 1.06 PAINTING AND PROTECTION OF DISSIMILAR SURFACES

A. General preparation of metal surfaces to receive shop coating shall be in accordance with the methods outlined in the Steel Structures Painting Council Specification (SSPC) as may be applicable for intended exposure and location.

Part 2 - PRODUCTS

- 2.01 GENERAL
 - A. For fabrication of miscellaneous and ornamental metal work whichwill be exposed to view in the finished work, use only materials which are smooth and free from surface blemishes including pitting, seam marks, roller marks, trade names, roughness and other defects which will be apparent in the finished products.
 - B. Stock materials, patterns, products and standard methods of fabrication will be approved provided they conform to specified requirements and in general to the details shown.
 - C. Metals and accessory items shall conform to the current applicable recognized industry standards and the following grades.

2.02 FERROUS METAL WORK

- A. Structural steel shapes galvanized when exposed to weather or moisture, prime coated for interior.
 - 1. W-Shapes: ASTM A 992/A 992M
 - 2. Channels, Angle-Shapes: ASTM 36/36M
 - 3. Plates and Bars: ASTM 36/36M
- B. Steel plates for bending or cold forming ASTM A 283, Grade C.
- C. Carbon Steel Sheets ASTM A 653, galvanized where exposed to moisture or weather.

D. Standard Steel Sheets - ASTM A 1011, galvanized when exposed to moisture or weather.

2.03 STEEL PIPE, TUBES, BAR STOCK

- A. Steel Pipe ASTM A 53, Type S, Grade B, galvanized for moisture and/or weather exposure.
 - 1. Standard for general use.
 - 2. X-Strong and/or XX-Strong for bollards, railings and otheritems not satisfying criteria set forth above or required tosatisfy safety and performance criteria.

2.04 STAINLESS STEEL MATERIALS

- A. General ASTM A 167, AISI Types 302/304 with #4 finish for exposed surfaces and mill for concealed surfaces unless otherwise required.
- B. Rails shall be provided with ANSI B36.19 designation for standard Schedule 40 pipe unless otherwise specified or required due to code

2.05 FASTENERS, INSERTS, MISCELLANEOUS

- A. Bolts & Nuts (Steel) ASTM A 307.
- B. Inserts Threaded, wedge or slot type, galvanized castings, ASTM A47 or A 27.
- C. Fasteners and anchorage devices shall be of type, grade, class and style best suited for the respective purposes; galvanized, cadmium plated or stainless steel.
- D. Use flat head Phillips type machine screws for exposed fastenings OR tamperproof devices as directed by the Architect and/or conditions of use.

Part 3 - EXECUTION

3.01 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.02 MISCELLANEOUS

- A. Provide at the proper time all the various miscellaneous metalsupports and framing not provided under other sections and required to complete the work.
- B. All items of miscellaneous metal such as access doors, manhole covers, plate frames and covers, and the like not otherwise specified, but shown on the drawings shall be part of this contract.

3.03 FINISHING

- A. Clean and repair any damage to paint after erection.
- B. At galvanized surfaces, apply orange zinc repair paint in compliance with ASTM A 780. Galvanizing paint shall have 95% zinc by weight. Thickness shall not be lesser than required by ASTM A 123 or A 153 as applicable. Touchup of galvanized surfaces with aerosol spray, silver paint, brite paint, etc. is unacceptable.

3.04 PROTECTION

- A. Protect existing construction, adjacent work and finished work from damage. Provide drop cloths or other suitable protective coverings in all areas of the work.
- B. Damage caused by the handling, storing, mixing or application of materials or the failure to provide adequate protection shall be repaired or replaced at no additional cost to the Owner.

3.05 ACCEPTANCE AND PATCHING

- A. On completion of work, all equipment and rubbish resulting from the work of this section shall be removed from the premises.
- B. Leave work clean, whole, and sound ready for additional finish or

3.06 WASTE MANAGEMENT - Coordinate with Section 01 74 19

- A. Separate and recycle materials and material packaging in accordance with Waste Management Plan and to the maximum extent economically feasible and place in designated areas for recycling.
- B. Set aside and protect materials suitable for reuse and/or remanufacturing.
- C. Separate and fold up metal banding; flatten and place along with other metal scrap for recycling in designated area.

SECTION 06 10 00 ROUGH CARPENTRY

Part 1 - GENERAL

- 1.01 Applicable provisions of the Conditions of the Contract and Division #1,
- General Requirements, govern work in this Section.
- 1.02 DESCRIPTION OF WORK
 - A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all rough carpentry work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:

NOTE: Material which is buried in construction such as roof blocking, window blocking and the like shall be preservative treated; blocking in connection with doors and door frames, interior framing for partitions and furring for wall treatments, support/blocking for casework, etc. shall be fire treated.

- 1. Provide all wood blocking, battens, nailers, grounds, furring and the like required to secure the work of this and all other sections.
- 2. Provide temporary partitions, dust and noise control enclosures, temporary doors and bucks, temporary exterior opening enclosures; guard rails at openings and the like; coordinate with Sections 02 41 20 and 01 74 19.
- 3. Provide all fasteners, anchorage items and rough hardware required for the work of this Section whether or not specified in detail.
- 4. Perform all priming, backpainting, shop coating and the like necessary to complete the work of this Section.
- 5. Provide all other labor, materials, equipment, and accessories and other items necessary to make the work of this Section complete.
- 1.03 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above and as follows:
 - A. Special built metal and/or wood casework.
- 1.04 QUALITY ASSURANCE
 - A. Requirements given herein may be affected by other related requirements of the project specifications. Correlation of the contract requirements is the responsibility of the Contractor.
 - B. All materials used for work of this Section shall conform with Voluntary Product Standards and trade Association Units as follows:
 - 1. Northeastern Lumber Manufacturer's Association Inc. (NELMA); Southern Pine Inspection Bureau (SPIB); Western Wood Products Association (WWPA).
 - 2. American Plywood Association (APA); Douglas Fir Plywood Association (DFPA).
 - 3. Architectural Wood Work Institute (AWI)
 - 4. American Society for Testing and Materials (ASTM).
 - 5. American Wood Preservers' Association and Institute (AWPA) (AWPI)
 - 6. Applicable Federal Specifications for fasteners, bolts, nails, screws, etc.
 - 7. Structural standards as set forth by American Forest and Paper Association (AFPA)
 - 8. New York State Building Code.
 - 9. Underwriters' Laboratories, Inc. (UL) Building Materials Directory, Sections BPVV, BUGV and as applicable to materials specified within this Section.

Reference Standards Specific to Fire Retardant Treatments in addition and/or supplement to those voluntary standards set forth above.

- 1. ASTM D 3201 Test Method for Hygroscopic Properties of Fire Retardant Wood.
- 2. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials -Extended 30 minute test.
- 3. Military Specifications MIL-L-19140E Lumber and Plywood, Fire Retardant Treated.
- C. Identify each piece of dimensional lumber and plywood withUnderwriters Laboratories, Inc. mark certifying surface burning characteristics, interior Type A in accordance with AWPA C-20 (Lumber) AWPA C-27 (Plywood), kiln-dried after treatment (KDAT).Identification mark shall also indicate monitoring by Timber Products Inspection, Inc., in accordance with nominated manufacturers standard governing such work.
- D. Quality Mark: All borate preservative treated wood members shallbear a permanent ink stamp indicating the following:
 - 1. Manufacturer's name.
 - 2. Treatment plant name.

- 3. Quality mark of an AWPA approved independent inspection agency.
- 4. Symbol "SBX" (sodium borate), preservative retention level, and date of treatment.

5. AWPA treatment standard, wood species, and the words "Above Ground and Continuously Protected From Liquid Water."

- 1.05 SUBMITTALS Coordinate with Section 01 33 00
 - Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
 - As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
 - Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings
 are critical to the proper execution of the Work and failure to honor these requirements may become the basis for
 denial of any and all claims for either or both "time" and "money".
 - The Contractor is encouraged to submit for approval products made from recycled and/or environmentally
 responsible material. Every effort will be made by the Design Professional Team to approve these materials; the
 substitution request procedure shall still be enforced.
 - A. Each type of material and anchorage devices to be used in the work of this section.
 - B. All other items as deemed necessary by the Architect.
 - C. Certification of specification compliance for materials incorporated in the work including the National Evaluation Report discussing high temperature strength testing, flame spread, corrosion, and hygroscopic properties for fire retardant treatments.
 - D. This Contractor shall take all necessary field measurements prior to fabrication and installation of work and shall assume complete responsibility for accuracy of same.
 - E. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)

- A. Deliver all materials to the job site clearly labeled as to product, manufacturer, color and/or other pertinent characteristics.
- B. Pile lumber to insure proper ventilation and drainage.
- C. Store materials a minimum of 6 inches above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation.
- D. Protect fire retardant materials against high humidity and moisture during storage and erection. Keep materials dry during deliveryand storage.
- E. Provide temporary enclosure of doors, windows and other exterior openings when necessary to meet conditions specified; maintained in good repair; and remove when no longer required. Protect door and window frames from traffic.

1.07 SITE ENVIRONMENTAL PROCEDURES

- Indoor Air Quality:
 - 1. Temporary ventilation: Provide temporary ventilation during work of this Section.
 - a. During and immediately after installation of treated wood, engineered wood products, and laminated wood products at interior spaces, provide temporary ventilation.

1.08 WARRANTY - Treated Wood, 20 years.

1.09 SUSTAINABILITY

Α.

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or postindustrial waste.

Part 2 - PRODUCTS

2.01 GENERAL

- A. Grade Marking: Grade Mark, trademark and mill identification of the trade association having jurisdiction shall appear on each piece of standard yard dimension lumber (not boards) except that the shipment may instead be accompanied by a Certificate of Inspection identifying Compliance with these Specifications. This certificate shall be issued by an agency authorized to grade by the manufacturer's association recognized as responsible for grading rules for species involved.
- B. Moisture Content: Lumber 2 inches and less in thickness, and boards, shall not exceed 19%.
- C. SIZING: Surface lumber 4 sides as per Simplified Practice Recommendations PS16, latest edition.
- D. Grounds, blocking, furring and the like No. 2 and better Douglas Fir, West Coast Hemlock, Southern Yellow Pine, Sitka Spruce or Northern Pine.
- E. Lumber for concealed work shall be fire and/or preservative treated =and of suitable construction grade species.

2.02 PLYWOOD

- A. Panel System 3/4 inch APA "A-D'. Interior, Exp 1.
- B. General Purpose, Concealed APA, EXT B/C in thickness to suit conditions of use and/or as shown on the drawings.

2.03 GLUES AND ADHESIVES

NOTE: All adhesives used in the work of this project shall be VOC compliant in accordance with requirements of the applicable codes.

- A. Glue Type II moisture resistant adhesive for interior use and Type I waterproof adhesive for exterior and all fabricated systems used in "wet" areas. No stain lines permitted.
- B. Adhesives "Construction Adhesive" by Sika Corporation; "TiteBond Construction Adhesive" by Franklin International; "Speed Grip" by Geocel Corp. and deemed suitable for intended application.

2.04 CARPENTER IRON AND ROUGH HARDWARE

- A. All anchorage items shall be sized to meet requirements and conditions at the site. All anchorage items shall be non-corrosive steel. Provide backup plates and other devices as part of the work of this Section.
- C. Toggle bolts for fastening of wood to hollow wall construction shall be of spring wing type, not less than 3/8 inch diameter; screws shall be not less than 1/4 inch diameter self-drilling type.
- D. Wood to Concrete and/or masonry minimum 3/8 inch diameter stainless steel sleeve or wedge anchors by Ramset/Redhead Division of ITW; Powers Fasteners; Simpson Strong Tie; or equal showing compliance with applicable building codes and industry governing bodies..
- E. Attachment devices for new framing to existing construction:
 - Metal to existing wood 1/4 inch diameter by 2 inch long lag bolts spaced at 10 inches on center.
 Metal to masonry or concrete 5/8 inch diameter bolts and expansion sets, minimum 3 inch depth and spaced at maximum 2 foot 6 inch centers.
- F. Attachment devices for door frame head to existing construction 5/8 inch diameter lag bolts long enough to penetrate masonry a minimum of 3 inches and spaced at 12 inch centers.
- G. Metal to metal connectors minimum #6 self tapping sheet metal screws spaced at 8 inches on center.

2.05 FIRE TREATMENT

- A. Each piece of lumber and plywood shall bear the Underwriters Laboratories (UL) Classification Mark certifying a flame spread rating of 25 or less in the (ASTM E 84) "Tunnel Test", and when the test is extended for 20 additional minutes (30 minutes total), the flame shall not extend more than 10.5 feet from the center line of the burner and there shall be no evidence of significant progressive combustion.
- B. Lumber design values and plywood span ratings shall be recognized by issuance of a National Evaluation Report which shall include evaluation of strength testing for roof applications.
- C. In addition to UL monitoring for flamespread certification, production and kiln drying after treatment shall be monitored by Timber Products Inspection (TP).
- D. Lumber shall be kiln dried after treatment to 19% or less moisture content, and plywood to 15% or less moisture content.
- E. Treatment formulation shall contain no halogens, sulfates, chlorides or ammonium phosphate.
- F. Treatment shall qualify as non-hygroscopic in accordance with ASTM D 3201.
- G. System shall be similar and equal to that as manufactured by Hoover "PYRO-GUARD 3rd Generation Fire Retardant Treatment"; Hickson "Drycon"; Chemical Specialties, Inc. or approved equal and shall be certified as "paintable" or "stainable" in accordance with the requirements of this project.

2.06 BORATE OR SODIUM SILICATE PRESERVATIVE TREATED WOOD PRODUCTS

- A. Manufacturer
 - 1. Borate Treated Systems -Osmose, Inc., Wood Preserving Division
 - 2. Sodium Silicate Systems TimberSIL (SST).
- B. Borate Preservative Treatment: Disodium octoborate tetrahydrate (DOT) treatment for insect and decay protective pressure treatment of wood as produced by manufacturer's licensed treatment plants, producing material meeting the following minimum standards:
 - 1. Preservative Treatment Standard: AWPA P5.
 - 2. Structural Lumber Treatment Standard: Comply with AWPA C31.
 - 3. Plywood Treatment Standard: Comply with AWPA C9.
 - 4. Treatment Level: Provide borate preservative treatment retention level recommended by manufacturer to provide the following minimum protection, as indicated on wood product quality stamp specified in Quality Assurance article: .42 DOT retention (0.28 pcf (4.5 kg/m3) B2O3) minimum retention (required for warranty).
- C. Field Applied End Coat: Preservative solution approved by preservative treated wood manufacturer for application.
- D. Where it is necessary to frame lumber on the job after treatment, all cut surfaces, bolt holes and machined areas shall be liberally brushed with the same preservative in accordance with AWPA Standard M4. Where shrinkage is a serious fault or where treated lumber will be in contact with lime or cementitious surfaces, and where water-borne treated lumber is to be painted, excess moisture will be removed. Lumber 2 inch nominal and less shall be dried to 15- 19% moisture content, and material to be painted shall have knots and pitch streaks sealed as with untreated wood.
- 2.07 MISCELLANEOUS STRUCTURAL LIGHT FRAMING #2 Southern Pine, Spruce-Pine-
 - Fir group or other suitable commercial softwood species, S4S, kiln-dried and conforming to the following:
 - A. Bending 1,200 psi
 - B. Tension (Parallel to Grain) 1,050 psi
 - C. Horizontal Shear 70 psi
 - D. Compression (Perp. to Grain) 335 psi
 - E. Compression (Par. to Grain) 1,000 psi
 - F. M.O.E 1,500 mpsi
- 2.08 Balance of materials shall be as specified elsewhere in this Section.

Part 3 - EXECUTION

- 3.01 I NSPECTION AND ACCEPTANCE
 - A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.02 WORKMANSHIP AND CONSTRUCTION, GENERAL

- A. All work hereunder shall be executed by mechanics skilled in the trade.
- B. Set all work plumb, level, straight and true. Secure to grounds and blocking so as to be rigid throughout. Work which adjoins other finish shall be fitted and scribed in a careful manner so as
- C. Perform all joining and fastening in a manner to insure work remaining permanently in place and to avoid all splitting or opening of joints.
- D. Field cutting of fire retardant treated dimensional lumber and plywood. End cuts, drilling holes, and joining cuts are permitted. Do not rip or mill fire retardant treated lumber. Fire retardant treated plywood can be cut in any direction.

3.03 PRIMING AND BACKPAINTING

- A. Materials used shall comply with requirements of such materials as specified under Section 09 90 00, suitable for intended application.
- B. Except where stain or natural finish is specified, thoroughly prime all sides and edges of all lumber as soon as delivered to the site. Where material is called for to be "sealed" with a consolidant type sealer, said material shall be sealed on all faces, edges, natural and cut ends prior to placement in the work.

NOTE: Where fire treated lumber is employed in the work, priming and backpainting of same will not be required.

3.04 MISCELLANEOUS ROUGH CARPENTRY

- Contractor shall do all rough framing work in connection with installation of access doors, heating and Α. ventilating grille, panels, roofing and sheet metal work, cabinets and mechanical trades, where required and according to conditions at the building.
- Do all required cutting, patching and jobbing in advance of finishing trades and work. Β.
- Furnish and install wood grounds, nailing strips, cant strips, blocking and similar items wherever C. necessary or required throughout the buildings for support, proper erection or installation of carpentry and for the support of cabinets, shelf cleats, and all other millwork and building construction work of all other sections.

3.05 ROUGH HARDWARE

- Α. Install all rough hardware for proper installation of carpentry and millwork.
- Β. Hardware shall be as per Part 2 of this Section.

3.06 PLYWOOD INSTALLATION

Install all plywood in conformance with recommendations of the American Plywood Association. Α.

3.07 WASTE MANAGEMENT - Coordinate with Section 01 74 19

- Separate wood waste in accordance with the Waste Management Plan. Α. Β.
 - Separate the following categories for salvage or reuse on site:
 - Sheet materials larger than 2 sq. ft. 1.
 - 2. Solid wood:
 - a. Trim longer than 16 inches
 - b. Multiple offcuts of any size larger than 12 inches
- C. Recycle the following categories:
 - 1. Clean, unpainted engineered wood products
 - 2. Clean, unpainted dimensional lumber
- D. Separate the following categories for disposal and place in designated areas for hazardous materials:
 - 1. Treated, stained, painted, or contaminated wood

SECTION 06 20 00 FINISH CARPENTRY

Part 1 - GENERAL

- 1.01 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.
- 1.02 DESCRIPTION OF WORK
 - A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all finish carpentry, millwork and related accessories for this project as required by the schedules, keynotes and drawings.

CODE NOTES

- Fire treat all lumber and plywood exposed to view in the inished work, and as set forth in the "code" statement below as required and specified. Reference Section 09 90 00 for field type fire treatments *as and if code required*.
- Further, all wood work and other applied decorative finishes exposed within the structure shall be finished and/or treated to comply with the International Building Code (2006) setting standards for Flame Spreads for use classification in accordance with Table 803.5 of the referenced code.
- NFPA 101, Section 10.2.1.1 Classification of interior finish materials shall be in accordance with tests made under conditions simulating actual installations, provided that the authority having jurisdiction shall be permitted to establish the classification of any material on which a rating by standard test is not available, unless otherwise provided in 10.2.1.2.
- NFPA 101, Section 10.2.1.2 Materials applied directly to the surface of walls and ceilings in a total thickness of less than 0.9 mm (1/28 in.) shall be exempt from tests simulating actual installation if they meet the requirements of Class A interior wall or ceiling finish when tested in accordance with 10.2.3 using inorganic reinforced cement board as the substrate material.
- 1.03 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification.

1.04 QUALITY ASSURANCE

D.

- A. AWI Quality Standards
 - 1. All work shall comply with applicable requirements of the AWI "Architectural Woodwork Quality Standards, 8th Edition, Version 2.0, 2006" and specific grading standards set forth within this Section.
- B. Fabrication and Installation Qualifications: Firm which can demonstrate a minimum of 3 years of successful experience in
- C. Reference Standards: All materials used for work of this Section shall conform with Voluntary Product Standards and trade Association Units as specified in Section 06 10 00.
 - In addition, all materials incorporated in the work of this Section shall comply with the following:
 - 1. Class A, Flame Spread 0-25 interior finish shall be mandatory in corridors; passageways; stairs; exit ways; kitchens; maintenance, repair and custodial areas; trim/paneling systems in places of public assembly.
 - 2. Class C, Flame Spread Less than 200 interior finish is mandatory in all instructional and office spaces. In any case, regardless of the flame spread classification, no material having a smoke developed rating of 450 or more may be used in any area of work on this project.
- 1.05 SUBMITTALS Coordinate with Section 01 33 00
 - Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
 - As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
 - Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings
 are critical to the proper execution of the Work and failure to honor these requirements may become the basis for
 denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Everyeffort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
 - A. Shop Drawings showing location of each fabricated item along with dimensioned plans and elevations; large scale details, jointing and profiles; attachment devices; material listing; finish designations; accessories and other components.
 - 1. Identify woodwork item using same identification system shown on Architectural Drawings.
 - 2. Coordinate details and cutouts to accommodate accessories specified under other Sections. Prepare drawings to a minimum scale of 1-1/2 inches to 1 foot.
 - B. Samples including -
 - 1. Wood Trim: 2 pieces, 12 inches long of each type and finish.
 - 2. Anchorage devices to be used in the work of this section, 2m each.
 - C. Product Data: Submit manufacturer's or supplier's product data for each product and process specified as work of this Section and incorporated into items of finish carpentry.
 - D. Certification of specification compliance for all work including:
 - 1. Quality Certification: Submit woodwork Manufacturer's (Fabricator's) certification, stating that fabricated woodwork complies with AWI quality grades and other requirements indicated herein.
 - 2. Wood Treatment Data: Submit chemical treatment manufacturer's instructions for handling, storing, installation, and finish of treated material.
 - 3. Fire Retardant Treatment: Provide certification by treating plant that treated materials comply with requirements.
 - E. This Contractor shall take all necessary field measurements prior to fabrication and installation of work and shall assume complete responsibility for accuracy of same.
 - F. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product.
- 1.06 ENVIRONMENTAL, STORAGE AND HANDLING REQUIREMENTS AND RESTRICTIONS (Coordinate with Section 01 61 00)
 - A. Deliver all materials to the job site clearly labeled as to product, manufacturer, color and/or other pertinent characteristics.
 - B. Protect millwork against dampness. All materials shall be stored flat and level in a fully enclosed space. **Do not store seasoned materials in wet or damp portions of buildings.**
 - C. Millwork and trim installations shall be done only when the temperature and humidity closely approximate the interior conditions that will exist when the building is occupied. The heating and cooling systems shall be operating before, during, and after installation, with the humidity of the interior spaces maintained between 25% and 55%.
 - D. Acclimate all materials, millwork and trim for a minimum of 72 hours immediately prior to installation.
 - E. Store materials a minimum of 6 inches above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation.
 - F. Store doors under cover, stacked substantially upright on wood strips and with spaces between doors to assure drainage of condensation and ventilation of all surfaces.
 - G. Protect fire retardant materials against high humidity and moisture during storage and erection.

1.07 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or postindustrial waste.

Part 2 - PRODUCTS

- A. Grading and Fabrication: AWI Quality Standard 100 "CUSTOM" and graded as I, II or III as applicable to intended use.
- B. Moisture Content: 6 to 8%.
- C. Sizing: Surface lumber 4 sides as per Simplified Practice Recommendations PS16, latest edition.
- D. Species:
 - 1. Hardwoods
 - a. Natural Plain Sliced Birch
 - b. Painted Poplar
- 2.02 GLUES AND ADHESIVES See Section 06 10 00
- 2.03 ANCHORAGE AND FASTENERS
 - A. Size anchorage items to meet requirements and conditions at the site and shall be as set forth in Section 06 10 00 as if restated herein in full and shall be as applicable for intended usage.
 - B. Fasteners shall be of size and type to suit application.
 - 1. Interior: All stainless steel.
 - 2. Concealed joint fasteners shall be of threaded steel or other patented type assembly.
- 2.04 ACCESSORIES
 - A. Brackets: "Work Station Brackets" by A&M Hardware fabricated from 1/8 inch steel, fully welded and rated for 1000# loading. Unit assemblies shall be prefinished with textured powder coat in manufacturer's standard colors.
- 2.05 PRESERVATIVE & FIRE TREATMENT as per Section 06 10 00 as if restated herein in full and shall be as applicable for intended usage.
- 2.06 STANDING AND RUNNING TRIM SYSTEMS
 - A. Accomplish all work involved herein in accordance with AWI QualityStandard 300, "Custom" fabrication.
 - B. All trim elements required for the work of this Project shall be of suitable species as specified in Paragraph 2.01 of this Section for respective finish.
- Part 3 EXECUTION
- 3.01 INSPECTION AND ACCEPTANCE
 - A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.
- 3.02 WORKMANSHIP AND CONSTRUCTION, GENERAL
 - A. All work hereunder shall be executed by mechanics skilled in the trade. Construction and finishing of millwork shall be specially and carefully done by experienced journeymen.
 - B. All finish work shall be assembled and finished at the shop, asfar as practicable, and delivered to the site ready to be set in place.
 - C. Work shall be set plumb, level, straight and true. Secure to grounds and blocking so as to be rigid throughout. Work which adjoins other finish shall be fitted and scribed in a careful manner so as not to injure any exposed surfaces.
 - D. Install running and other finish trim with tight joints. Secure with finishing nails, except as otherwise specified. Set exposed heads of nails for putty where in "painted surfaces"; do not fill where "stained" finish is noted. Sand as necessary to remove irregularities and tool marks. Leave work free from defects and blemishes and in proper condition to receive specified finishes.
 - E. Joints shall be tight and formed to conceal shrinkage. Corners shall be mitered unless otherwise shown.
 - F. Running trim shall be in long lengths and jointed only where solid fastening can be made. End joints in built-up members shall be well distributed. Miter exterior corners and cope interior angles. Where required, carefully scribe wood work to other adjacent work.
 - G. Perform all joining and fastening in a manner to insure work remaining permanently in place and to avoid all splitting or opening of joints.
- 3.03 PREPARATION FOR PAINTER'S FINISH
 - A. Clean, smoothly dress, and sandpaper all exposed surfaces. No plane or tool marks shall show. Further dress all exposed surfaces of interior finish woodwork with fine grit sandpaper or steel wool, to smooth and clean surfaces. Deeply set nails and screws for putty stopping or plugging as specified.

3.04 PRIMING AND BACKPAINTING

- A. Materials used shall comply with requirements of such materials as specified under "Painting" Section.
- B. Priming: Except where stain or natural finish is specified, thoroughly prime all sides and edges of all interior finishing lumber as soon as delivered to the site. Prime all millwork which is assembled or built up of more than one piece in the woodworking mill before material is fabricated or built up. Trim elements scheduled to be natural finish and not factory finished shall be clear sealed immediately upon receipt on site to insure integrity of wood and profiles prior to erection and final finishing.
- C. Back painting: No interior millwork or trim shall be installed until all surfaces in contact with masonry or plaster, or concealed in finished work, have been back painted with a heavy coat of alkyd paint.

3.05 INSTALLATION - ARCHITECTURAL WOODWORK

A. All paneling, trim, cabinets, casework and the like shall be installed in accordance with requirements set forth in AWI Quality Standard 1700 for **"Custom"** work as outlined under 1700-S-1, S-2 and S-3 standards for preparation, alignment, securement, joinery and the like not withstanding any statements made within this section to the contrary.

3.06 ADJUSTABLE SHELVING STANDARDS

- A. Install adjustable shelving standards and brackets on walls and partitions where indicated. Coordinate with drywall construction for location of reinforcing.
- B. Standards shall be toggle or expansion bolted to masonry and screwed through drywall construction into wood blocking or steel strapping. Coordinate with Sections 04 20 00 and 09 29 00.

3.07 PROTECTION

- A. Protect all new and existing construction, adjacent work and finished work from and damage. PROVIDE DROP CLOTHS OR OTHER SUITABLE PROTECTIVE COVERINGS IN ALL AREAS OF THE WORK.
- B. Damage caused by the handling, storing or application of materials or the failure to provide adequate protection shall be repaired or replaced at no additional cost to the Owner.

3.08 ACCEPTANCE AND PATCHING

- A. On completion of work, all equipment and rubbish resulting from the work of this section shall be removed from the premises.
- B. Leave work clean, whole, and sound ready for additional finish or sealing as specified and/or as shown on the drawings.
- C. Clean all glass, doors, frames, and accessories free of dirt and other foreign materials after completion of installation.

3.09 WASTE MANAGEMENT

- A. Separate wood waste in accordance with the Waste Management Plan.
- B. Separate the following categories for salvage or reuse on site:
 - 1. Sheet materials larger than 2 sq. ft.
 - 2. Solid wood:
 - a. Trim longer than 16 inches
 - b. Multiple offcuts of any size larger than 12 inches

End of Section

SECTION 07 84 00 FIRESTOPPING

Part 1 - GENERAL

1.01 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.02 DESCRIPTION OF WORK

A. T he work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all firestopping and smoke seal work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:

NOTE: Fire stopping is defined as a material, or combination of materials, to restore the integrity of fire rated walls and floors by maintaining an effective barrier against the spread of flame, smoke and toxic gases and further defined in 1.04 below.

- 1. Provide fire stopping and smoke seals as indicated on the drawings and/or required to maintain full and continuous smoke and fire barrier between zones including:
 - a. Through penetration firestops and smoke-stops for all fire-rated bearing and non-bearing wall and floor assemblies, both blank (empty) and those accommodating penetrating items such as cables, conduits, pipes, ducts, etc.
 - b. Membrane penetration protection for fire-rated walls.
 - c. Architectural/Construction joint firestops within walls, floors, or the intersection of floors to exterior walls, or the intersection of top of walls to ceilings.
 - d. Top of wall firestopping in all fire-rated partitions
 - e. Top of wall and construction joint smoke-stopping in all smoke partitions Cope and seal around all structural elements to insure smoke and fire barriers.

IT IS A MANDATE OF THIS CONTRACT THAT ALL FIRESTOPPING WORK BE ACCOMPLISHED BY A FM4991 ACCREDITED CONTRACTOR WITH AT LEAST ONE "Designated Responsible Individual (DRI)" IN THE EMPLOY OF THE SPECIALTY CONTRACTOR FIRM. A COPY OF THE QUALITY ASSURANCE MANUAL SHALL BE MAINTAINED ON THE JOB SITE FOR REVIEW BY THE DESIGN PROFESSIONAL, CONTRACTOR AND ANY OTHER INTERESTED PARTY.

NOTE: A preinstallation conference shall be scheduled by the Contractor with this Specialty Contractor and all other Specialty Contractors, Subcontractors and the like to establish procedures to maintain optimum working conditions and to coordinate the work of this Section with related and adjacent work.

1.03 RELATED WORK SPECIFIED ELSEWHERE - Entire Project Specification with specific reference to those sections noted above and as follows:

NOTE: Proper execution of this work will maintain the hourly ratings of the walls and floors and ensure progress of work in other Sections as listed below:

- A. Division 22 Plumbing
- B. Division 23 HVAC
- C. Division 26 Electrical Work

1.04 QUALITY ASSURANCE

A. Firestopping systems (materials and design):

1. Shall conform to both Flame (F) and Temperature (T) ratingsas required by local building codes and as tested by nationally accepted test agencies per ASTM E 814 or UL 1479 fire tests in a configuration that is representative of fieldconditions.

2. The F rating must be a minimum of 1 hour but not less than the fire resistance rating of the assembly being penetrated.

3. T rating when required by code authority shall be based on measurement of the temperature rise on penetrating item(s).

4. The fire test shall be conducted with a minimum positive pressure differential of 0.03 inches of water column.

5. For joints, must be tested to UL 2079 or E 1399 and E 1966with movement capabilities equal to those of the anticipated conditions.

6. Where there is no specific third party tested and classified firestop system available for a particular firestop configuration, the firestopping contractor shall obtain from the firestop manufacturer an Engineering Judgment (EJ) or Equivalent Fire Resistance Rated Assembly (EFFRA) for submittal.

- B. Firestopping materials and systems must be capable of closing or filling through-openings created by 1) the burning or melting of combustible pipes, cable jacketing, or pipe insulation materials, or 2) deflection of sheet metal due to thermal expansion (electrical and mechanical duct work).
- C. Firestopping sealants must be flexible, allowing for normal pipe movement.
- D. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces.
- E. Firestopping materials shall be moisture resistant, and may not dissolve in water after curing.
- F. For firestopping exposed to view, traffic, moisture, and physical damage, provide appropriate firestop systems for these conditions.
- G. All firestopping materials shall be manufactured by one manufacturer (to the maximum extent possible).
- H. Material used shall be in accordance with the manufacturer's written installation instructions.
- I. Firestopping shall be performed by a Specialty Contractor trained or approved, in writing, by firestop material manufacturer. Said specialist shall be as defined in the Conditions. Equipment used shall be in accordance with firestop material manufacturer's written installation instructions.
- J. Materials shall conform to all applicable governing codes.
- K. All materials used in the work shall be certified "asbestos free" and shall be free from any and all solvents or components that require hazardous waste disposal or, that after curing, dissolve in water.
- L. All materials shall comply with the interior finish flame spread and smoke developed requirements for the area in which they are installed. Coordinate with governing codes.

M. DEFINITIONS

- 1. FIRESTOPPING: The use of a material or combination of materials in a fire-rated structure (wall or floor) where it has been breached, so as to restore the integrity of the fire rating on that wall or floor.
- 2. SYSTEM: The use of a specific firestop material or combination of materials in conjunction with a specific wall or floor construction type and a specific penetrant(s), constitutes a "System"
- 3. BARRIER: Any bearing or non-bearing wall or floor that has an hourly fire and smoke rating.
- 4. THROUGH-PENETRATION: Any penetration of a fire-rated wall or floor that completely breaches the barrier.
- 5. MEMBRANE-PENETRATION: Any penetration in a fire-rated wall that breaches only one side of the barrier.
- 6. CONSTRUCTION GAPS: Any gap, joint, or opening, whether static or dynamic, where the top of a wall may meet a floor; wall to wall applications; edge to edge floor configurations; floor to exterior wall; or any linear breach in a rated barrier. Where movement is required, the firestopping system must comply with UL2079 for dynamic joints.
- 1.05 SUBMITTALS Coordinate with Section 01 33 00
 - Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
 - As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
 - Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
 - The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
 - **NOTE**: A "Certificate of Conformance", from the manufacturer listed in Part 2, is required with the "Submittal Package" to ensure that the material selected meets all of the criteria of this specification as set forth in Paragraph 1.04 of this Section.
 - A. Submit manufacturer's product literature for each type of firestop material to be installed. Literature shall indicate product characteristics, typical uses, performance and limitation criteria, and test data. Submittal should be in compliance with Section 01 3300.

- B. UL Tested Systems: Submit drawings showing typical installation details for the methods of installation. Indicate which firestop materials will be used and thickness for different hourly ratings.
- C. Engineering Judgments: Submit manufacturer's drawings for all nonstandard applications where no UL tested system exists. All drawings must indicate the "Tested" UL system upon which the judgment is based so as to assess the relevance of the judgment to some known performance.
- D. Submit manufacturer's installation procedures for each type of product. E. Approved Applicator: Submit document from manufacturer wherein manufacturer recognizes the installer as qualified or submit a list of past projects to demonstrate capability to perform intended work.
- F. Upon completion, installer shall provide written certification thatmaterials were installed in accordance with the manufacturer's installation instructions and details.
- G. Mockups:
 - 1. Prepare job mockup of the material proposed for use in the project as directed by Architect. Approved mockups shall be left in place as part of the finished project and will constitute the standard for remaining work, including aesthetics.
- H. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product.
- 1.06 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)
 - A. Deliver all materials to be used in the work of this section to the project site in original sealed containers with manufacturer's brand and name, lot numbers, UL labeling, mixing and installation instructions clearly identified thereon.
 - B. Store all materials in accordance with manufacturer's directions.
 - C. All materials shall be dated with shelf life and shall be removed from the project site at the contractors expense if date is expired.

1.07 REFERENCE STANDARDS

Α.

- American Society for Testing and Materials (ASTM)
 - 1. E 814 Standard Method of Fire Tests of Through Penetration Fire Stops.
 - 2. E 119 Methods of Fire Tests of Building Construction and Materials.
 - 3. E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 4. 136 Test Method for Behavior of Materials in a Vertical Tube Furnace at 750F
 - 5. E 1399 Cyclic Movement and Measuring Minimum and Maximum Joint Widths
 - 6. E 1966 Test Method for Resistance of Building Joint
 - 7. E 2174 Standard Practice for On-Site Inspection of Installed Fire Stops
 - 8. E 05.11.14 Standard Test Method for Determining the Fire Endurance of Perimeter Fire Barrier Systems Using the Intermediate-Scale, Multi Story Test Apparatus (ISMA); ASTM permanent number assignment pending approval of Draft
- B. Underwriters Laboratories, Inc. (UL)
 - 1. UL 1479 Fire Tests of Through Penetration Fire Stops.
 - 2. UL 263 Fire Tests of Building Construction and Materials.
 - 3. UL 723 Surface Burning Characteristics of Building Materials.
 - 4. UL 2079 Tests for Fire Resistance of Building Joint Systems
 - 5. UL "Fire Resistance Directory", current year, including but not limited to the following:
 - a. For penetrations by uninsulated, non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT) UL System: CAJ1235, CAJ1404, WL1152.
 - b. For penetrations by insulated, non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT) UL System: CAJ5222, CAJ5250, CAJ5251, WL5171.
 - c. For penetrations by PVC jacketed, flexible cable or cable bundles and plastic pipe (closed piping systems) UL System: CAJ2401, CAJ3185, CAJ3199, CAJ3234, WL3118, WL3179, WL3199.
 - d. For penetrations by combustible plastic pipe (open piping systems) UL System: CAJ2174, CAJ2339, CAJ2351, CAJ2432, WL2168, WL2170, WL2185, WL2259.
 - e. For penetrations by multiple combustible and/or noncombustible items UL System: CAJ8101, CAJ8133,WL8007.

- f. For large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways UL System: CAJ1406, CAJ1502, CAJ4053, CAJ6027, WJ6004, WL1207, WL1343 WL4030, WL6018.
- g. For penetrations by steel ducts UL System: CAJ7075, CAJ7082, WJ7045, WJ7046, L7006, WL7046, WL7081, WL7082.
- h. For fire-rated construction joints and other gaps OPL System: CEJ296P, CEJ302P. 6. For openings between structurally separate sections of wall and floors. At the top of walls - UL System: HWD0107,HWD0110, HWD0257, HWD0267, HWD0299, HWD0327, HWD0266, HWD0333, HWD0334.
- C. Factory Mutual (FM) Approval Guide, current year.
- 1. FM Approval Standard of Firestop Contractors Class 4991
- D. Building code of the jurisdiction of the Work.
- E. National Fire Protection Association
 - 1. NFPA 101 Life Safety Code.
 - 2. NFPA 70 National Electrical Code.
 - 3. NFPA 221 Fire Walls and Fire Barriers (preliminary to be released)
 - 4. NFPA 251 Fire Tests of Building Construction and Materials
- F. FICA "Manual of Practice"
- G. Certification of "DRI" employee(s)
- H. International Firestop Council (IFC):
 - 1. Ref. 1 Recommended IFC Guidelines for Evaluating Firestop Engineering Judgments (April 2001)
 - 2. Ref. 2 Inspectors Field Pocket Guide
- 1.08 PROJECT CONDITIONS
 - A. Conform to manufacturer's printed instructions for installation and when applicable, curing in accordance with temperature and humidity. Conform to ventilation and safety requirements.
 - B. Coordinate work required with work of other trades; fire stopping shall, where practical, precede gypsum board or other applied sheet finishing operations.
 - C. Where firestopping is installed at locations which will remain exposed in the finished work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as required against damage from other construction operations.

1.09 SEQUENCING

- A. Schedule firestopping after installation of penetrants but prior to concealing the openings.
- B. Firestopping shall precede gypsum board finishing.

1.10 PROTECTION

A. A Where firestopping is installed at locations which will remain exposed in the completed work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as necessary against damage from other construction activities.

1.11 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or postindustrial waste.

Part 2 - PRODUCTS

- 2.01 GENERAL
 - A. Firestopping materials and systems shall meet the requirements specified herein.
 - B. Architect must approve in writing any alternates to the materials and systems specified herein.

- C. All firestop products and systems shall be designed and installed so that the basic sealing system will allow the full restoration of the thermal and fire resistance properties of the barrier being penetrated with minimal repair if penetrants are subsequently removed.
- D. For applications where combustible penetrants are involved, i.e.. insulated and plastic pipe, a suitable intumescent material must be used.
- 2.02 SPECIFICATION STANDARD: For purposes of establishing standards of quality and levels of performance and not for the purposes of limiting competition, the basis of this specification is upon units as manufactured by one of the following and their respective model suitable for the intended application.
 - A. Hilti, Inc.
 - B. Specified Technologies, Inc.
 - C. Grace/IPC Corp.
 - D. Nelson Firestop Products
 - E. Tremco, Inc.
 - F. U.S. Gypsum Company
 - G. Johns Manville

2.03 PRODUCTS SHALL GENERALLY INCLUDE

- A. Cast-In-sleeves (3M CID)
- B. Mortar seals
- C. Fire stop design sealant compounds, caulk and foam systems.
- D. Putty and putty pads
- E. Firestop kits including collars, plugs, etc.
- F. Seal bags
- G. Tapes and blankets
- H. Intumescent design wrap strips
- I. Mineral type unfaced safing insulation with third party wrap, 3.5 pcf density, UL R-10905 label.

2.04 ACCESSORY ELEMENTS

- A. Forming, damming materials shall be mineral fiber board or other suitable material recommended by nominated system manufacturer.
- B. Primers, sealant and solvent cleaners shall be as recommended by the nominated system manufacturer.
- C. Metal Systems 20 gauge phosphatized, electrogalvanized steel plate and/or galvanized steel clips.
- 2.05 Balance of materials shall be as specified elsewhere in this Section.

Part 3 - EXECUTION

3.01 INSPECTION AND ACCEPTANCE

- A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.
- B. Verify that environmental conditions are safe and suitable for installation of firestop products.
- C. Verify that all pipe, conduit, cable, and other items which penetrate fire-rated construction have been permanently installed prior to installation of firestops.

3.02 PREPARATION

- A. The surface shall be dry, clean, and free of all foreign matter. Do not apply firestopping to surfaces previously painted or treated with a sealer, curing compound, water repellant or other coatings unless tests have been performed to ensure compatibility of materials.
- B. Provide primers as required which conform to manufacturer's recommendations for various substrates and conditions.
- C. Mask where necessary to protect adjoining surfaces.
- D. Remove excess material and stains on surfaces as required.

3.03 INSTALLATION - GENERAL SYSTEMS

- A. Install in strict accordance with manufacturer's printed instructions as well as U.L guidelines and state and local fire codes..
- B. Ensure that anchoring devices, backup materials, clips, sleeves, supports and other materials used in the actual fire test are installed.

- C. Install firestopping with sufficient pressure to properly fill and seal openings to ensure an effective smoke seal.
- D. Tool or trowel exposed surfaces. Remove excess firestop material promptly as work progresses and upon completion.
- E. Install dams when required to properly contain firestopping materials within openings and as required to achieve required fire resistance ratings. Combustible damming materials must be removed after appropriate curing. Incombustible damming materials may be left as a permanent component of the firestopping system.

3.04 FIRESTOPPING CONSTRUCTION AT BUILDING EXTERIOR PERIMETERS, INTERIOR WALLS, SHAFTS, ETC.

- A. Install material of proper size on continuous plates or clips as required for proper support in order to safeoff area between exterior walls, interior walls and shafts and floor slabs and said walls and roof areas leaving NO VOIDS. Firestopping is required at all juncture conditions whether or not clips, angles or other structural elements exist either intermittently or continuously. Attach plates and/or clips to floor levels and other breaks and extend through framing to sheathing and/or other solid strata. Where metal decking flutes, either parallel or perpendicular to walls, occur and are open, same shall be fully packed and sealed with proper firestopping system. Where firestopping is accomplished after installation of drywall or other applied sheet finish, all spaces between penetrations and finish shall be filled to the thickness of said sheet finish with intumescent caulk.
- B. At all linear openings, fill voids with a minimum of 6 inches of minimum 3.5 lb./cu.ft. density safing insulation as specified in Part 2 herein and cover entire surface with UL listed firestop sealant of one of nominated manufacturers identified in Part 2 herein.

3.05 PENETRATION SEALS

- A. Penetrations are defined as conduits, cables, wires, piping, ducts or other elements passing through one or both outer surfaces of fire rated walls, floors or partitions and shall be firestopped on both sides of penetration in accordance with requirements set forth in Paragraph 1.04 of this Section.
- B. Where sleeves are used, same shall be as specified in Part 2 herein; in event that sleeves are not used, core openings and caulk or wrap penetrating items with intumescent system the full length of penetration and seal on both sides with intumescent caulk. Residual openings within square or rectangular holes shall be filled with compounds applicable for substrate encountered and all penetrations sealed on both sides with caulk.
- 3.06 FIELD QUALITY CONTROL
 - A. Contractor shall immediately notify the Architect if the firestopping systems herein specified cannot meet the requirements of the specification.
 - B. Contractor shall examine firestops to ensure proper installation and full compliance with this specification.
 - C. All areas of work must be accessible until inspection by the applicable Code authorities.
 - D. Correct unacceptable firestops and provide additional inspection to verify compliance with this specification at no additional cost.

3.07 IDENTIFICATION

- A. Identify firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
 - 1. The words: "Warning--Firestop System--Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Firestop system designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Firestop system manufacturer's name.
 - 6. Installer's name.

3.08 CLEANING

- A. When finished work will be visible, clean adjacent surfaces in accordance with manufacturer's printed instructions.
- B. If visible in the finished work, remove temporary dams after initial cure of firestops.
- C. Correct staining and discoloring on adjacent surfaces.
- D. Remove all debris and excess materials entirely from site and leave work in a neat and clean condition.

3.09 FIRESTOP SYSTEM SCHEDULE

- A. The following schedules shall be completed by the Contractor and reviewed prior to submission to the Architect. The untitled table included shall be completed with each of the following categories of penetrating items.
 - 1. Single uninsulated metallic piping and conduit.
 - 2. Multiple uninsulated metallic piping and conduit.
 - 3. Uninsulated plastic piping and conduit.
 - 4. Insulated metallic piping.
 - 5. Insulated high temperature flues and exhaust pipes (boiler flues, generator exhausts insulated with calcium silicate or other non-combustible insulation).
 - 6. Cable tray.
 - 7. Electrical/telephone cable.
 - 8. Bus duct.
 - 9. Miscellaneous penetrations.
- B. Complete the additional tables for the following using the formatprovided.
 - 1. Blanks, voids, holes.
 - 2. Engineering judgments.
 - 3. Fire rated/resistant joints.
 - 4. Ductwork engineering judgments.
- 3.10 WASTE MANAGEMENT Coordinate with Section 01 74 19
 - A. Separate and recycle materials and material packaging in accordance with Waste Management Plan and to the maximum extent economically feasible and place in designated areas for recycling.
 - Set aside and protect materials suitable for reuse and/or remanufacturing.
 - C. Separate and fold up metal banding; flatten and place along with other metal scrap for recycling in designated area.

PENETRATING ITEM:

Β.

Manufacturer/Product Name: Color: Accessories:

INSERT CHART

ENGINEERING JUDGMENTS (Submit Actual Installation Drawing and Letter of Certification)

Manufacturer/Product Name: Color: Accessories:

INSERT CHART

FIRE RATED/RESISTANT JOINTS

Manufacturer/Product Name: Color: Accessories:

INSERT CHART

DUCTWORK ENGINEERING JUDGMENTS

(Submit Actual Installation Drawing and Letter of Certification) Manufacturer/Product Name: Color: Accessories:

INSERT CHART

SECTION 07 90 00 CAULKING AND SEALING/JOINT SEALANTS

Part 1 - GENERAL

1.01 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.02 DESCRIPTION OF WORK

A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all caulking and sealing work for this project as required by the schedules, keynotes and drawings.

It will be the responsibility of the nominated supplier/suppliers of any sealant system proposed for use in the work to perform a "bond" test on all substrates to determine adhesion properties and requirement, if any, for primer application; coordinate with Article 1.05 herein.

NOTE: Sealants are generally required at the following locations

- a. Interior door frames to surrounding face construction;
- b. Interior window trim/reveals to window frames;

c. Plumbing fixtures and accessories where same abut finished surfaces;

d. Scribed counter and casework systems where same abut finished surfaces;

e. Where gypsum wall board is in contact with concrete slabs, walls and columns (tops, bottoms and sides)

f. Where concrete block is in contact with concrete slabs, walls and columns (tops, bottoms and sides)

g. At fire rated gypsum partition systems (coordinate with Section 09 29 00)

and like locations where dissimilar materials abut each other in finished areas.

1.03 RELATED WORK SPECIFIED ELSEWHERE - Entire Project Specification.

1.04 QUALITY ASSURANCE

- A. Bond testing shall be performed as noted in Paragraph 1.02.A above and results submitted to Architect for file.
- B. All surfaces to receive sealant shall be dry and cleaned of all foreign matter as specified in Part 3.
- C. Application devices shall have nozzles of proper size and shall provide sufficient pressure to completely fill joints as detailed.
- D. Sealants shall comply with VOC requirements of the Jurisdiction of the Work, or in absence of said regulation, all material shall comply with the following as applicable for particular application and shall **not** contain or be formulated with aromatic solvents, halogenated solvents, fibrous talc or asbestos, formaldehyde, mercury, lead, cadmium, hexavalent chromium or their derivatives.
- E. Reference Standards
 - 1. ASTM C 719 Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
 - 2. ASTM C 794 Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.
 - 3. ASTM C 834 Latex Sealing Compounds
 - 4. ASTM C 919 Standard Practice for Use of Sealants in Acoustical Applications.
 - 5. ASTM C 920 Elastomeric Joint Sealants.
 - 6. ASTM C 1087 Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.
 - 7. ASTM C 1193 Standard Guide for Use of Joint Sealants.
 - 8. ASTM C 1248 Standard Test Method for Staining of Porous Substrate by Joint Sealants.
 - 9. ASTM C 1311 Solvent Release Sealants.
 - 10. ASTM C 1330 Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
 - 11. ASTM C 1401 Standard Guide for Structural Sealant Glazing
 - 12. ASTM C 1481 Standard Guide for Use of Joint Sealants with Exterior Insulation and Finish Systems (EFIS)
 - 13. ASTM D 1056 Flexible Cellular Materials, Sponge or Expanded Rubber.

14. SWRI (Sealant, Waterproofing and Restoration Institute) -Sealant and Caulking Guide Specification.

1.05 UBMITTALS – Coordinate with Section 01 33 00

- Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- The Contractor is encouraged to submit for approval products made from recycled and/or environmentally
 responsible material. Every effort will be made by the Design Professional Team to approve these
 materials; the substitution request procedure shall still be enforced.

A. Product Data indicating for each type of sealant and component used in this work - chemical characteristics; performance criteria; substrate preparation; limitations; color availability; and the like affecting the use of each product.

- B. Samples of all components to be used in the work of this section.
- C. Color charts for selection.
- D. Test Reports:
 - 1. Submit results of laboratory pre-construction testing.
 - 2. Submit results of field pre-construction testing.
 - 3. Submit manufacturer's recommendations for joint preparation, priming, and joint accessory materials based on test results.
 - 4. Submit manufacturer's recommended installation procedure modifications resulting from field adhesion tests.

E. Manufacturer's installation instructions indicating, if any, special procedures; surface preparation; perimeter conditions requiring special attention; and like items affecting installation of each product. **Results of bond tests shall be incorporated in installation recommendations.**

F. Certification of specification compliance.

- 1. Certify products are suitable for intended use and products meet or exceed specified requirements.
- 2. Certify applicator is approved by manufacturer.

G. Qualification Data: Submit applicator's qualifications, including reference projects of similar scope and complexity, with current phone numbers and contact names of architects and owners for verification.

H. Manufacturer's Field Reports:

- 1. Indicate time present at project site.
- 2. Include observations, indicate compliance with manufacturer's installation instructions, and supplemental instructions provided to installers.
- I. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product. J. Operation and Maintenance Data:
 - 1. Submit recommended inspection intervals.
 - 2. Submit instructions for repairing and replacing failed sealant joints.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61

00)

- A. Deliver products in original factory packaging bearing identification of product, manufacturer, and batch number. Provide Material Safety Data Sheets for each product.
- B. Store products in a location protected from freezing, damage, construction activity, precipitation, and direct sunlight in strict accordance with manufacturer's recommendations.
- C. Condition products to approximately 60 to 70 degrees F (16 to 21 degrees C) for use in accordance with manufacturer's recommendations.
- D. Handle all products with appropriate precautions and care as stated on Material Safety Data Sheet.

1.07 QUALITY CONTROL

- A. Preconstruction Sealant Tests for Adhesion and Compatibility:Submit sealant samples for each material to be sealed in the work including, but not limited to metal flashing, painted wood at windows, glazing gaskets, glazing materials, framing members, masonry and stone of each type used, and all other components and accessories, to sealant manufacturer to verify sealant compatibility and to determine, by testing in compliance with ASTM C 794, as well as the type of primer required for each condition to ensure sealant adhesion to substrates.
 - 1. Cost of Testing: The sealant manufacturers shall perform and/or the Contractor shall, at his own expense employ an independent testing agent acceptable to the Architect to perform tests and certifications indicated. No costs shall be passed to the Owner.
 - 2. Test Samples: Submit to the testing agency or sealant manufacturer at least 5 pieces of each type, finish, kind, condition, and form of material to which sealant is to be attached.
 - 3. Scheduling: Scheduling sufficient time for testing, analysis, and reporting of results.
 - 4. Test Reports and Recommendations: Obtain written reports and recommendations regarding proper sealant material, primer, and application for each condition. Use sealants and substrates only in combinations for which favorable adhesion and compatibility results have been obtained.
- B. Construction Sealant Adhesion Tests shall be performed as specified under "Field Quality Control" in Part 3 of this Section.

1.08 SPECIAL GUARANTEE/WARRANTY TERMS

A. This Contractor shall, and hereby does warrant; and the Contractor shall, and hereby does guarantee that caulking and sealing work will be free from defects of materials and workmanship for 2 years from the date of final acceptance of this work. The following types of failure will be adjudged defective work: leakage, hardening, chalking, crumbling, melting, shrinking or running of caulking; or staining of adjacent work by caulking. Repair and replace work which becomes defective during the guarantee term, without cost to the Owner.

1.09 SITE ENVIRONMENTAL PROCEDURES

A. Indoor Air Quality: Temporary ventilation: Provide temporary ventilation during work of this Section. Coordinate interior application of joint sealants with interior finishes schedule.

1.10 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or postindustrial waste.

Part 2 - PRODUCTS

2.01 GENERAL

- A. Joint primer, sealer and/or conditioner shall be as recommended by the sealant manufacturer.
- B. Preformed joint fillers shall be nonstaining compatible with Backer Rod for General Vertical Use: ASTM C 1330, Types B or C, rod stock closed cell polyethylene foam, closed cell neoprene foam, or open cell urethane foam, as recommended by sealant manufacturer as being compatible both with the sealant used and the primer.
- C. Accessory Items:
 - 1. Bond Breaker Tape Polyethylene or other plastic tape as recommended by the sealant manufacturer; non-bonding to sealant; self-adhesive where applicable; thickness, minimum 0.012 inch.
 - 2. Cleaning Solvents Oil free solvents as recommended by the sealant manufacturer. Do not use reclaimed solvents.

- 3. Masking Tape Removable paper or fiber tape, self-adhesive, non-staining.
- 4. Materials impregnated with oil, bitumen or similar materials shall not be used.

D. Sealant Colors

- 1. Exposed materials, provide color as indicated or, if not indicated, as selected by the Architect from manufacturer's standard colors.
- 2. Concealed materials, provide the natural color which has the best overall performance characteristics.

2.02 MATERIAL TABLE

- A. Type IIA GLAZING SYSTEMS Sealant compound Silicone rubber of design recommended by the manufacturer for the intended application and similar and equal to -
 - 1. General Electric -SSG 4000 OR 4200 Structural Glazing Sealant; 3211 or 3103 Insulating Glass Sealant; 2000 Weather Seal.
 - 2. Dow Corning 795, 895, 983 or 995 as suitable for encountered conditions.
 - 3. Tremco Inc.– Tremco Proglaze SG or Spectrem 2 Structural Glazing Sealant; Tremco Proglaze II Insulation Glass Sealant.
 - 4. Pecora #895 or other suitable combination as recommended by the nominated manufacturer of the overall window/curtain wall assembly.
- B. Type IIB SANITARY SEALS (use at interior wet areas only -Counter tops to surrounds Material shall be a single component, mildew resistant silicone sealant similar and equal to -
 - 1. Dow Corning 786
 - 2. General Electric Sanitary 1700
 - 3. Bostik Silicone Rubber Bathroom Caulk.
 - 4. Pecora #898 or 863 at option of Contractor.
 - 5. Tremco Tremsil 200
- C. Type V (For use in acoustical sealing operations) Sealant compound Butyl Rubber or Latex Base for developing acoustical requirements specified. Material shall be similar and equal to -
 - 1. Pecora (BA-98)
 - 2. W.W. Henry (313)
 - 3. U.S. Gypsum (Acoustical Sealant)
 - 4. Tremco (Acoustical Sealant)
- D. Type VI (For interior sealant systems around door frames, window reveals and like locations in painted surfaces)
 Sealant compound
 – Siliconized Acrylic Latex or FDC Siliconized Acrylic each with a 50 year warrantee similar and equal to:
 - 1. RCS20 by GE-Silicones.
 - 2. DAP® ALEX PLUS® Acrylic Latex Caulk Plus Silicone
 - 3. LIFETIME® Siliconized Acrylic by Red Devil
 - 4. Pro Select® Siliconized Acrylic Latex Caulk by Sherwin Williams Backing as required by conditions of use.
- E. Type VII Fire Rated Caulking compound for bedding and/or sealing of joints in rated gypsum wall systems shall be similar and equal to: "AC20 FTR" by Pecora; "Tremstop Acrylic" by Tremco; "Blockade" by DAP or approved equal.

Part 3 - EXECUTION

3.01 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.02 JOINT DESIGN

- A. Joints shall be a maximum of 3/8 inch deep by minimum 3/8 inch wide.
- B. Joints in metal, glass and other non-porous surfaces: Depth shall be a minimum of 1/2 the applied sealant width, and shall in no case exceed the applied sealant width.

3.03 PREPARATION

- A. Prepare joints in accordance with ASTM C 1193 and manufacturer's instructions.
- B. Clean joint surfaces immediately before installation of sealant and other materials specified in this Section.

3.04 JOINT BACKING INSTALLATION

- A. Install bond breaker tape in relaxed condition as it comes off the roll. Do not stretch the tape. Lap individual lengths.
- B. Prevent three sided adhesion by use of bond breaker tapes or backer rods at the back of the joint. Install backer rods at the proper depth to create the specified sealant depth, avoid placing backer rods too deep which will result in sealant failure due to excessive sealant depth. Backup material shall be suitable size and shape so that when compressed 20 to 50%, it will fit in all joints where required. Do not cut or puncture the surface skin of the rod.
- C. Apply masking tape where required by surfaces encountered, and as may be determined by mockup testing, in continuous strips in alignment with joint edge. Remove tape immediately after joints have been sealed and tooled.

3.05 SEALANT INSTALLATION

- A. Prime surfaces where required with primer recommended by sealant manufacturer and as determined by "bond" test required in Part 1 of this Section.
- B. Apply, tool and finish sealant in accordance with manufacturer's recommendations.
- C. Finishing: Tool all vertical, non-sag sealants so as to compress the sealant, eliminating all air voids and providing a neat smoothly finished joint. Provide slightly concave joint surface, unless otherwise indicated or recommended by the manufacturer.

3.06 FIELD QUALITY CONTROL

- A. Require sealant manufacturer to be present at project site to:
 - 1. Observe sealant mockup installation and to issue reports of observations.
 - 2. Conduct field pre-construction testing.
- B. Test Samples
 - 1. If requested by the Architect, for each 1,000 linear feet of joint installed, cut out and carefully remove a 6 inch long sample of the undisturbed sealant and joint backer material from the newly installed Work. Remove the samples in the presence of the Testing Laboratory's Representative, who will retain them for evaluating and testing.
 - 2. Reseal cutout areas with the same type materials.

3.07 CLEANING

- A. Immediately remove misapplied sealant and droppings from metal surfaces with solvents and wiping cloths. On other materials, remove misapplied sealant and droppings by methods and materials recommended in writing by the manufacturer of the sealant material.
- B. After sealants are applied and before skin begins to form on sealant, remove all masking and other protection. Clean up remaining defacement caused by the Work.
- C. All finished work shall be left in neat, clean condition.

3.08 WASTE MANAGEMENT – Coordinate with Section 01 74 19

- A. Separate waste in accordance with the Waste Management Plan.
- B. Close and seal tightly all partly used sealant containers and store protected in well-ventilated, fire-safe area at moderate temperature.
- C. Place used sealant tubes and containers in areas designated for hazardous materials.

End of Section

SECTION 08 71 00 FINISHED HARDWARE

Part 1 – GENERAL

1.01 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.02 DESCRIPTION OF WORK

- A. The work of this Section consists of the furnishing of all materials, accessories, incidentals and the like necessary and/or required for the complete execution of finished hardware and related work for this project as required by the schedules, keynotes and drawings.
- 1.03 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above and as follows: NOTE: This section does not cover items generally known as rough hardware nor items of finish hardware when noted elsewhere in the specifications as being furnished or included with unit items by other suppliers or contractors as well as the following.
 - A. 08 11 00/08 14 00 Installation
 - B. Casework Hardware except lock systems to be furnished herein as part of the requirements of this Section

1.04 QUALITY ASSURANCE

- A. Conform to all applicable codes. Provide all throws, projections, coatings, knurlings, opening and closing forces, and other special functions required by State and Local Building Codes, and all applicable Handicap Codes and conformance to ADA requirements.
- B. For fire rated openings, provide hardware complying with NFPA 80 and NFPA 101 without exception. Provide only hardware tested and listed by UL for the type and size of door installed and fire resistance rating required;
- C. Further, furnish all products to comply with New York State Building Code; and handicapped codes and regulations. This specification notwithstanding, the Drawings, local, state, or jurisdictional authority shall take precedence. Any change required to meet such codes or authority shall be made by this Contractor and shall be a part of this work.
- D. All hardware shall be of the best quality in construction, design and finish, and free from defects and shall be the proper kind for its required use and shall fit its intended location perfectly. Should any hardware, as specified, fail to meet the intended requirements or require any modification to suit the intended location, this matter or any other advance information shall be brought to the attention of the Architect in ample time to avoid delay in the manufacture and delivery of the hardware. Any defective pieces shall be replaced by the Contractor at his own expense.
- E. Hardware on all spaces shall be a type which will always permit the door to be opened from the inside without direct manipulation of any locking device.
- F. Qualification of Supplier:
 - 1. A recognized supplier of architectural finish hardware with warehousing facilities, who has been furnishing hardware in the vicinity of the project for not less than 5 years, and who is, or who employs, an architectural hardware consultant.
 - 2. Qualifications of Architectural Hardware Consultant (AHC): Certified by the Door and Hardware itute.

Institute.

- 1.05 SUBMITTALS Coordinate with Section 01 33 00
 - Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
 - As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
 - Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings
 are critical to the proper execution of the Work and failure to honor these requirements may become the basis for
 denial of any and all claims for either or both "time" and "money".
 - The Contractor is encouraged to submit for approval products made from recycled and/or environmentally
 responsible material. Every effort will be made by the Design Professional Team to approve these materials; the
 substitution request procedure shall still be enforced.

A. As soon as practicable after award of contract, before a hardwareschedule is prepared and before any hardware is delivered to the project, submit 1 sample of each item for approval. List each of the different items of finish hardware on a form similar to the following:

	HARDWARE SAMPLE LIST		
	PROJECT SPECIFICATION		MANUFACTURER'S
	REFERENCE TYPE OR	NAME OF	NAME & CATA. NO.
ITEM NO.	CATALOG NUMBER	ITEM	OF ITEM SUBMITTED

- B. Opposite each item listed, provide the Specification reference, the name of the article and the rer's name and catalognumber of the hardware to be furnished. Submit the manufacturer's catalog or cut and description of each item with the sample list.
- C. The approved samples will remain on file with the Architect until all other similar items have been installed in the project, at which time they will be released to the Contractor for installation in predetermined locations on the Project.
- D. Before any hardware is fabricated and after approval of samples and sample lists, submit a hardware schedule for approval in accordance with the Conditions. The hardware schedule shall show the symbols, quantities, type and location, finish and other necessary information of all items of finish hardware required for the project, and shall contain the catalog numbers of the items that appear on the sample list. Order all hardware immediately on approval to insure prompt delivery.
- E. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product.

1.06 EXTRA STOCK/SPARE PARTS

- A. The owner shall receive installation and maintenance instructions for all hardware types. Include a complete spare parts list and sources of supply.
- B. In order to keep the building functioning safely and securely at all times, the following items of hardware will be delivered to the owner by the hardware supplier upon occupancy of the building.
- C. Allow 5% (full piece count) of all items furnished under work of this section.

1.07 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC)content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or postindustrial waste.
- 1.08 SPECIAL GUARANTEE/WARRANTY TERMS: Door Closers, 5 years.

1.09 REFERENCES

A. Hardware shall comply with the requirements of the following references. American National Standards Institute (ANSI) numbers are specified for hardware items except when only Builders Hardware Manufacturers Association (BHMA) numbers are available.

ANSI 156.1 Butts and Hinges (Grade 1)

ANSI 156.2 Locks and Locktrim (Grade 1)

ANSI 156.3 Exit Devices (Grade 1)

ANSI 156.4 Door Controls -- Closers

ANSI 156.6 Architectural Door Trim

ANSI 156.7 Template Hinge Dimensions

ANSI 156.8 Door Controls -- Overhead Holders

BHMA 1301 Materials and Finishes

BHMA 1201 Auxiliary Hardware

Part 2 - PRODUCTS

2.01 GENERAL

- A. The "Door Hardware Sets" and "Door Hardware Components" hereafter know as "Schedules" as attached, are assumed to be complete. However, the omission of any item or items shall not relieve the Contractor from furnishing of same. Locks and other devices shall be furnished for all openings as called for in the "Schedule".
- B. These "Schedules" is not intended to mention every particular item of hardware required, but is intended to establish type andquality for the locations and types of openings where hardware will be applied. Items not specifically mentioned shall be supplied in quality and type equal to similar work included inthese "Schedules".
- C. Hardware sets are used to indicate the desired function and operation of doors. All modifications in hardware required by reason of the construction characteristics shall be such as to provide the specified operation of functional features, subject to approval of the Architect.

2.02 MATERIALS AND QUALITY

- A. All hardware shall be of the best grade of solid metal entirely free from imperfections in manufacture and finish.
- B. Qualities, weights, and sizes given herein, are the minimum that will be accepted. It is the responsibility of the Hardware Supplier to supply the specified size and weight of hardware, the proper functions of hardware in each case, and to provide the proper UL approved hardware at all fire rated doors.
- C. Provide, as far as possible, locks of one lock manufacturer and hinges of one hinge manufacturer. Modifications to hardware that are necessary to conform to construction shown or specified shall be provided as required for the specified operative and functional features.

2.03 HARDWARE DESIGNATIONS

A. All items of hardware are referenced by manufacturer's names and numbers. The manufacturer's names and numbers are used to define the function, design, and quality of the material to be supplied. Substitution of products other than those listed shall be submitted to the Architect for approval prior to the submission of the finish hardware schedule. The Architect shall be the sole judge of any proposed substitution.

2.04 TEMPLATES

A. Hardware Supplier shall immediately, but not later than 3 days after approval of the Schedule by the Architect, furnish the General Contractor with complete template information necessary for fabrication of doors, frames, etc. No templates shall be furnished prior to the approval of the Hardware Schedule.

2.05 REQUIRED FINISH HARDWARE

A. This Contractor shall furnish all finish hardware required for the project. Hardware not specified for a particular opening shall be furnished under this Section and shall conform to hardware for similar openings elsewhere in the building.

2.06 KEYS AND KEYING

- A. All Locks/Cylinders shall be Grandmaster keyed and Master keyed in groups and further with a built-in construction master key system all as directed by Owner/Architect at the Factory furnishing said hardware. The system shall permit voiding of the construction master key system without cylinder removal. Furnish only construction keys as specified to construction company. Cylinders: 6-pin design complying with performance requirements of ANSI A156.5. All keys to be of nickel silver only.
- B. After receipt of an approved Hardware Schedule and prior to ordering any locking devices, hardware supplier shall arrange through the General Contractor for a meeting with the Architect and/or Owner to discuss keying arrangements for this project. A Keying Layout Schedule shall be submitted for review within 10 days after such meeting.
- C. Keys Material, nickel silver only; Size bow, Standard. All keys shall be identified by BOW STAMPING BOTH KEYS AND CYLINDER. Key quantity as follows:
 - 6 Grand Master
 - 6 Master keys, each selection
 - 10 Construction Master Keys
 - 2 Change Keys per Cylinder
 - 5% of total key requirements in blanks
- D. Supply a bitting list for all change keys and master keys to the Owner.

E. All Grand Master, Master and change keys shall be delivered to the Owner and/or Owner's representative via registered mail.

2.07 FASTENERS

- A. Manufacture hardware to conform to published templates, generally prepared for machine screw installation.
- B. Furnish screws, expansion shields, toggle bolts and other anchorage devices required for proper and code compliant installation, with each hardware item. Provide Phillips flat head screws except as otherwise indicated. Finish exposed screws to match the hardware finish, or if exposed in surfaces of other work, to match the finish of such other work as closely as possible, except as otherwise indicated.
- C. Provide concealed fasteners for hardware units which are exposed when the door is closed, except to the extent no standard manufactured units of the type specified are available with concealed fasteners. It is this suppliers responsibility to provide proper fasteners at mineral core doors, where wood blocking is provided in mineral core doors, thru bolts are not to be furnished.
- D. All closers and exit devices on labeled wood doors shall be thru bolted if required by the door manufacturer.
- E. All thresholds shall be fastened with machine screws and anchors.
- F. All hardware shall be installed only with fasteners supplied by manufacturers of specific products.
- NOTE: If required by intended use, fasteners shall be "security" type.

2.08 PACKING AND MARKING

- A. All hardware shall have the required screws, bolts, and fastenings necessary for proper installation and shall be wrapped in the same package as the hardware item for which it is intended and shall match finish of hardware with which to be used.
- B. Each package shall be clearly labeled indicating the portion of the work for which it is intended.

Part 3 - EXECUTION

3.01 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.02 INSTALLATION OF HARDWARE

- A. Preparation of hardware and installation of hardware is the work of other trades and is specified to be provided under other Sections. The Hardware Supplier shall provide instructions to the various other trades generally in accordance with the following.
- B. Install hardware following manufacturer's instructions. Except as indicated or specified otherwise. Use fasteners furnished with hardware to fasten hardware in place. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws. Use machine screws set in expansions shields for fastening hardware to solid concrete and masonry surfaces. Use toggle bolts where required for fastening to hollow core.construction. Use through bolts where indicated or specified and where necessary for satisfactory installation.

3.03 RESPONSIBILITY

- A. The Contractor will be responsible for all hardware after the delivery to him until final completion and acceptance of the building.
- B. Hardware supplier shall be responsible for:
 - 1. Coordinating of hardware with material to which it is applied.
 - 2. Coordinating of his material with other trades.
 - 3. Obtaining shop drawings for materials to which hardware is applied.
 - 4. Checking shop drawings and furnishing templates to other suppliers or Subcontractors requiring same.
- C. The strikes for all latch and dead lock units shall be furnished with wrought boxes to match finish specified.
- D. Painted parts of closers shall be finished with a rust inhibitive paint.
- E. All wrapping furnished by the manufacturer on knobs, handles, and pulls shall be replaced upon the hardware as soon as it is installed and shall remain thereon until the completion of the construction.

3.04 SHIPPING AND IDENTIFICATION

- A. Ship all hardware with proper fastenings for secure application to intended substrate.
- B. Each package of hardware shall be legibly marked indicating the part of the work for which it is intended. Markings shall correspond with the item numbers shown on the approved Hardware Schedule.
- C. Keys shall be tagged within each package set and plainly marked on the face of the envelope with the Key Control number, door designation and all identification as necessary.

3.05 WASTE MANAGEMENT – Coordinate with Section 01 74 19

- A. Separate and recycle materials and material packaging in accordance with Waste Management Plan and to the maximum extent economically feasible and place in designated areas for recycling.
- B. Set aside and protect materials suitable for reuse and/or remanufacturing.
- C. Separate and fold up metal banding; flatten and place along with other metal scrap for recycling in designated area.

End of Section

Part 1 - GENERAL

1.01 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.02 DESCRIPTION OF WORK

- A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all gypsum drywall cladding, stud framing and accessory work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:
 - 1. Provide partition systems in design configuration shown and/or required to complete the work of the project. Provide acoustical insulation and isolation systems within partitions and surrounds as required by schedules.

NOTE:

- Mold and humidity resistant boards shall be provided for all drywall partitions at all locations.
- 2. Close openings as indicated with steel studs and gypsum.
- 3. Close door transoms as scheduled and detailed.
- 4. Provide gypsum board fascia and soffit treatments in connection with acoustical ceilings as detailed. Coordinate with Section 09 51 00 for custom trim systems.
- 5. Provide freestanding furring installations, single and/or double layer as required to complete the project work.
- 6. Provide continuous grounds minimum of 12 inches wide applied horizontally to steel studs to first stud beyond item being secured (both directions) prior to placement of gypsum. Provide grounds at all locations where casework, counters and/or cabinets, visual display boards, shelf standards, chair rails, hook strips, grab bars and the like are to be anchored to steel grounds with suitable screws and/or bolts. Manufacturer of wall system shall recommend proper method of anchorage. Where items are to be wall hung or wall mounted including wall hung cabinets, visual display boards and the like, grounds shall be installed at the top and the bottom of these items. Additional grounds shall be installed between the top and bottom grounds for additional points of attachment as may be required by particular application.
- 7. Tape and finish all gypsum work to Level 4 guidelines.
- 8. Provide all metal and/or PVC trim, casing beads, caulking, gaskets, control joints, fasteners, and all other appurtenances indicated on drawings, specified and/or required to provide a complete installation.

9. Caulk:

- a. all openings around pipes, fixtures and the like flush and neat prior to erection of tile finish.
- b. all door and window frames to surrounds;
- c. dissimilar materials, i.e. gypsum to concrete, hollow metal to masonry and/or gypsum, concrete masonry and the like both vertical and horizontal
- d. All gypsum wallboard be installed with a fire sealant bead of 3/8 in. (9 mm) between the floor and the bottom edge of the gypsum; coordinate requirements with Section 07 90 00.
- 10. Perform balance of gypsum construction as may be required to complete the work of the project.
- 1.03 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above and as follows:
 - A. Furnishing of all door frames, access panels, etc. for installation in drywall construction.

1.04 QUALITY ASSURANCE

A. All gypsum construction required under this phase of the work shall be performed in strict accordance with the following

Reference Standards:

- 1. Drywall Construction Guidelines promulgated by U.S. Gypsum within the 4th edition of the Gypsum Construction Handbook.
- 2. ASTM C 754, Specifications for Installation of Steel Framing Members to Receive Screw Attached Gypsum Wallboard.
- 3. ASTM C 840, Standard Specification for Application and Finishing of Gypsum Board.
- 4. ASTM C 1178 Standard Specification for Glass Mat Water Resistant Gypsum Backing Panel.

- 5. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
- 6. ASTM E 90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- 7. Applicable publications of the Gypsum Association; 810 First Street NE; Washington, DC 20002.
- 8. Balance of ASTM specifications governing gypsum construction, framing and fasteners as applicable to intended installation including C 36, C79, C 442, C 645, C 931, C 1002, C 1047 and, as recognized by governing agencies/code facilitators ASTM C 1396.
- B. Definitions: Gypsum Board Construction Technology: Refer to ASTM
- C. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.
- D. Fire rated Construction Ratings: Wherever fire resistance classifications (2 hour, 1 hour, and similar designations) are indicated on the Drawings, or required by local fire regulations and codes, for walls and partitions, provide materials, accessories, and use assemblies which have been listed by UL or tested in excess of requirements of ASTM E 119 for the type of construction shown and the governing building code and fire regulations, other requirements of these specifications notwithstanding.

1.05 SUBMITTALS – Coordinate with Section 01 33 00

- 1. Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.
- 2. As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.
- 3. Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".
- 4. The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.
- A. Certification of Specification Compliance on all materials.
- B. Product Data: Submit manufacturers' specifications for the following products: gypsum board, joint compound, acoustical sealant, insulation, metal studs and fasteners.

C. Samples:

- 1. Gypsum Board: 12 inches square, each type specified.
- 2. Fasteners: 10, each type.
- 3. Acoustical Sealant: 1 pint.
- 4. Insulation: 12 inches square, each type specified.
- 5. Studs, tracks, shoes, furring channels and accessories: 12 inch lengths, each type specified/required.
- 6. Trim systems, including reveal shapes.
- D. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)

- A. Delivery and Handling
 - 1. Deliver materials to the project site with manufacturer's labels intact and legible.
 - 2. Handle materials with care to prevent damage.
 - 3. Deliver fire rated materials bearing testing agency label and required fire classification numbers.
- B. Storage
 - 1. Store materials inside under cover, stack flat, off floor.
 - 2. Stack wallboard so that long lengths are not over short lengths.
 - 3. Do not overload floor system.
 - 4. Store adhesives in dry area, provide protection against freezing at all times.

- A. Temporary Climate control will be used to maintain dry bulb temperatures between 55 and 80 degrees F and relative humidity at less than 50% during installation, taping and curing of joint compound.
- B. Ventilation
 - 1. Provide ventilation during and following adhesives and joint treatment applications.
 - 2. Use temporary air circulators in enclosed areas lacking natural ventilation.
 - 3. Under slow drying conditions, allow additional drying timebetween coats of joint treatment.
 - 4. Protect installed materials from drafts during hot, dry weather.
- C. The moisture content of the taped and sanded gypsum board walls be measured and documented by the general contractor at two locations on each wall: the bottom edge and halfway between floor and ceiling. Specify that the interior finish may not be applied until the moisture content of the wallboard is below 0.4% on a gypsum moisture meter or below 12% on a wood meter.
- D. Protection: Protect adjacent surfaces against damage and stains.

1.08 SPECIAL MATERIAL AND CONSTRUCTION REQUIREMENTS

- A. Tolerances: Do not exceed 1/8 inch in 8 feet variation from plumb or level in any exposed line or surface, except at joints between planes or abutting edges or ends. Shim as required to comply with specified tolerances.
- B. Provide control joints in all partitions at 30 foot maximum spacing; at all ceilings at 30 foot maximum centers without perimeter relief (900 square foot increments); at all ceilings at 50 maximum centers with perimeter relief (2500 square foot increments) and where ceilings form "L", "U" or "T" shaped configuration. Where joints are placed in rated partitions, conform to UL assembly data for particular installation; double framing at all joints.

1.09 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or postindustrial waste.

Part 2 - PRODUCTS

2.01 MATERIALS - GENERAL

- A. Basic gypsum wallboard materials for work in this section, unless otherwise specified, shall be as far as possible by one manufacturer. Materials specified by trade name or model number are those of the United States Gypsum Company, similar and equal products of the following will be acceptable.
 - 1. G-P Gypsum (Dens-Glass Products)
 - 2. National Gypsum
 - 3. CertainTeed
 - 4. LaFarge North America
 - 5. Temple Inland

NOTE: Material shall be furnished with tapered edge for taping systems specified below and subject to criteria established in Part 1 above. It should be noted that no board will be permitted to be hung until a controlled environment is achieved for the work area(s) involved – i.e. fully weather protected and temperature/humidity controlled.

2.02 WALLBOARD – SPECIFICS

Gypsum Wallboard shall conform to ASTM C 1396 for conventional material and C 1629 for abuse resistant material and shall be in 4 foot widths by largest practical length and as follows:

- A. Humidity, mold and abuse resistant gypsum panels to have a noncombustible, moisture and mold resistant gypsum core encased in a mold and moisture-resistant, 100-percent recycled green, blue or purple face and brown back papers; 5/8 inch thickness, Type X.
 - 1. US Gypsum "SHEETROCK brand MOLD TOUGH AR" gypsum panels
 - 2. National Gypsum "Type XP/AR"
 - 3. G-P Gypsum "Dens-Armor Plus/AG"
 - 4. CertainTeed "ProRoc w/M2Tech"

Or equal having a noncombustible, moisture and mold-resistant gypsum core that is encased in moisture and mold-resistant, 100 percent recycled face and back cladding; panels shall be classified Type X.

2.03 STEEL STUD FRAMING - ASTM C 645

- A. Stud and accessory systems shall be as manufactured by one of the following:
 - 1. Dietrich Metal Framing, A Worthington Industries Company
 - 2. MarinoWare; a Division of Ware Industries
 - 3. ClarkWESTERN Building Systems
 - 4. SCAFCO Corporation
 - 5. The Steel Network

Or approved equal manufacturer.

- B. Gauge minimum 20 (0.0312) for all framing; NO LIGHTER MATERIAL SHALL BE USED. Acceptable alternative is the UltraSTEEL assembly by Dietrich Metal Framing in 20 gauge equivalent (0.0296 inch). Modify stud gauges at the following locations:
 - Steel studs adjacent to door bucks either:
 - a. 16 gauge (0.055) minimum.
 - b. "Boxed" studs, 20 gauge (0.0312) minimum.
 - c. Patented system of jamb studs and header systems in gauges determined by span of opening and certified by engineering calculations equal to:
 - 1. "ProX Header System and Jamb Stud" by Brady Construction Innovations
 - 2. "Header Assembly and Jamb Stud" by Priceless Steel Products.
 - 3. "Red-Header Jamb and Header System" by ClarkWESTERN.
 - 3. Track systems, gauge as for studs: Leg height, 1-1/4 inch throughout unless modified by details.
- C. All material shall be electro galvanized steel in locations and sizes as indicated or required by "limiting height" criteria.
- 2.04 FURRING CHANNELS: #25 gauge electro galvanized steel, U.S.G., Drywall Furring Channels, and/or RC1 as required installation.

2.05 ACCESSORIES

1.

- A. Corner Beads General: #25 gauge, perforated, galvanized steel, U.S.G. Dur-A-Bead (#103), flange width as recommended by the manufacturer for each thickness of wallboard. Corner beads to be installed at all outside corners of gypsum.
- B. Casing Beads: U.S.G. No. 400 Series or similar, as required (for all terminal edges of gypsum board as indicated) (where gypsum board abuts other materials unless noted otherwise).
- C. Control Joints: U.S.G. No. 093 or similar.
- D. Adhesive: recommended by the approved gypsum wallboard manufacturer for each particular installation.
- E. Strapping 20 gauge by 12 inch galvanized sheet steel or patented assembly known as "Danback® Flexible Wood Backing Plate" as distributed by Dietrich.

2.06 FASTENERS

- A. Screws for fastening conventional gypsum board systems: Corrosion resistant U.S.G. Drywall Screws, minimum 1-5/8 inch, Type S Flat Phillips, Hex or Pan Head, self drilling screws or as recommended by the accessory manufacturer for the specific condition and thickness of materials being joined.
- B. Anchor Bolts and Studs: ASTM A 307, Grade A, carbon steel, with hex-head carbon steel nuts and flat steel washers. Hot-dip zinc coated in accordance with ASTM A 153. Provide bolt or stud type and size as required by structural design calculations required by 1.05 above.
- C. Expansion Anchors: Federal Specification FF-S-325, Group II, Type 4, Class 1. Provide bolts listed or approved by one or more of the following and of diameter and length as required by structural design calculations required by 1.05 above.
 - 1. Underwriters Laboratory.

- 2. Warnock Hersey (ITS).
- 3. International Conference of Building Officials.
- D. Powder Actuated Fasteners: Federal Specification FF-P-395b. Manufacturer from AISI 1062 or 1065 steel, austempered to a minimum core hardness of 50 to 54 HRC and zinc plated in accordance with ASTM B 633. Provide fasteners listed or approved by one or more of the following and of type, diameter and length as appropriate for installation and construction type.:
 - 1. Underwriters Laboratory.
 - 2. Warnock Hersey (ITS).
 - 3. International Conference of Building Officials.
- 2.07 GASKETS: Polyvinylchloride (PVC) closed cell foam, approximately 3/8 inch by 3/8 inch, buff or white, with pressure sensitive adhesive one side.
- 2.08 JOINT FINISHING SYSTEM:
 - A. Perforated reinforcing joint tape Similar and equal to "Perf-ATape" by U.S. Gypsum.
 - B. Joint Compound Regular Gypsum Installations: Similar and equal to U.S. Gypsum "Durabond" and/or "Ready-Mixed Joint Compound-All Purpose" ready mixed joint compound in formulation as determined by the manufacturer as suitable for intended use.

NOTE: See Part 1 herein for restrictive measures to be taken for preparation, application and curing of compound systems; further Toxicity/IEQ - Lime compound. All purpose joint and texturing compound containing inert fillers and natural binders. Pre-mixed compounds shall be free of antifreeze, vinyl adhesives, preservatives, biocides and other slow releasing compounds.

- 2.09 CAULKING/SEALING: Type V for general work, Type VII for fire caulking requirements, reference Section 07 90 00.
 - Acoustical Sealant: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

NOTE: Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

- 1. Acoustical Sealant for Exposed and Concealed Joints:
 - a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
 - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
- 2. Acoustical Sealant for Concealed Joints:
 - a. Ohio Sealants, Inc.; Pro-Series SC-170 Rubber Base Sound Sealant.
 - b. Pecora Corp.; BA-98.
 - c. Tremco, Inc.; Tremco Acoustical Sealant.

2.10 INSULATION

Α.

- A. Sound attenuation batt type thickness and locations shown on drawings shall be of glass fiber formulation, unfaced design and designed for friction fitting within stud cavity. Material shall be class "A" as per ASTM E 84 requirements.
- B. Fully seal and tape joints when accessible, fully butt all others to insure sound tight joint.
- C. Material shall be one of the following:
 - 1. "SoundShield" by Johns Manville
 - 2. "Sound Attenuation Batts" by Owens Corning.
 - 3. "CertaSound" by CertainTeed.

OPTION: Mineral fiber blankets similar and equal to U.S.Gypsum "Thermafiber SAFB" in 2.5 pound density.

2.11 Balance of materials required for the work shall be as specified elsewhere in this Section.

Part 3 - EXECUTION

- A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.
- 3.02 INSTALLATION PARTITION FRAMING
 - A. At all partition floor and ceiling tracks and wherever drywall partitions abut vertical masonry or concrete surfaces, provide gaskets and/or caulking/sealing.
 - B. When double layer, face caulk on base layer top, bottom and edges.
 - C. Provide drywall furring channels on walls and partitions where indicated. Secure channels to masonry or concrete at 16 inches o.c. with suitable fasteners at maximum of 24 inches o.c.
 - D. Framed partitions shall be constructed with steel studs and channels true to line and fastened to construction top and bottom at 24 inches o.c. Studs shall be twist locked into tracks at 16 inches o.c. Partitions shall be carried to the base structure above and fastened. Double studs to structures at all openings. Place steel studs approximately 2 inches from abutting partitions and 2 inches from each side of interior angle of all corners. Secure steel studs to top tracks with galvanized steel adjustable stud shoes or within "flex track" or by use of double insert head track.
 - E. Stud Tracks Standard 1-1/4 inch drywall floor and ceiling stud tracks securely fastened to beams, slabs or partitions with ½ inch stud bolts or other method approved by manufacturer spaced not more than 24 inches on centers. Gauge of steel, minimum 20 (0.0312) or as indicated on Drawings.
 - F. Horizontal Bracing 3/4 inch steel furring channels fastened to inside of stud with webs in a horizontal position. Spacing of channels shall not exceed 6 feet.
 - G. Shaft type partitions shall be erected in strict accordance with the manufacturer's directions.
 - H. All free standing furring and/or solid partition shall be aligned accurately according to the partition layout and constructed as for D. above.
- 3.03 BOARD APPLICATION General application shall be as for gypsum board following requirements set forth in basic specification and as supplemented by ASTM C 840 specifications for Application and Finishing of Gypsum Wallboard.
 - A. Locate all attaching screws 12 inches o.c. Attach all wallboard to studs with screws as specified.
- 3.04 CORNER AND TRIM TREATMENT
 - A. Internal Corners Treat as specified for joints, except that the reinforcing tape shall be folded lengthwise through the middle and fitted neatly into the corner.
 - B. External Corners
 - 1. Install a corner bead fitting neatly over the corner and secured with the same type fasteners used for applying the wallboard, spacing the fasteners approximately 6 inch on centers and driving through the wallboard into the framing and furring member.
 - 2. After the corner piece has been secured into position, treat the corner with joint compound and reinforcing tape as specified for joints.
 - C. The drawings do not purport to show all locations and all requirements for metal trim in connection with the work of this Section. Carefully study the Drawings and the installation; provide in place all metal trim normally recommended by the manufacturer of the gypsum wallboard used in strict accordance with the manufacturer's recommended methods of installation.

3.05 GYPSUM WALLBOARD FINISHING

A. The following specification defines the level of finishing of gypsum board surfaces as defined in ASTM C 840, Article 22 and as amended by GA 214-90.

Level "4"UB - All joints and interior angles shall have tape embedded in joint compound and shall receive separate coats of joint compound applied over all joints, angles, fastener heads and accessories; surface shall be free of excess joint compound; all surfaces shall be smooth and free of tool marks and ridges.

B. Allow each application of compound applied to joints and fasteners to dry, then sand if necessary. Caution shall be used to avoid roughing of wallboard paper.

3.06 DRYWALL CEILINGS AND SOFFITS

A. Framed drywall ceilings and soffits shall have 20 gauge metal stud channels, 16 inches o.c., secured where possible directly to construction above, with suitable fasteners at a maximum of 24 inches o.c.

- Β. Direct hung drywall ceilings and soffits shall be installed thru use of a direct hung suspension system employing a tee grid system as specified in Part 2 above.
- C. Provide all accessory items including edge trim angles, exposed for exterior applications and concealed for attachment and taping for all interior applications.
- Secure single or double layer of gypsum wallboard to furring channels and tape and spackle with D. products as per Part 2 in accordance with Paragraph 3.02 above.
- 3.07 FIELD QUALITY CONTROL: Prior to any board installations, Architect or designee will conduct an above-ceiling observation to ensure compliance with UL criteria for all full-height fire-rated partitions, and report deficiencies observed. Do not proceed with installation of gypsum board until deficiencies have been corrected.

3.08 PARTITION IDENTIFICATION

- Place identification on all partitions indicated on Drawings as having a required fire or smoke rating, or Α. lead lining. Β.
 - Identification shall be as follows:
 - 1. Type: Same as indicated on drawing legend.
 - 2. Location: 10 feet on center, both sides of partitions, above ceiling lines.
 - 3. Place above access panels in hard ceilings.
 - Style of Lettering: 2 inches high, helvetica style, painted 4.
 - 5. Color: Red.

3.09 PROTECTION AND CLEANING

- Protect, by suitable means, all work of this section until responsibility for same shall have been relieved Α. by next operation.
- Β. This Contractor shall sweep all his debris and remove same as work progresses.
- 3.10 WASTE MANAGEMENT - Coordinate with Section 01 74 19
 - Separate clean waste gypsum products from contaminants for recycling in accordance with the Waste Α. Management Plan. Do not include wood, plastic, metal, asphalt-impregnated gypsum board, or any gypsum board coated with glass fiber, vinyl, decorative paper, paint, or other finish. Place in designated area and protect from moisture and contamination.
 - Β. Recycle clean waste gypsum products:
 - 1. Return to gypsum board manufacturer.
 - 2. Pulverize and apply on-site as soil amendment in accordance with landscape specifications. Do not use products containing glass fiber. Protect granular material from moisture.
 - C. Separate metal waste in accordance with the Waste Management Plan and place in designated areas for recycling or reuse.

End of Section

Part 1 - GENERAL

- 1.01 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements govern work in this Section.
- 1.02 DESCRIPTION OF WORK
 - A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all resilient flooring work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:
 - 1. Provide all resilient flooring systems designated on drawings and schedules.
 - 2. Provide rubber base in all areas designated on finish schedule.

NOTES: Unless otherwise indicated or scheduled, provide rubber bases at all partitions.

- 3. Prepare all floors scheduled to receive applied flooring. Coordinate with Section 03 54 00 for underlayment material provided under that section of the work or by this subcontractor so as to provide a unified responsibility.
- 1.03 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification.

1.04 QUALITY ASSURANCE

A. Provide types of flooring and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.

- B. Certifications
 - 1. Furnish manufacturer's certification from an independent testing laboratory acceptable to authorities having jurisdiction that resilient flooring complies with fire test performance requirements.
 - 2. Furnish certification from flooring installer that the substrate surfaces have been examined and are acceptable for installation of the Work of this Section.
- C. Fire Test Performance Provide resilient flooring which complies with the following performance criteria as determined by an independent testing laboratory acceptable to authorities having jurisdiction.
 - 1. ASTM E 648 (Critical Radiant Flux) of 0.45 watts per sq. cm. or greater, Class I.
 - 2. ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or less.
 - 3. ASTM E 84 Flame Spread: Not more than 25; rated as Class1.
- D. General Performance Requirements
 - 1. ASTM C 501 Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser.
 - 2. ASTM D 2047 Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.
 - 3. ASTM F 1303 Standard Specification for Sheet Vinyl Floor Covering with Backing.
 - 4. ASTM F 710 Standard for Concrete or other monolithic floors.
 - 5. Resilient Floor Covering Institute (RFCI): Standard Slab Moisture Test Method (Calcium Chloride Method) and/or The relative humidity probe method, also known as the RH test or the "in situ" test as per ASTM F2170-02, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes.
- 1.05 SUBMITTALS Coordinate with Section 01 33 00

Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.

As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.

Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claimsfor either or both "time" and "money".

The Contractor is encouraged to submit for approval products madefrom recycled and/or environmentally responsible material. Everyeffort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.

A. Product Data - Provide manufacturers' specifications, installationinstructions and surface preparation requirements for each material specified.

B. Submit shop drawings, layout plan, and manufacturer's technical data and installation instructions for commercial vinylcomposition tile flooring and accessories.

- C. Samples
 - 1. For Initial Selection: Submit actual sections of resilient flooring materials, showing full range of colors and patterns available, for each type of resilient flooring required.
 - 2. For Verification, prior to installation, submit the following:
 - a. Resilient tile: Full size, each type, size and color specified.
 - b. Base: 12 inch long sections, each type and color specified.
 - c. Adhesives: One pint, each type, labeled to indicate location of use and type of surface to receive product.
 - d. Floor Finish: One pint.

D. Submit a copy of the manufacturer's recommended maintenance procedures for resilient flooring and accessories provided underthis Section.

E. Certification of Specification Compliance.

F. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product.

- 1.06 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)
 - A. Store materials (resilient flooring, base and adhesives) in location having a minimum temperature of 65 degrees F for at least 24 hours prior to start of laying of flooring.

1.07 PROJECT CONDITIONS/REQUIREMENTS AND RESTRICTIONS

- A. Environmental Requirements: Maintain a minimum temperature in the spaces to receive the flooring and accessories of 65 degrees F (18 degrees C) for at least 48 hours before, during, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55 degrees F (13 degrees C) in areas where work is completed.
- B. Install resilient flooring and accessories after other finishing operations, including painting, have been completed. Do not install resilient flooring over concrete slabs until the same are cured and sufficiently dry to achieve bond with adhesive as determined by manufacturer's recommended bond and moisture test which will determine if their moisture content and alkalinity are within acceptable limits for installation of resilient flooring as specified in Part 3.
- C. All work of a nature conducive to high humidity conditions shall have been completed and be thoroughly dry. This contractor shall be held responsible for the cost of replacing all work of this Section damaged due to his failure to take the above precautions.

1.08 ADDITIONAL MATERIALS FOR MAINTENANCE

- A. Prior to final acceptance of the project, furnish to the Owner additional resilient flooring, and base in each color, type and pattern installed. All materials must be new, clean, undamaged and in original containers.
- B. Furnish materials at the rate of 1 carton for each 1000-1500 sq. ft. Furnish 1 roll of rubber base for future replacement. Additional material shall not be used for punch listing.

1.10 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or postindustrial waste.

Part 2 – PRODUCTS

2.01 RESILIENT TILE FLOORING:

- A. For purposes of establishing a standard of quality and not for the purposes of limiting competition, the basis of this specification is upon "MIGRATIONS" with BioStride BioBased Tile Flooring as manufactured by Armstrong World Industries, Inc., in color selected by the Architect from the range currently available from Armstrong World Industries, Inc., having a nominal total thickness of 1/8"/0.125in. (3.2mm), 12 in. x 12 in. (305 mm x 305 mm), composed of polyester resin binder, fillers and pigments with colors and texture dispersed uniformly throughout its thickness.
- B. Migrations with BioStride Tile shall conform to the size, squareness, thickness, indentation, impact, deflection, resistance to chemicals and resistance to heat requirements of ASTM F 1066, Class 2 through pattern.

2.02 ACCESSORIES

- A. Rubber Base shall be a thermoplastic composition combined with high quality additives and colorants designed specifically to meet the performance and dimensional requirements of ASTM F 1861, Type TP, Group 2 (solid) Standard Specification for Resilient Wall Base and shall conform to the following physical characteristics.
 - 1. Compression type.
 - 2. 4 inch high, .080 inch thick (tolerance + .005 inch).
 - 3. Top corner rounded, bottom coved, arranged for above floor application for tile areas; toeless for carpet applications.
 - 4. 120' (36.58 m) coiled lengths.
 - 5. Furnish inside and outside corners with 4 inch (10.16 cm) returns.
- B. Base shall comply with the following performance characteristics.
 - 1. Hardness ASTM D 2240: Rubber 85 Shore A.
 - 2. Flexibility Will not crack, break, or show any signs of fatigue when bent around a 1/4 inch (6.4 mm) diameter cylinder.
 - 3. Meets or exceeds the performance requirements for resistance to heat/light aging, chemicals, and dimensional stability when tested to the methods, as described, in ASTM F 1861.
 - 4. Fire Resistance: ASTM E 84/NFPA 255 (Steiner Tunnel Test) Class C; ASTM E 648/NFPA 253 (Critical Radiant Flux) Class
 - 1; ASTM E 662/NFPA 258 (Smoke Density) 450 or less.

Manufacturers – Armstrong; Johnsonite; Flexco; Mercer; Musson or approved equal.

2.03 ADHESIVES AND PRIMERS

- A. Materials shall be "v.o.c." compliant (green) and suitable for intended purpose be it tile, treads or other such resilient flooring material; location and structural conditions required and/or intended; use without adulteration or reducing and in accordance with manufacturer's printed instructions; types for each use shall be approved by the manufacturer of the respective materials and certifications of same in writing, shall be delivered to the Architect.
- B. Conventional resilient floor tile adhesives shall be as manufactured by:
 - 1. Armstrong (#S-521 for full moisture installation guarantee)
 - 2. W.W. Henry
 - 3. Domco/Tarkett
 - 4. XL Flooring
 - or other prime tile manufacturer nominated for the work of this Section.
- C. Wall Base adhesive: Similar and equal to Armstrong "#S-725 Wall Base Adhesive".

Part 3 - EXECUTION

- A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.
- 3.02 PREPERATION, GENERAL
 - A. Surfaces receiving resilient flooring shall not vary more than 1/8 inch in 10 foot distance, more than 1/16 inch within any 1 foot distance.
 - B. Perform a bond and moisture test as recommended by the resilient flooring manufacturer on concrete subfloors to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and any other coatings; and ready to receive resilient flooring.
 - C. Perform pH tests on concrete floors regardless of their age or grade level. All test results shall be documented and retained.
 - D. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring. Make subfloor free from dust, dirt, grease, and all foreign materials.

3.03 INSTALLATION – GENERAL

- A. All floor coverings shall be installed in full accordance with the manufacturer's written instructions, using recommended adhesives, tools, and procedures. Observe the recommended adhesive trowel notching, open times, and working times.
- B. No resilient flooring shall be set where it is required to be flush with other finishes until such other finishes have been installed and approved.
- C. Lay resilient flooring only while adhesive has proper tack, starting at center and working toward walls. Borders of field shall be equalized and no marginal tile shall be less than 4 inches wide, except where tile abuts askew vertical wall surfaces.
- D. Allow adhesive to become tacky before installation. Roll the floor covering with a 100 lb. three-section roller to break down adhesive ridges and expel any entrapped air while adhesive isstill wet.
- E. Marginal tile shall extend full width thru door openings to adjoining areas having like floor covering and have as few cross joints as possible, none of which shall occur in the center of the opening.
- F. Joints shall be tight, straight and inconspicuous; parallel to and at right angles with the enclosing walls and symmetrical with centerlines of rooms unless otherwise noted.
- G . Flooring shall not be cut except at walls and other abutting surfaces and materials. Holes required for pipes or other penetrations shall be neatly cut and flooring closely fit so as to leave no space for dirt to collect. Seal joints inconspicuously with waterproof floor mastic around pipes and at other vertical surfaces.
- H. All finish floor surface shall be smooth and free from buckles, waves, projecting edges, cracks and breaks.
- I. Provide tapered or flush engineered saddles as indicated on the project drawings at door and other openings between floor materials of different patterns or colors; one piece, color as selected.
- J. All work shall be neatly fitted around work penetrating floors and

3.04 RUBBER BASE INSTALLATION

- A. Installation shall not begin until flooring is completed and approved.
- B. Install on walls, partitions, columns, piers, cabinets, etc., to form continuous base at junction of vertical surfaces and finished floors.
- C. Keep vertical joints to a minimum by setting long strips.
- D. Base shall be continuous around external corners and lap a minimum of 6 inches.
- E. Base shall be continuous around internal corners and lap a minimum of 2 inches.
- F. When base terminates at external corner, provide integral molded corner.

3.05 CLEANING

- A. Promptly remove all excess adhesives and other surface soiling or stains from face of all flooring, bases and adjoining surfaces using cleaning agents recommended by the manufacturer of the material being cleaned.
- **B.** Perform initial maintenance according to the flooring manufacturer's instructions. **Immediately After Installation**
 - 1. Sweep, dust mop or vacuum the floor thoroughly to remove all loose dust and dirt.
 - 2. Remove any dried adhesive residue with a clean white cloth dampened with mineral spirits, carefully following warnings on container.
 - 3. Damp mop the floor with a properly diluted neutral detergent solution such as Armstrong S-485 Commercial Floor Cleaner. Do not wet wash, machine scrub, or strip the floor for at

least four days after installation. This is to prevent excess moisture from interfering with the adhesive bond and/or seam treatments.

- 4. Apply two coats of a high-quality commercial floor polish such as Armstrong
- 5. S-480 Commercial Floor Polish in addition provide a high quality stain-resistant sealer such as Armstrong S-495 Commercial Floor Sealer beneath the polish.

3.06 PROTECTION

- A. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.
- B. All rooms or spaces in which resilient floors are being laid shall be closed to traffic or other work and kept closed until floors are completed and firmly set.
- C. Just prior to final acceptance of the project, leave all resilient floors polished, buffed, clean, whole and in perfect condition.
- 3.07 SITE ENVIRONMENTAL PROCEDURES
 - A. Indoor Air Quality: Ventilate products prior to installation. Remove from packaging and ventilate in a secure, dry, wellventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree F maximum continuously for minimum 72 hours. Do not ventilate within limits of Work unless otherwise approved by Architect.

3.08 WASTE MANAGEMENT – Coordinate with Section 01 74 19

- A. Separate waste in accordance with the Waste Management Plan and place in designated areas in the following categories for reuse:
 - 1. Sheet materials larger than 2 sq. ft.
 - 2. Tiles larger than 1/2 tiles
- B. Linoleum waste may be shredded and composted.
- C. Close and seal tightly all partly used adhesive containers and store protected in well-ventilated, fire-safe area at moderate temperature.

End of Section

SECTION 09 90 00

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This Section includes surface preparation and field painting of exposed interior and exterior items and surfaces.
 - 1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Project Manager will select from standard colors and finishes available.
 - 1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
 - 1. Prefinished items include the following factory-finished components:
 - a. Architectural woodwork.
 - b. Acoustical wall or ceiling panels.
 - c. Metal toilet enclosures.
 - d. Elevator entrance doors and frames.
 - e. Elevator equipment.
 - f. Finished mechanical and electrical equipment.
 - g. Light fixtures.
 - h. Fire, Smoke, and Life Safety equipment.
 - 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
 - a. Furred areas.
 - b. Ceiling plenums.
 - c. Pipe spaces.
 - d. Duct shafts.
 - e. Elevator shafts.
 - 3. Finished metal surfaces include the following:
 - a. Anodized aluminum.
 - b. Stainless steel.
 - c. Chromium plate.
 - d. Copper and copper alloys.
 - 4. Operating parts include moving parts of operating equipment and the following:
 - a. Valve and damper operators.
 - b. Linkages.
 - c. Sensing devices.
 - d. Motor and fan shafts.
 - 5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

- A. The term "Painting" wherever used herein, means the application of all coatings such as paint, primer, enamel, varnish, shellac, oil, etc. as listed in the Painting Schedules.
- B. Standard coating terms defined in ASTM D 16 apply to this section.
 - 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
 - 2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
 - 3. Semi-gloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60degree meter.
 - 4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.
- C. The term "Painting" shall also include preparation of surface for such application, and the clean-up as hereinafter specified.
- D. The term "Walls" means all vertical surfaces from floor, or top of base, or top of wainscot, to ceiling or suspended ceiling.
 - 1. Include pilasters, breaks, jambs, reveals, returns, arches.
 - 2. Include hardboards, pegboards.
 - 3. Include free-standing columns, low partitions.
 - 4. Includes interior of all enclosed spaces.
 - 5. Includes exterior concrete block, metal panels, wood siding, wood shingles.
- E. The term "Ceilings" means the general overhead horizontal surfaces including cornices, fascias, arches, soffits, stair soffits, metal frame of ceiling lights and the like.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D 16 Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2007.
- C. ASTM D 4442 Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 1992 (Reapproved 2003).
- D. Green Seal GS-11 Paints and coatings (2011). http://www.greenseal.org/Portals/0/Documents/Standards/GS-11/GS-11_Paints_and_Coatings_Standard.pdf
- E. Green Seal GC-03 Anticorrosive Paints, http://www.greenseal.org/Portals/0/Documents/Standards/GS-11%20Stn%20Dev/anti-corrosivepaints.pdf
- F. South Coast Air Quality Management District Rule 1113, Architectural Coatings, <u>www.aqmd.gov/rules/reg/reg11/r1113.pdf</u>
- G. California Air Resources Board (ARB) Suggested Control Measure for Architectural Coatings http://www.arb.ca.gov/coatings/arch/approved_2007_scm.pdf
- H. Environmental Conservation Law, Article 19 6NYCRR, part 205 (Architectural Coatings).

1.04 SITE ENVIRONMENTAL PROCEDURES

A. Indoor Air Quality: Provide temporary ventilation as required to maintain adequate ventilation in enclosed areas throughout construction period required to: facilitate progress of Work; to protect Work against dampness and heat; to prevent moisture condensation on surfaces; to provide suitable ambient temperatures for installation and curing of painting; to provide adequate ventilating; to meet health regulations for safe working environment; and, to prevent hazardous accumulations of dusts, fumes, mists, vapors or gases in areas occupied during construction. Provide local temporary exhaust ventilating to prevent harmful dispersal of hazardous substances into atmosphere of occupied areas. Dispose of exhaust materials in manner that will not result in harmful exposure to persons or property. Provide ventilating operations at all times personnel occupy an area, when subject to hazardous accumulations of harmful elements. Continue operation of temporary ventilating system for as long as required after cessation of Work to assure removal of harmful elements.

In areas where the Work shall occur near building or area ventilation intake vents and/or devices, Contractor shall notify Project Manager, in writing, at least 72 hours in advance. Project Manager will determine if intake vents

and/or devices need to be turned off or shutdown prior to the Work commencing. The College will make every effort to comply with the Contractor's request, pending review of how said turn-off or shutdown will impact surrounding areas, building operations, and programs.

1.05 SUSTAINABILITY

- A. Materials used for the work of this Section shall, where applicable be VOC compliant with the latest rulings from the EPA and shall further meet LEED requirements which are set by Green Seal, Inc. In addition, the Green Seal recommendations that paints be formulated without specific harmful ingredients (e.g., formaldehyde, benzene) and heavy metals (e.g., cadmium, lead, mercury) shall be enforced. For architectural coatings other than paint, systems shall comply with the California Air Resources Board (ARB) Suggested Control Measure for Architectural Coatings (2008) and/or the South Coast Air Quality Management District's Rule 1113.
- B. VOC Content: Determine VOC (Volatile Organic Compound) content of solvent borne and waterborne paints and related coatings in accordance with EPA Method 24 and ASTM D 3960.
- C. In the selection of the products and materials of this Section as well as for the entire Project, preference will be given to those with the following characteristics:
 - 1. Water-based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no VOC (Volatile Organic Compound) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.

1.06 SUBMITTALS

- A. Product Data: Submit manufacturers' product literature for all coating materials, including paint label analysis and application instructions, recommendations for environmental conditions, surface preparation, priming, mixing, reduction, spreading rate, and storage for each material proposed for use.
- B. Product Data-Safety: Safety Data Sheets for each product to be used must be submitted to the Project Manager before application, including VOC content.
- C. Samples: Submit samples for Project Manager's review of color and texture only. Compliance with all other requirements is the exclusive responsibility of the contractor. Provide a listing of material and application for each coat of each finish sample. Samples are to be labeled for location and application.
- D. Samples are to be 12" x 12" hardboard, provide two (2) samples of each color and material, with texture to simulate actual conditions.
- E. Stain Killer: Submit manufacturer's technical information including label, analysis and application instruction.
- F. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.
- G. Certification: By manufacturer that all paints and coatings do not contain any of the prohibited chemicals specified; Green Seal GS-11 and GC-03 certification is not required but if provided shall constitute acceptable certification.
- H. Manufacturer's Instructions: Indicate special surface preparation procedures.
- I. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.
- J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Paint and Coatings: 1 gallon of each color; store where directed.
 - 2. Label each container with color in addition to the manufacturer's label.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- C. Source Limitations: Obtain primers for each coating system from the same manufacturer as the finish coats.
- D. Before and during the application of interior finishing, varnishing, painting, etc. and until final acceptance by the Project Manager of all work covered by the Contract, the Contractor shall, unless otherwise specified in the Contract Documents, provide sufficient heat to produce a temperature of not less than 68 degrees F nor more than 78 degrees F.
- E. Regulatory Requirements
 - 1. Applicable building code.
 - New York State Department of Environmental Conservation –Part 205 in "Architectural Surface Coatings" for Volatile Organic Compounds (VOC).
 - 3. U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) Construction Industry Standards (29 CFR 1926/1910), Revised 1993, Washington, DC.
 - 4. U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) Construction Industry Standards Part 1926.62, Lead Standard.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to job site in manufacturer's original, new and unopened packages and containers bearing manufacturers name and label, and the following information:
 - 1. Project Name or title of material.
 - 2. Product description (generic classification of binder type).
 - 3. Fed Spec. number if applicable, Manufacturers name, stock number and date of manufacture.
 - 4. Contents by volume for major pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color and number.
 - 8. VOC content.
- B. The college will provide one storage room exclusive for paint for the contractor to use during the duration of the contract. This will be in the Old Dorms, room C-09 unless and until other location(s) are designated. The contractor is responsible for maintaining the storage room to acceptable standards and for the security of equipment and materials. Remove oily rags and waste daily. The college is allowed to inspect the room as required.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in a well-ventilated area, and as required by manufacturer's instructions. Maintain storage containers in a clean condition, free of foreign materials and residue.
- D. As required by OSHA standard 29 CFR 1910.1200, the contractor shall provide Safety Data Sheets for all products the contractor brings on site. All such products shall be properly labeled in accordance with. The storage of water based paints and other nonflammable material shall be limited to no more than twenty-five (25) gallons at any one time. Oil-based paints, lacquer finishes, cleaning solvents and other flammable materials must be stored in fire-proof storage cabinets provided by the contractor and approved by the Project Manager.
- E. The contractor shall store materials and equipment in areas on site only as designated by the College. All materials shall be stored in a neat and orderly manner, and those subject to weather damage shall be protected by contractor against the weather by floored weatherproof temporary storage trailers. No painting work will start in any area until the contractor has the required materials on site.
1.09 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the coating product manufacturer, or as listed below (whichever is more restrictive):
 - Apply water-base paints only when temperatures of surfaces to be painted and surrounding air temperatures are between 50 degrees F (10 degrees C) and 90 degrees F (32 degrees C) unless otherwise permitted by paint manufacturers printed instructions.
 - Apply solvent-thinned paints only when temperature of surface to be painted and surrounding air temperatures are between 45 degrees F (7.2 degrees C) and 95 degrees F (35 degrees C) unless otherwise permitted by paint manufacturers printed instructions.
 - 3. Do not apply paint in snow, rain, fog or mist; or when relative humidity exceeds 85%; or to damp or wet surfaces, unless otherwise permitted by paint manufacturers printed instructions.
 - 4. Provide finish coats which are compatible with prime paints used. Provide coats and/or re-prime if primer is found to be incompatible with finish coats.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. All materials used in the work shall be pure, of best quality, and "Top-of-Line" of approved manufacturers. Materials not displaying manufacturers' identification as a standard, best-grade product will not be acceptable.
- B. Furnish all materials from one manufacturer unless otherwise specifically approved by Project Manager; no exceptions.
- C. Manufacturers' products which comply with coating requirements of applicable Federal Specifications, yet differ in quantitative requirements, may be considered for use when acceptable to Project Manager. Furnish material data and manufacturers' certificate of performance to Project Manager for any proposed substitutions. Information submitted shall outline how substitution matches or exceeds standards of specified projects.
- D. Acceptable Manufacturers:
 - 1. Benjamin Moore & Co. http://www.benjaminmoore.com
 - 2. Sherwin-Williams <u>http://www.sherwin-williams.com</u>
 - 3. PPG Industries <u>http://www.ppg.com</u>
 - 4. Glidden/ICI Industries <u>http://www.glidden.com</u>
 - 5. Pratt & Lambert <u>http://www.prattandlambert.com</u>

2.02 PAINTS AND COATINGS - GENERAL

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
 - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Supply each coating material in quantity required to complete entire project's work from a single production run.
 - 3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
 - 4. Paint colors, surface treatments, and finishes are to be specified by Project Manager.
 - 5. Prior to beginning work, Project Manager will furnish color chips for surfaces to be painted.
 - 6. Use representative colors when preparing samples for review.
 - 7. Final acceptance of colors will be from samples applied on the job.
 - a). Color Pigments: Pure, non-fading applicable types to suit substances and surfaces indicated.

- b). Lead Content: Paint as specified in this specification shall be void of any lead content.
- c). This limitation is extended to interior surfaces and those exterior surfaces, such as stairs, decks, porches, railings, windows, and doors which are readily accessible to children under seven (7) years of age.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
 - 1. Apply prime coat to material which is required to be painted or finished and which has not been prime coated by others.
 - 2. Re-coat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat to assure a finish coat with no burn-through or other defects due to insufficient sealing.
- C. Volatile Organic Compound (VOC) Content:
 - 1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. Ozone Transport Commission (OTC) Model Rule, Architectural, Industrial, and Maintenance Coatings; www.otcair.org; specifically:
 - 1) Opaque, Flat: 50 g/L, maximum.
 - 2) Opaque, Nonflat: 150 g/L, maximum.
 - 3) Opaque, High Gloss: 250 g/L, maximum.
 - 4) Varnishes: 350 g/L, maximum.
 - Architectural coatings VOC limits of State in which the project is located.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- D. Colors: As indicated by Project Manager or as outlined in project documents.

2.03 MIXING AND TINTING

C.

- A. Except where specifically noted in this section, all paint shall be ready-mixed and pre-tinted. Agitate all paint prior to and during application to ensure uniform color, gloss, and consistency.
- B. Thinner addition shall not exceed manufacturer's printed recommendations. Do not use kerosene or other organic solvents to thin water-based paints.
- C. Where paint is to be sprayed, thin according to manufacturer's current guidelines.

2.04 PAINT SYSTEMS - EXTERIOR

- A. Concrete and Stucco Opaque, Latex / Alkyd, 3 Coat:
 - 1. One coat of latex/alkyd exterior primer sealer.
 - 2. Flat/Low Luster/Satin/Semi-Gloss/High Gloss: Two coats of exterior grade latex/alkyd.
- B. Concrete Masonry Units (CMU) Opaque, Latex, 3 Coat:
 - 1. One coat of latex exterior block filler or masonry primer sealer.
 - 2. Flat/Low Luster/Satin/Semi-Gloss/High Gloss: Two coats of exterior grade latex.
- C. Ferrous Metals, Unprimed, Latex/Alkyd/Epoxy, 3 Coat:
 - 1. One coat of alkyd/acrylic/epoxy metal primer.
 - 2. Gloss: Two coats of latex/alkyd enamel.
 - 3. Semi-gloss: Two coats of latex/alkyd enamel.
- D. Ferrous Metals, Primed, Latex/Alkyd, 2 Coat:
 - 1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
 - 2. Gloss: Two coats of latex/alkyd enamel.
 - 3. Semi-gloss: Two coats of latex/alkyd enamel.
- E. Wood Opaque, Latex/Alkyd, 3 Coat:
 - 1. One coat of latex/alkyd exterior primer sealer.
 - 2. Flat/Low Luster/Satin/Semi-Gloss/High Gloss: Two coats of exterior grade latex/alkyd.
- F. Gypsum Board and Plaster Opaque, Latex/Alkyd, 3 Coat:
 - 1. One coat of latex/alkyd exterior primer sealer.

2. Flat/Low Luster/Satin/Semi-Gloss/High Gloss: Two coats of exterior grade latex/alkyd.

2.05 PAINT SYSTEMS - INTERIOR

- A. Concrete and Stucco Opaque, Latex, 3 Coat:
 - 1. One coat of latex interior primer sealer.
 - 2. Flat/Eggshell/Satin/Semi-Gloss/High Gloss: Two coats of interior grade latex/alkyd.
- B. Concrete Masonry Units (CMU) Opaque, Latex, 3 Coat:
 - 1. One coat of latex primer & underbody sealer.
 - 2. Flat/Eggshell/Satin/Semi-Gloss/High Gloss: Two coats of interior grade latex.
- C. Ferrous Metals, Unprimed, Latex/Alkyd/Epoxy, 3 Coat:
 - 1. One coat of alkyd/acrylic/epoxy metal primer.
 - 2. Gloss: Two coats of latex enamel.
 - 3. Semi-gloss: Two coats of latex enamel.
- D. Ferrous Metals, Primed, Latex, 2 Coat:
 - 1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
 - 2. Gloss: Two coats of latex enamel.
 - 3. Semi-gloss: Two coats of latex enamel.
- E. Wood Opaque, Latex/Alkyd, 3 Coat:
 - 1. One coat of latex/alkyd interior primer sealer.
 - 2. Flat/Eggshell/Satin/Semi-Gloss/High Gloss: Two coats of interior grade latex/alkyd.
- F. Gypsum Board and Plaster Opaque, Latex/Alkyd, 3 Coat:
 - 1. One coat of latex/alkyd interior primer sealer.
 - 2. Flat/Eggshell/Satin/Semi-Gloss/High Gloss: Two coats of interior grade latex/alkyd.

2.06 CAMPUS PAINTING GUIDELINES

- A. The following finish guidelines shall be followed unless otherwise directed by the Project Manager:
 1. Ceilings Flat finish.
 - 2. Walls, low partitions, soffits Eggshell/Satin finish.
 - 3. Metal doors, door frames, cove bases, and radiation covers Semi-Gloss/High Gloss finish.
 - 4. Metal handrails High Gloss finish.
- B. Paint all grilles and registers in walls and ceilings, fire extinguisher cabinets, hose cabinets, etc. not having a factory applied finish to match adjoining surface finish, unless directed otherwise by the Project Manager. A factory applied prime coat is not a finish. Such painting cannot interfere with the operation of these items.
- C. Paint all exposed electrical conduit and panelboards in all areas of the Work to match adjoining the wall finish, unless otherwise directed by the Project Manager.
- D. Paint all exposed mechanical piping and ductwork which runs vertically or horizontally on wall surfaces, unless otherwise directed by the Project Manager.
- E. <u>**Do not**</u> paint any telecommunications and/or electrical wiremold or raceway that is of the type that is to remain accessible. If item is in question, notify the Project Manager for approval prior to painting these items.

2.07 ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition, in writing, that may potentially affect proper application or is detrimental to the proper and timely completion of work, to the Project Manager prior to beginning work.
- C. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
- D. Starting of painting will be construed as applicators acceptance of surfaces and conditions within any particular area.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Interior Wood: 15 percent, measured in accordance with ASTM D 4442.

3.02 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
 - 2. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
 - 1. Provide barrier coats over incompatible primers or remove and re-prime. Apply primers/stain killer on all surfaces that contains material which will bleed through the specified paint finish shall receive an application of stain killer. It will be the contractor's responsibility to prepare the surface properly. The College will not accept areas which have blemishes or bleed through.
 - 2. <u>Plaster</u>: Minor plaster repair work includes removing all loose, friable, raised or uneven existing plaster patches, preparing and filling minor cracks (1/16 inch and less) or small holes (such as those from hardware) in the plaster with "Durabond" set type material mixed with an acrylic bonding agent as preparation for repainting. Reinforce crack larger than hairline with fiberglass tape embedded in patching material. Sand all repairs smooth. Further, all plaster surfaces shall be thoroughly washed, rinsed and prepared in strict accordance to the recommendations of the paint manufacturer.
 - 3. <u>Concrete and Concrete Masonry</u>: Clean surfaces free of loose particles, sand, efflorescence, laitance, form oil, curing compounds, and other substances which could impair coating performance or appearance.
 - 4. <u>Gypsum Drywall</u>: Provide dry, smooth sanded, clean and free of dust, dirt, powder residue, grease, oil, wax, or other contaminates such as flaking or peeling paint. Any dull glossy old surfaces to be lightly sanded prior to coating. Patch holes (smaller than (3) three square inches) and cracks with spackle and sand smooth and spot prime prior to application of coating system.
 - 5. <u>Wood</u>: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 - b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
 - c. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.

- d. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
- 6. <u>Ferrous Metals</u>: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
 - a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
 - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 - c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.
- 7. <u>Shop-Primed Steel Surfaces to be Finish Painted</u>: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
- 8. <u>Existing Coatings</u>: Remove surface irregularities by scraping or sanding to produce uniform substrate for coating application; apply one coat primer of type recommended by coating manufacturer for maximum coating adhesion. If presence of lead in existing coatings is suspected, cease surface preparation and notify Architect immediately.
- 9. <u>Corroded Steel and Iron Surfaces</u>: Prepare using at least SSPC-PC 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).
- 10. <u>Uncorroded Uncoated Steel and Iron Surfaces</u>: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand or power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of formic acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
- 11. <u>Metal Doors</u>: Prime metal door top and bottom edge surfaces.
- 12. <u>Wood Doors</u>: Seal door tops and bottoms prior to finishing.
- D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
 - 1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 - 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 - 3. Use only thinners approved by paint manufacturer and only within recommended limits.

3.03 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
 - 1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
 - 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 - 3. Provide finish coats that are compatible with primers used.
 - 4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
 - 5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 - 7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 - 8. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
 - 1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is

required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.

- 2. Omit primer over metal surfaces that have been shop primed and touchup painted.
- 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
- 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
 - 1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
 - 2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
 - 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.
- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.
- F. Mechanical items to be painted include, but are not limited to, the following:
 - 1. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
- G. Electrical items to be painted include, but are not limited to, the following:
 - 1. Electrical conduit.
- H. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- I. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- J. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.
- K. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.04 FIELD QUALITY CONTROL

A. Field Quality control shall be obtained by review of first finished area or item of each color scheme as required by the Project Manager for color, texture and workmanship. Said area, or areas, when accepted will serve as the minimum project standard for all ensuing work.

3.05 CLEANING

A. The contractor shall, at all times during the progress of the work, keep the site free from accumulation of waste matter or rubbish and shall confine his apparatus, materials and operations of their personnel to limits

prescribed by law or by the Contract Limit Lines, except as the latter may be extended with the approval of the State University. Waste matter or rubbish must be properly removed from the College. <u>College containers are</u> not to be used for discarding waste materials generated under this contract. Upon completion of the work covered by the contract, the contractor shall leave the completed project ready for use without the need of further cleaning of any kind and with all work in new condition and perfect order. In addition, upon completion of all work, the contractor shall remove from the vicinity of the work and from the property owned or occupied by the State of New York, all paint, building material, rubbish, unused material, and other material belonging to contractor or used under contractor's direction during construction which impairs the use or appearance of the property and shall restore such areas affected by the work to their original condition, and, in the event of contractor's failure to do so, the same shall be removed by the College at the expense of the contractor.

- B. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- C. Clean excess coating materials, and coating materials deposited on surfaces not indicated to receive coatings, as construction activities of this section progress; do not allow to dry.
- D. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- E. Re-install hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items that have been removed to protect from contact with coatings.
- E. Relocate to original position equipment and fixtures that have been moved to allow application of coatings.
- F. Remove protective materials.
- G. Tools and painting equipment, i.e., brushes and rollers, shall be cleaned in accordance with all Federal, State, and local regulations. <u>Do not use the College's plumbing facilities for this purpose.</u>

3.06 PROTECTION

- A. Protect finished coatings until completion of project.
- B. Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing and repainting, as acceptable to Project Manager.
- C. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for the protection of their work after completion of painting operations.

3.07 ATTIC STOCK

A. Not required.

END OF SECTION

- 1.01 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements govern work in this Section.
- 1.02 DESCRIPTION OF WORK
 - A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all laboratory and miscellaneous equipment work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:
 - 1. Disassembly, moving, modification, reinstallation of existing equipment as may be scheduled.
 - 2. Provide all necessary new connections whether described elsewhere or specifically described herein.
- 1.03 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification.

1.04 QUALITY ASSURANCE

- A. The work of this Section shall be accomplished by a "Specialty Contractor".
- 1.05 SUBMITTALS Coordinate with Section 01 33 00

Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.

As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times. Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".

The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.

- A. Samples of all other materials required to complete the work.
- B. Certification of Specification Compliance.
- C. Where applicable, Contractor shall take all necessary field measurements prior to fabrication and shall assume complete
- D. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)

- A. All materials shall be delivered to the job site in unopened factory sealed containers clearly labeled as to product, manufacturer, color and/or other pertinent characteristics.
- B. Materials shall be stored under conditions recommended by the manufacturer.

Part 2 - PRODUCTS

2.01 Attention is directed to the drawings for equipment schedules.

NOTE: All required connections to equipment shall be made by the respective Trade Contractors, coordinate with applicable technical sections of these specifications.

Part 3 - EXECUTION

- 3.01 INSPECTION AND ACCEPTANCE
 - A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.02 INSTALLATION

- A. Units shall be installed true to line and level by the manufacturer or his authorized representative in accordance with approved shop drawings.
- B. All operating units shall be adjusted and left in perfect working order.

A. All debris resulting from construction operations will be removed daily and upon final completion, all operating parts will be cleaned and protection removed.

3.04 WASTE MANAGEMENT – Coordinate with Section 01 74 19

- A. Separate and recycle materials and material packaging in accordance with Waste Management Plan and to the maximum extent economically feasible and place in designated areas for recycling.
- B. Set aside and protect materials suitable for reuse and/or remanufacturing.
- C. Separate and fold up metal banding; flatten and place along with other metal scrap for recycling in designated area.

End of Section

SECTION 11 00 00 LABORATORY EQUIPMENT

- 1.01 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements govern work in this Section.
- 1.02 DESCRIPTION OF WORK

A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of all laboratory and miscellaneous equipment work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:

- 1. Disassembly, moving, modification, reinstallation of existing equipment as may be scheduled.
- 2. Provide all necessary new connections whether described elsewhere or specifically described herein.

1.03 RELATED WORK SPECIFIED ELSEWHERE - Entire Project Specification.

1.04 QUALITY ASSURANCE

A. The work of this Section shall be accomplished by a "Specialty Contractor".

1.05 SUBMITTALS - Coordinate with Section 01 33 00

Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.

As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.

Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".

The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.

A. Samples of all other materials required to complete the work.

B. Certification of Specification Compliance.

C. Where applicable, Contractor shall take all necessary field measurements prior to fabrication and shall assume complete

D. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)

A. All materials shall be delivered to the job site in unopened factory sealed containers clearly labeled as to product, manufacturer, color and/or other pertinent characteristics.

B. Materials shall be stored under conditions recommended by the manufacturer.

Part 2 - PRODUCTS

2.01 Attention is directed to the drawings for equipment schedules.

NOTE: All required connections to equipment shall be made by the respective Trade Contractors, coordinate with applicable technical sections of these specifications.

Part 3 - EXECUTION

3.01 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.02 INSTALLATION

A. Units shall be installed true to line and level by the manufacturer or his authorized representative in accordance with approved shop drawings.

B. All operating units shall be adjusted and left in perfect working order.

3.03 CLEANUP AND PROTECTION

A. All debris resulting from construction operations will be removed daily and upon final completion, all operating parts will be cleaned and protection removed.

3.04 WASTE MANAGEMENT – Coordinate with Section 01 74 19

A. Separate and recycle materials and material packaging in accordance with Waste Management Plan and to the maximum extent economically feasible and place in designated areas for recycling.

B. Set aside and protect materials suitable for reuse and/or remanufacturing.

C. Separate and fold up metal banding; flatten and place along with other metal scrap for recycling in designated area.

End of Section

LABORATORY CASEWORK – GENERAL REQUIREMENTS

Part 1 - GENERAL

1.01 Applicable provisions of the Conditions of the Contract and Division #1,

General Requirements govern work in this Section.

- 1.02 DESCRIPTION OF WORK
 - A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary and/or required for the complete execution of the laboratory casework for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:
 - 1. Laboratory casework systems, complete with tops in material as scheduled and/or shown; reagent racks; drawer and door configurations; fittings and fixtures; backboards; and the like necessary and/or required to complete the work of this Project.
 - 2. Overshelf units in material scheduled and/or noted.
 - 3. Design Requirements: Manufacturer is responsible for designing, engineering, fabricating and installation of systems; Anchorage to structure and modifications to meet specified requirements and maintain visual design concepts.
 - 4. Attachment considerations: Account for site peculiarities, expansion and contraction movements, so there is no loosening, weakening, and fracturing, of connections between units and substrate.
 - 5. Comply with UL 544 for electrically powered equipment.
 - 6. Interface With Adjacent Systems: Coordinate with mechanical service lines and ductwork; Coordinate with electrical service lines.
- 1.03 RELATED WORK SPECIFIED ELSEWHERE Entire Project Specification with specific reference to those sections noted above and as follows:
 - A. Division 6 Rough carpentry, blocking within walls to adequately support casework.
 - B. Division 7 -Sealants.
 - C. Section 11 53 00 Laboratory Equipment General Requirements: Equipment Schedule.
 - D. Division 22 Plumbing: Service lines, plumbing connections,
 - E. drains, traps, strainer, tailpieces, and fittings.
 - F. Division 23 HVAC: Ductwork, blowers, fume hood fans, and
 - G. air flow monitors.
 - H. Division 26 Electrical: Service lines, electrical rough in, connections, receptacles, and covers.
- 1.04 QUALITY ASSURANCE
 - A. Single Source Responsibility:
 - 1. Furnish units from one manufacturer for entire Project, unless otherwise acceptable to Architect.
 - 2. Provide casework modules as complete units, including
 - B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section.
 - C. Installer Qualifications: Acceptable to fabricator with documented experience on at least 5 projects of similar nature in past 5 years.
 - D. Regulatory Requirements: Ensure flammable components comply with applicable portions of local, state, and federal codes, laws, and ordinances for flame spread and smoke developed indices.
 - E. In general, all materials shall be the best of their respective kinds for the purpose intended and all methods used in construction shall conform to the best practices of the Scientific Laboratory Equipment Industry, including any specialized materials required and further, all work of this Section shall conform with Voluntary Product Standards and trade Association Units as follows:
 - 1. American Plywood Association (APA); Douglas Fir Plywood

Association (DFPA).

- 1. Architectural Wood Work Institute (AWI) Quality Standards as enumerated in Part 2 of this Section.
- 2. American Society for Testing and Materials (ASTM).
- 3. Applicable Federal Specifications for fasteners, bolts, nails, screws, etc.
- 4. Underwriters' Laboratories, Inc. (UL).
- F. The published standards of the National Sanitation Foundation will be considered as the minimum requirements for stainless steel construction. Manufacture and install all equipment hereinafter specified, in accordance with these standards.

- G. All equipment hereinafter specified shall be in compliance with all requirements of the State and local health codes having jurisdiction. This Contractor shall be responsible for securing any or all Health Department approvals as required (if any.)
- Η. This Contractor agrees for himself suppliers, and his or their employees, that all laws or rules and regulations of any governmental agency or body, now or hereinafter applicable to the furnishing of the equipment or services described herein, shall be binding upon them and shall be complied with by them.
- In any case, where there exists two standards or codes for one type of work, the stricter method shall ١. govern.

1.05 SUBMITTALS – Coordinate with Section 01 33 00

Submittals shall be made in groupings where installations are complementary, i.e. steel, steel decking, steel stairs, stair railings; roof systems/flashings; mechanical and electrical apparatus and the like. Failure to comply with this requirement will be cause for rejection of any or all submittals.

As set forth in Sections 01 33 00 and 01 32 00, prepare and submit a fully developed submittal schedule; note review times set forth in Section 01 33 00 are deemed "average", for large submissions allow longer review times.

Attention is directed to Section 01 31 14 for coordination drawing requirements for this project. These drawings are critical to the proper execution of the Work and failure to honor these requirements may become the basis for denial of any and all claims for either or both "time" and "money".

The Contractor is encouraged to submit for approval products made from recycled and/or environmentally responsible material. Every effort will be made by the Design Professional Team to approve these materials; the substitution request procedure shall still be enforced.

Α. Product Data:

1. Submit manufacturer's descriptive literature and product specifications for each pro duct.

2. Include data to indicate cabinet construction.

3. Include information for factory finishes, chemical resistance ratings, hardware, glass, sealants, accessories, and other required components.

Β. Shop Drawings:

1. Prepare Project -specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

2. Indicate typical casework and countertop layout including dimensioned floor plans, sections and elevations, and service fixture holes locations.

3. Indicate enclosures, cabinets, hardware, service fixtures complete wit h numbers and item names, and details including construction kinds of cabinets, countertops, process tables, and other components. 4. Coordinate with equipment clearances required.

5. Submit detail drawings of special accessory components not included in manufacturer's product data.

6. Indicate joints in countertop material.

7. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

Samples: C.

- Work Surface Samples: One sample of all top materials shown or called for, of sufficient size to 1. perform finish requirement tests. Two pieces sealed and joined. Full depth of counter and 6 inches from each side of joint.
- 2. Wood Finish Samples: Include manufacturer's full range of samples for Architect's selection; Size: 3" x 5"
- 3. Metal Casework Color Samples: Include manufacturer's full range of colors for Architect's selection; Architect will select casework components' color with no change in contract sum; Provide sample of colors, as selected by Architect, on same meta I from which casework will be fabricated: Size: 6"x 6"
- Sample of all mechanical service fittings, locks, door pulls, hinges, and interior hardware. 4.
- D. Certification of Specification Compliance.
- E. This Contractor shall take all necessary field measurements prior to fabrication and installation of work and shall assume complete responsibility for accuracy of same. F.
 - Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product.
- Qualification Data: G.
 - 1. Submit manufacturer's and installer's qualifications verifying years of experience.
 - Include list of completed projects having similar scope of Work identified by name, location, date, 2. reference names, and phone numbers.
- Manufacturer's Instructions: Submit manufacturer's printed installation instructions. Η.

I. Warranty: Submit specified warranty in accordance with Division 1.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING (Coordinate with Section 01 61 00)

- A. Deliver, store and handle casework in such a manner so as to prevent damage and deterioration.
- B. Materials shall be stored under conditions recommended by the manufacturer. Laboratory Casework and custom millwork shall be satisfactorily protected against dampness. Maintain relative humidity in storage areas not exceeding 60%.
- C. Protect all surfaces of casework subject to damage while in transit and on job site during and after installation.
- D. Provide temporary skids under all large or heavy casework.
- E. The Contractor shall notify the Architect in writing at least ten working days in advance of each expected shipping date of any cabinet work. If space will not be available for storage, or installation, the Contractor shall, at his own cost, store the work in the cabinet work plant or in a warehouse, under conditions noted above.

1.07 DEFINITIONS

- A. Service Fixtures: Plumbing Service Fixtures: Gas, air, vacuum and specialty gas cocks; ball turrets; hot, cold, and pure water gooseneck faucets; remote control valves; safety eyewash; shower heads; and other fittings.
- B. Electrical Service Fixtures: Electrical convenience outlet boxes, electrical pedestals, single or duplex receptacles, switches: etc. Other items which serve as functional part of equipment.
- C. Service Lines: Gas, air, and vacuum piping; hot, cold and pure water piping; drain and vent lines; fittings; and control and shut off valves; to carry respective services from building roughing-in floors and walls through equipment to service fixtures.
- D. Conduit, junction boxes, conduit fitting, wire disconnect switches, fuses, and circuit breakers, to carry electrical services from building roughing-in outlets in floors, and walls through equipment to service fixtures.
- E. Exposed: As used in this Specification Section, "exposed" portions of case work include surfaces visible when doors and drawers are closed. Bottoms of case work more than 4 feet above finish floor are considered exposed. Visible surfaces in open casework or behind clear doors also are considered as exposed.
- F. Semi -Exposed: As used in this Specification Section, "semi exposed" portions of casework include those members behind opaque doors, such as shelves, divisions, interior faces of ends, case backs, drawer sides, backs and bottoms, and back face of doors. Tops of cases 6' -6" or more above finish floor shall be considered semi -exposed. Bottoms of woodwork less than 4 feet above finish floor are considered semi -exposed. Semi -exposed portions of woodwork shall be of same species, color and finish as the "exposed" portions.

1.08 PERFORMANCE REQUIREMENTS

- A. Base cabinets shall be constructed to support at least a uniformly distributed load of 200 lbs. per square foot of cabinet top area, including working surface without objectionable distortion of interference with door and drawer operation.
- B. Base cabinet corner gussets with leveling bolts shall support 500 lbs. per corner, at 1 -1/2" projection of the leveling bolt below the gusset.
- C. Each adjustable and fixed shelf 4 ft. or shorter in length shall support an evenly distributed load of 40 lbs. per square ft. up to a maximum of 200 lbs., with nominal temporary deflection, but without permanent set. These requirements apply to all shelves including, but not limited to wall mounted shelves, shelves at island benches, and shelves inside cabinets.
- D. Drawer construction and performance shall allow 13 -5/8" clear when in an extended position and suspension system shall prevent friction contact with any other drawer or door during opening or closing. All drawers shall operate smoothly, a minimum of 10,000 cycles with an evenly distributed load of 150 lbs.
- E. Swinging doors on floor mounted casework shall support 200 lbs. suspended at a point 12" from hinged side. Weight load test shall allow only a temporary deflection, without permanent distortion or twist. Door shall operate freely after test and assume a flat plane in a closed position.

1.09 TESTING

A. The laboratory furniture manufacturer shall be required to submit with their bid certified test reports on the laboratory casework finish, all work top materials to be furnished, and hoods. These test reports shall be performed by an independent nationally recognized testing laboratory and shall certify that the materials

to be supplied will conform to the requirements of these specifications as well as testing procedures. Failure to include these test reports with the bid might be cause for rejection of the bidder and of the bid proposal.

1.10 FIELD MEASUREMENTS

- A. It is the laboratory furniture manufacturer's responsibility to verify all field measurements and that all equipment will fit through entry ways, corridors and door openings enabling a smooth flow of equipment to its proper location in the building.
- B. Drawings show arrangement and location of casework. If it is necessary to vary from arrangement shown, because of structural, mechanical, electrical or other considerations make such variations only after approval of Architect and at no additional expense to Owner.
- C. Measure all recesses and openings at buildings and provide all trim pieces, fillers, and closures, in sizes required.

1.11 PRE-INSTALLATION CONFERENCE

- A. Conduct pre-installation conference in accordance with Division 1.
- B. Convene pre-installation conference one week prior to commencing work of this Section.
- C. Attendance Required: Owner, Architect, Contractor, Manufacturer's Representative, and Installer.
- D. Agenda: Discuss and agree upon acceptable substrate and support conditions, preparatory work, interface with mechanical and electrical services, and methods of installation and testing.

1.12 SUSTAINABILITY

- A. In the selection of the products and materials of this section as well as for the entire project, preference will be given to those with the following characteristics:
 - 1. Water based.
 - 2. Water-soluble.
 - 3. Can be cleaned up with water.
 - 4. Non-flammable.
 - 5. Biodegradable.
 - 6. Low or preferably no Volatile Organic Compound (VOC) content.
 - 7. Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
 - 8. Manufactured without compounds that contribute to smog in the lower atmosphere.
 - 9. Do not contain methylene-chloride.
 - 10. Do not contain chlorinated hydrocarbons.
 - 11. Contains the least possible of post-consumer or postindustrial waste.

Part 2 - PRODUCTS

2.0I MANUFACTURERS

- A. The specific requirements shown and specified are indicated to establish a standard of design and quality for materials, construction, size and workmanship.
- B. Dimensions, voltages, electrical power requirements, and utility connections are based on the items specified. Contractor is responsible for all costs for dimensional adjustments and for providing or arranging for additional electrical or utility services or equipment required as a result of using an equal product.
- C. Acceptable Manufacturers: Metal casework and miscellaneous fillers and panels required for a finished installation:
 - 1. Kewaunee Scientific Corporation, Statesville, NC
 - 2. Thermo Scientific Hamilton, Two Rivers, WI
 - 3. Bedcolab, Ltd., Laval, QC
 - 4. Mott Manufacturing Limited, Brantford, ON
 - 5. Jamestown Metal Products, Jamestown, NY

2.02 MATERIALS

- A. Exposed solid wood: White Ash hardwood lumber, clean and free of defect. Interior solid wood: White Ash hardwood lumber, clean and free of defect. All lumber kiln –dried to uniform moisture content of six percent.
- B. Exterior Plywood:
 - 1. White Ash and hardwood (White Ash faced poplar) Plywood: Balanced construction of cross and face plies glued with water resistant resin glue.

- 2. White Ash Veneer: Quarter sawn White Ash veneer, grade A, on all exposed faces. Vertically matched
- C . Glue: waterproof as per Section 06 10 00.
- D. Wood Finish: Highly chemical resistant catalyzed vinyl varnish finish with "blocker" additive to resist fading from sun light.
- E. Edgebanding: 1/8" hardwood on all edges of doors and drawers; fronts, of shelves base, wall, upper and tall cases, and all exposed edges.
- F. Epoxy Resin:
 - 1. Modified epoxy resin compounded and cured for optimum physical and chemical resistant properties.
 - 2. Uniform mixture throughout full thickness.
 - 3. Non-glaring sheen.
 - 4. Color: (by Architect from standard range of gray or black)
 - 5. Countertop and back splash thickness: 1 inch.
 - 6. Slab flatness: No gap exceeding 0.09 inches in 96 inch span, measured in an unrestrained condition.
 - 7. All exposed edges shall be smooth and polished.
 - Glass: !/4 inch laminated safety glass as specified in Section 0880 00.
- H. Epoxy Resin Cement:
 - 1. Suitable for use in joining sections of epoxy resin countertop, backsplashes, and sinks.

2. Sufficient adhesion properties at temperatures 40 degrees to 100 degrees Fahrenheit for permanently anchoring epoxy resin countertops to base cabinets.

- 3. Chemical resistance equal to that specified for epoxy resin countertops and sinks.
- 4. Loss of hardness and adhesion properties at temperatures in excess of approximately 140 degrees Fahrenheit.
- I. Silicone Sanitary Sealant: Comply with requirements specified in Division 7.
- J. Galvanizing Touch-up Paint: SSPC Paint 20.
- K. Sheet Carbon Steel: ASTM A568.
- L. High Strength low -alloy steel.
 - 1. Cold rolled, drawing quality, patent beveled and re -squared.
 - 2. Capable of structurally developing required strength and rigidity for each component part.
 - 3. Phosphate conversion coated.
- M. Sound Deadening: Heavy bodied resinous coating, with resilient filler material, compounded for permanent, non -flaking adhesion to metal in 1/8 inch thick coating.

2.03 COMPONENTS

G.

- A. Epoxy Sinks:
 - 1. Material: Epoxy Resin.
 - 2. Construction: Taper side of sink. Inside corners radiused. Pitch bottom of sink to drain.
 - 3. Size: See drawings.
 - 4. Epoxy Sink Supports: Steel channels attached to sink cabinet ends and screw type adjustable rods to insure tight fit to underside of table with a water-proof compound.
 - 5. Seal around drain with silicone sealant as recommended by epoxy sink manufacturer, and as specified in Division 7. Plumbers putty is not acceptable.
- B. Sink Strainer and Tailpieces:
 - 1. Sink strainer and tailpieces:
 - a. Epoxy Sinks: Polypropylene. Coordinate tailpiece termination with service line connection requirements.
 - b. Stainless Steel Sink: See Division 22.
 - C. Epoxy Resin Countertops and Back Splashes:
 - 1. Fabricate from epoxy resin unless otherwise noted in drawings.
 - 2. Provide back splashes at rear of countertop and on end returns where indicated; notched as required.
 - 3. Fabricate to install without field cutting or drilling. Drill holes in counter for laboratory service fixtures as scheduled in Section 11 53 43.
 - 4. Seal gap between back splash and wall with acrylic latex sealant specified in Division 7.
 - 5. All exposed edges shall be smooth and polished.
 - 6. Joint between segments of tops and back splashes:
 - a. Smooth, even, and level with no raised edges.
 - b. Width: 1/8 inch maximum.
 - c. Seal watertight with modified epoxy resin cement.

7. Epoxy Resin countertops:

a. Cut to size of cabinet or knee space below, where indicated on drawing. Where no indication is made, countertops lengths shall be at Contractor's option b. with termination points at base cabinet or knee space edges.

- c. Do not cut to be smaller than 24 inches wide.
- d. Fabricate with drip grooves on underside of exposed edges.

e. Fabricate exposed edges of base sections of countertops with a 1/4 inch chamfer on front top edge, square bottom edge, and vertical corners; fabricate other countertop edges with square tops and bottoms.

f. Bond back splash to surface of countertop to form square joint.

g. Back splash to be 4 inches high, unless otherwise noted on Drawings.

- D. Peg Boards:
 - 1. Constructed of modified epoxy resin.
 - 2. Thickness: 1 inch.
 - 3. Color: Black for full thickness. To match adjacent counter tops.
 - 4. Polish front surface and edges.
 - 5. Fabricate with: Removable round -tip polypropylene peg section. Omit bottom row as required to avoid conflict with faucets. Seal unused peg holes with epoxy sealant. Stainless steel drip trough with 1/4 inch diameter outlet below peg area. Flexible clear tubing between drip trough outlet and sink (cut as required).
 - 6. Mechanically fasten drip trough to pegboard and continuously seal with sanitary silicone specified in Division 7 at to pedge.
- E. Hardware and Trim:
 - 1. Drawer and Door Pulls: Drawer and door pulls shall be satin finish stainless steel wire pulls, and shall be securely fastened to doors and drawers with vandal-proof screws. Two pulls shall be required on all drawers over 24 inches long. Drawer pulls shall be mounted horizontally. Door pulls shall be mounted vertically.
 - 2. Drawer Suspension: Provide full -extension, heavy duty drawers suspension. Loading capacity of 150 lbs.
 - 3. Drawer Stops: Provide on drawers to prevent inadvertent removal.
 - 4. Hinges: Hinges shall be the five (5) knuckle institutional, wrap around full overlay design for all swinging doors. Hinges shall be 2 -1/2" long, one (1) pair for doors under 4 ft in height and 1 -1/2 pair on doors over 4 ft in height. Hinges shall be mounted with flathead screws, so applied to door and cabinet to withstand a weight load of 150 lbs. minimum. All hinges shall be satin finish stainless steel.
 - 5. Locks: Locks shall be pin tumbler, heavy duty cylinder type. Exposed lock noses shall be chromium plated, satin finish, and stamped with identifying numbers. Provide locks where noted on lab plans. Keying: 1) Key locks individually; two keys per lock. 2) Master key locks by lab suite; two keys per suite. 3) Provide two grand master keys for locks
 - 6. Roller Catches: Roller catches shall be used on swinging doors. Catches shall have a spring loaded polyethylene roller and provided with a steel strike plate. Double -doors, without looks shall have a catch on each door. Full height cases shall have latching de vices located on the structurally fixed center shelf. The left hand door shall have a positive catch and the right hand door shall have the roller type catch.
 - 7. Elbow Catches: Elbow catches and strike plates shall be used on left hand doors of double door cases and are to be cast aluminum with bronze finish.
 - 8. Leg Shoes: Leg shoes shall be provided on all table legs, unless otherwise specified, to conceal leveling device. Shoes shall be 2 -1/2" high and a pliable, black vinyl material. Use of a leg shoe which does not conceal leveling device will not be acceptable.
 - Casters: Provide casters at tables and base cabinets as indicated on drawings. b. 4" diameter by 1 ¼" polyurethane wheels. Swivel type. All casters shall include a dual locking mechanism. Capacity: 25 0 lbs per caster.
 - 10. Shelf Support Clips: Shelf support clips for wood casework shall be pin type for mounting on interior of cabinet work. Clips shall be corrosion resistant and shall retain shelves from accidental removal. Shelves shall be adjustable on 1 1/4" centers. Surface mounted metal support strips and clips subject to corrosion are not acceptable.
 - 11. Fasteners and Anchors: Size and type to securely fasten and anchor items to substrates and supporting structure.

2.04 FINISH AND PERFORMANCE REQUIREMENTS

A. Wood Finish and Performance Requirements:

1. Wood Finish: Prior to application of the wood finish, case and cabinet surfaces shall be smoothly sanded to remove loose fibers, scratch marks and abrasions, with all dust thoroughly removed by compressed air.

2. Wood Finish Application: Finishes shall be applied under controlled atmospheric conditions, and shall be cured after application in a modern humidified oven humidified at 140° F and 30% -relative humidity. 3. Wood Casework Finish (Interiors): Interior surfaces and unexposed exteriors shall receive a double - pass coat of resinous wood sealer. 4. Wood Casework Finish (Exteriors): Case and cabinet exposed exterior surfaces, including interiors of glazed cases and open shelving, shall be provided with an acid, alkali, solvent, water and abrasion resistant finish. Surfaces shall be first coated with a nonfiber lifting stain, or toner to secure the desired color. The color coat shall be thoroughly dried. The first sealer coat shall be applied, thoroughly dried, sanded and carefullydusted. A second sealer coat shall be applied and thoroughly dried. A double pass coat of chemical resistant synthetic varnish shall then be applied and thoroughly dried, providing a semi -gloss finish. The completed case and cabinet exterior finish shall meet the performance test requirements specified under PERFORMANCE TEST RESULTS.

- 4. Performance Test Rating: Terms referred to in PERFORMANCE TEST RESULTS are as follows: "A" (Excellent) - Indicates excellent to superior integrity of finish film. Includes no effect to slight allowable changein gloss (dulling or increase in gloss) and slight discoloration."B" (Good) - Indicates good to very good integrity of finish film. Allows change of gloss or discoloration. Any effect can be removed from the tested area by abrading with 325 - mesh silica powder and water, indicating that the discoloration is only superficial and that the finish film in good below the surface.
- 5. Performance Test Results (Chemical Spot Tests): Chemical spot tests shall be made by applying 5 drops of each reagent to the surface to be tested. Each reagent (except those marked **) shall be covered with a 1 -1/4" dia. watch glass, convex side down to confine the reagent. Spot tests of volatile solvents marked ** shall be tested as follows: A 1" ball of cotton shall be saturated with solvent and placed on the surface to be tested. The cotton ball shall then be covered by an inverted 2 -ounce wide mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire test period, and at a temperature of 77° F +/ -3° F. At the end of the test period, the reagents shall be flushed from the surface with water, and the surface scrubbed with a soft bristle brush under running water, rinsed and dried. Volatile solvent test areas shall be cleaned with cotton swab soaked in the solvent used on the test area. Immediately prior to evaluation 16 to 24 hours after the reagents are removed, the test surface shall be scrubbed with a damp paper towel and dried with paper towels.

Reagents	Time In	Test
Acetone**	Minute	Ratings
	60	A

Ammonium Hydroxide, 28%	60	А
Benzene** 60 A		
Carbon Tetrachloride**	60	А
Ethyl Acetate**	60	А
Ethyl Alcohol**	60	Α
Ethyl Ethar**	60	А
Gasoline** 60 A		
Glacial Acetic Acid, 99%	60	А
Hydrochloric Acid, 37%	60	А
Methanol** 60 A		
Mothyl Ethyl Ketone**	60	A
Naphtha**	60	A
Nitric Acid, 30% 60 A		
Phosphoric Acid, 75%	60	A
Potassium Hydroxide, 40%	60	A
Sodium Hydroxide, 4 0%	60	A
Sodium Hydroxide, 10%	60	A
Sulfuric Acid, 70%	60	A
Toluene**	60	

- Where concentrations are indicated, percentages are by weight.
- ** Indicates these solvents tested with cotton and jar method
- 6. Performance Test Results (Heat Resistance): Hot water (190° F -205° F) shall be allowed to trickle on the finished surface, which shall be set at an angle of 45° from horizontal for a period of 5 minutes. After cooling and wiping dry, the finish shall show no visible effect from the hot water treatment.
- 7. Performance Test Results (Moisture Resistance): A cellulose sponge 2" x 3" x 1" shall be soaked with water and placed on the finished surface for a period of 100 hours. The sponge shall be maintained in a wet condition throughout the entire test period At the end of the test period, the surface shall be dried and no visible effect shall be shown on the finish.
- 8. Performance Test Results (Impact Resistance): A 1-lb. ball (approximately 2" dia.) shall be dropped from a distance of 1-ft. onto the finished surface of a 3/4" thick plywood panel supported underneath by a solid surface. There shall be no evidence of cracks or checks in the finish due to impact upon close examination.
- B. Metal Finish and Performance Requirements:
 - 1. Stainless Steel Finish: Number 4.
 - 2. Carbon Steel: Backed -on acid, alkali, and solvent resistant finish; highly resistant to corrosion, chemical activity, and abrasion; flexible, hard, and smooth; finishing sequence to be:
 - a. Prior to application of finish, carefully inspect each item and make ready for metal treatment and finish application
 - b. Thoroughly clean and remove oil, grease, harmful matter, and rust spots
 - c. Perform by cleaning solvent or by alkaline bath washing and spraying
 - d. Hard wiping is not permitted
 - e. Process to receive finish coats
 - f. Pass metal parts through paint chamber where epoxy powder coating is applied
 - g. Bake coating for appropriate time period to insure complete polymerization
 - 3. Dry-film thickness: Minimum 1.2 mils minimum; without "orange -peel", sags, runs and over spray.
 - 4. Cured films impact resistance: Unaffected by 3.2 N*m (28 inch -pound impact or 1/2 inch mandrel bend when supported on 18 gage steel panel b. Pencil hardness of 8H to 9H
 - 5. Polymerized film chemical resistance. Resist action of following reagents without effect other than loss of luster or slight discoloration when subjected to a one milliliter puddle test for one hour:
 - Acetic Acid: 1% to glacial
 - Sulfuric Acid: 25%
 - Sulfuric Acid: 50%
 - Sulfuric Acid: 85%
 - Hydrochloric Acid: 10%
 - Hydrochloric Acid: 37%
 - Nitric Acid: 10%
 - Nitric Acid: 25%
 - Nitr ic Acid: 60%
 - Phosphoric Acid: 85%
 - Perchloric Acid: 60%
 - Formaldehyde: 37%
 - Phenol: 854%
 - Ammonium Hydroxide Concentrate Carbon Tetrachloride
 - Chloroform
 - Acetone
 - Xylol
 - Furfural

Part 3 - EXECUTION

3.01 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions and approved shop drawings.
- B. Install items plumb, level, square, and free from warp and twist.

- C. Maintain dimensional tolerances and alignment with surrounding construct ion and adjacent surfaces.
- D. Install miscellaneous filler panels and scribes for a continuous
- E. tight -fitting assembly without gaps and spaces between cabinets,
- F. counters, service chase, and adjoining surfaces.
- G. Seal backsplashes at wall surfaces.
- H. Interface with other work. Install items in a sequence to not delay: Adjoining construction; Connections of casework and hoods to mechanical and electrical services
- 3.04 ADJUSTING: Adjust parts for smooth, uniform operation.

3.05 CLEANING

- A. Comply with manufacturer cleaning instruct ions.
- B. Do not use materials and methods, which may damage finish and surrounding construction.

3.06 PROTECTION

- A. Protect finished work.
- B. Advise contractor of procedures and precautions for protection of material, installed laboratory casework and fixtures from damage by other trades.
- C. Post casework completion notices to alert other trades to t he potential damage to completed work as required.

3.06 WASTE MANAGEMENT - Coordinate with Section 01 74 19

- A. Separate and recycle materials and material packaging in accordance with Waste Management Plan and to the maximum extent economically feasible and place in designated areas for recycling.
- B. Set aside and protect materials suitable for reuse and/or remanufacturing.
- C. Separate and fold up metal banding; flatten and place along withother metal scrap for recycling in designated area.

End of Section

SECTION 12 35 54 METAL LABORATORY CASEWORK

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes, but is not limited to, all materials, labor and equipment, complete with all anchors and related accessory, necessary to furnish, deliver and install: Metal Laboratory Case work including:
 - 1. Metal Casework and Metal Casework with Wood Fronts
 - 2. Base Cabinets (Swinging doors, drawers and open shelves and mobile)
 - 3. Wall-Mounted Glass Door Cabinets
 - 4. Wall Mounted Shelving Systems
 - 5. Fasteners, anchors and miscellaneous fillers and panels required for a finished installation.
 - 6. Accessories

For general requirements, applicable to this and all other Casework Specification Sections including, but not limited to definitions, system description, submittals, quality assurance, mock-up, testing, field measurements, pre-installation conference, delivery, storage and handling, project conditions, and sequencing requirements, refer to Specification Section 12 35 53 -Laboratory Casework -General Requirements.

PART 2 - PRODUCTS

2.01 GENERAL

A. For general requirements, applicable to this and all other Casework Specification Sections including, but not limited to, manufacturers, materials, components, and finish and performance requirements, refer to Specification Section 12 35 53 –Laboratory Casework -General Requirements.

2.02 MANUFACTURERS

- A. Acceptable Manufacturers: Metal casework and miscellaneous fillers and panels required for a finished installation:
 - 1. Kewaunee Scientific Corporation, Statesville, NC
 - 2. Thermo Scientific Hamilton, Two Rivers, WI
 - 3. Bedcolab, Ltd., Laval, QC
 - 4. Mott Manufacturing Limited, Brantford, ON
 - 5. Jamestown Metal Products, Jamestown, NY
- 2.03 METAL CASEWORK

A. Fabrication

- 1. Prior to fabrication, field measure actual existing conditions to ensure proper fit.
- 2. Coordinate construction of casework with metal casework construction style. Modify fabrication requirements for
- B. Construction:
 - 1. All all-metal units shall be flush front construction with intersection of vertical and horizontal case members, such as end panels, top rails, bottoms and vertical posts in same plane without overlap. Exterior corners shall be spot welded with heavy back up reinforcement at exterior corners. All door and drawer joints shall be welded and ground smooth to provide a continuous flat plane.
 - 2. Metal units with wood fronts shall be designed to same standards as other metal casework but shall be dimensioned for full flush overlay drawer and cabinet front style.
 - 3. All units shall have a cleanable smooth interior. Bottom shall be the pan type with both sides and back formed up for easy cleaning. Bottoms with pans turned down must be caulked around inside perimeter. Fabricate concealed surfaces of inner and outer pans from same finish as exposed surfaces.
 - 4. Unless otherwise indicated all casework units shall be fabricated of cold-rolled prime grade rollerleveled furniture steel. Gauges of steel used in construction shall be 18-gauge except as follows:
- C. Corner gussets for leveling bolts and apron corner braces, 12- gauge.
- D. Hinge reinforcements, 14-gauge.
- E. Top and intermediate front horizontal rails, apron rails and reinforcement gussets, 16-gauge.
- F. Door assemblies and adjustable shelves, 20-gauge.
- G. Toe space member:
 - 1. Size: 4 inches high by 3 inches deep, unless otherwise noted on Drawings.

2. Fabricate with channel-shaped flanges at bottoms, and flange at top for engagement with bottom rails forming interlocking joints.

Η. Corner gusset plates:

- Provide in each corner of sectional units. 1.
- 2. Floor mounted casework shall be equipped with leveling devices easily adjustable from within units, to compensate for unevenness in floor.
- Fabricate leveling socket as integral part of gusset plate. 3.
- Provide slot in each 1/2 inch leveling bolt for easy adjustment using screwdriver from above. 4.
- Provide access to leveling bolt through holes in cabinet bottoms directly above leveling bolts. 5.
- Provide access holes in cabinet bottoms with removable snap-on covers. 6.
- 7. Levelers accessible through front of toe space with snap on covers are also acceptable.

I. Doors (Metal):

- Fabricate of double wall sound deadened construction. 1.
- 2. Place sound-deadening mineral filler between inner and outer pans for quiet operation.
- 3. Fabricate for fit with minimum clearance.
- 4. Fabricate inner door pans to be held securely in place by concealed fasteners that are easily removable for cleaning in case of spillage.
- 5. Where swinging doors are specified or shown, fabricate of double wall construction, glazed where specified.
- J. Adjustable shelves in cabinets:
 - Fabricate with adjustable supports at 1/2 inch centers. 1.
 - 2. Support shelves on adjustable shelf clips, made of cadmium plated steel, engaging in slotted members so dust cannot accumulate at bottoms. Clips shall retain shelves to prevent accidental removal.
 - 3. Provide full depth adjustable shelves, as shown on drawings.

Finish: K.

- Swinging door cabinets shall have a completely finished interior same as exterior. 1.
- 2. Performance of painted surfaces shall meet the requirements specified in Section 12 35 53 - Laboratory Casework-General Requirements.

Base Cabinets: L.

Construct base cabinets to achieve standard height of 30 to 31 inches or 36 to 37 inches with a 1-inch 1. countertop without raising cabinet off floor beyond height required for normal leveling conditions (1 inch nominal). 2.

Drawers:

- a. Sectional unit drawer heads:
 - 1) Fabricate of double wall sound deadened construction.
 - 2) Place sound-deadening mineral filler between inner and outer pans for quiet operation.
 - 3) Fabricate concealed surfaces of inner and outer pans from same finish as exposed surfaces.
 - 4) Fabricate entire drawer including inner drawer head from 20-gauge material.
 - 5) Fabricate drawer body with channel shape at top on both sides and back for rigidity.

6) Fabricate outer drawer heads with channel shaped flanges at bottoms and ends for attachment to drawer bodies.

7) Fabricate inner drawer heads with flanged perimeter.

8) Fabricate inner drawer heads to be held securely in place by concealed fasteners that are easily removable for cleaning in case of spillage.

b. Drawer bodies: Fabricate of one-piece construction. Fabricate with reinforcing Z-Shaped 14gauge members welded to sides. Fabricate drawers to close against polyurethane bumpers. Rubber bumpers are not acceptable.

M. Wood Door and Drawer Fronts:

- White Ash Veneer Panels (door and drawer fronts) Flat cut, White Ash veneer grade "A" front with a 1. grade 1 back on a combination MDF/Plywood core. Finish
- 2. selection by Architect.
- Edge shall be banded with minimum 3mm solid maple. Panels shall have a minimum of 250 lb screw 3. holding strength on face and 225 lb on edge. Finished thickness shall be 3/4".
- 4. Grain shall be vertically matched on all drawers and doors. Include false drawer panel without pull at sink cabinets.

Doors: N.

- Doors shall be of White Ash Veneer Particle board. 1.
- 2. Secure hinges to cabinet posts with machine screws and concealed self-locking Keep-nuts. Provide positive door closer by nylon roller friction catches, mounted on horizontal top or intermediate members pull side of doors. Provide each hinged door with 2 rubber bumpers.
- 3. Doors, drawers, tracks and back panels shall be replaceable in the field without requiring special tools.

4. All standard double door cabinets shall be designed without center stiles to maximize access to the cabinet.

O. Drawers:

- 1. Drawer fronts shall be of White Ash Veneer Particle board.
- 2. Drawer body shall consist of one-piece construction including the bottom, two sides, back and inner front flanged end that shall be welded to the interior drawer front head. Drawer bodies shall have a reinforcing bend on top edges.
- 3. Provide full-extension drawers suspension. All drawer suspension assemblies shall be rated at 150 pounds. Slides shall wrap under drawer sides for additional support.
- 4. Provide built-in stops to prevent inadvertent removal of drawers, with allowance for drawer to be removed by lifting front of drawers and pulling out.
- P. Knee space: Provide with removable enclosure panels at rear of knee space for access to mechanical service areas where knee space is bounded by fixed cabinet or wall.

2.04 WALL MOUNTED SHELVING SYSTEM:

- A. Wall Mounted Shelving Systems shall consist of powder coated 12 gauge steel, wood or phenolic resin shelves as indicated on the Drawings, with Heavy Duty Vertical Wall Standards, and Heavy Duty Adjustable Shelf Brackets, as indicated on drawings. Fasten standards to concrete masonry walls or properly blocked steel studded walls with appropriate flat head screws.
- B. Vertical Wall Standards shall allow adjustable bracket to be positioned along its full length for maximum use of space. A pair of vertical supports shall hold the shelves and their support brackets.
- C. Adjustable shelf bracket shall have up-turned lip to prevent shelves from being pulled off bracket. It shall be formed from high-strength, cold-rolled steel. It shall include mounting hardware to secure bracket to vertical wall standards.
- D. Seismic Lip: Provide 2" high removable seismic lips the full length of the front of all shelves. Construct of 1/4" type 304 stainless steel rod with #4 finish.

2.05 ACCESSORIES

- A. Fasteners and Anchors: Size and type to securely fasten and anchor items to substrates and supporting structure.
- B. Provide miscellaneous fillers and panels required for a finished installation.

2.06 WALL MOUNTED SWINGING DOOR CABINETS

A. Cabinets shall be designed and integrally constructed for full enclosure to assure dust proofing of the cabinet interior.

2.07 FASTENERS, ANCHORS AND MISCELLANEOUS FILLERS AND PANELS

- A. Size and type to securely fasten and anchor items to substrates and supporting structure.
- B. Provide miscellaneous fillers and panels required for a finished installation.

PART 3 - EXECUTION

C.

3.01 GENERAL REQUIREMENTS

- A. For General Installation Requirements, applicable to this and all other Casework Specification Sections including, but not, limited to examination, installation, adjusting, cleaning, and protection general requirements, refer to Specification Section 123553 -Laboratory Casework -General Requirements.
 - 1. Locate at designated positions.
 - Level by means of adjustment device located in cabinet's bottom corners.
 - 3. Continuously seal space between base cabinet and floor with sanitary silicone specified in Division 7.
- B. Countertops: Anchor to base cabinets.
 - Field Joints: Reinforce and weld in manner equivalent to shop welds and joints.
- D. Wall Joints:
 - 1. Joints between equipment and walls up to 3/8 inches wide:
 - a. Fill with sealant backing bond breaker rod and silicone sealant.
 - b. Comply with requirements of Division 7.
 - c. Apply sealant in one continuous pass, compressing surface slightly concave and forcing contact with both sides of joints.
 - 2. Joints between casework and walls larger than 3/8 inches wide:
 - a. Seal with stainless steel closure or filler strip.

- Fit tightly and fasten securely with concealed clips.
- E. Site Tolerances: Install wall-to-wall countertops with a maximum 1/4 inch gap.

3.02 CLEANUP AND PROTECTION

Β.

b.

- A. All debris resulting from construction operations will be removed daily and upon final completion, all operating parts will be cleaned and protection removed.
- 3.03 WASTE MANAGEMENT Coordinate with Section 01 74 19
 - A. Separate and recycle materials and material packaging in accordance with Waste Management Plan and to the maximum extent economically feasible and place in designated areas for recycling.
 - Set aside and protect materials suitable for reuse and/or remanufacturing.
 - C. Separate and fold up metal banding; flatten and place along with other metal scrap for recycling in designated area.

End of Section

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Transition fittings.
 - 3. Dielectric fittings.
 - 4. Mechanical sleeve seals.
 - 5. Sleeves.
 - 6. Escutcheons.
 - 7. Grout.
 - 8. Equipment installation requirements common to equipment sections.
 - 9. Painting and finishing.
 - 10. Concrete bases.
 - 11. Supports and anchorages.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
 - 1. PE: Polyethylene plastic.
 - G. The following are industry abbreviations for rubber materials:
 - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Transition fittings.
 - 2. Dielectric fittings.
 - 3. Mechanical sleeve seals.
 - 4. Escutcheons.
- B. Welding certificates.
- C. Shop Drawing Review Stamp Definitions
 - 1. "No Exceptions Taken" means that the shop drawing is correct as to performance, capacity, etc. and substantial conformance to the contract drawings and specifications. Fabrication and/or purchase may commence.
 - 2. "Make Corrections Noted" means that the shop drawing is correct as to performance capacity, etc. and substantial conformance to the contract drawings and/or specifications, subject to and in compliance with the annotations and/or corrections indicated on the shop drawing. Fabrication and/or purchase may commence.
 - 3. "Amend and Resubmit" means that the comments and/or correction are so extensive and important that the reviewer wants to see how the comments and/or corrections are resolved prior to release for fabrication and/or purchase. Fabrications and/or purchase may not commence.
 - 4. "Rejected" means that the shop drawing does not comply or conform to the contract drawings and/or specifications. Fabrication and/or purchase may not commence.
- 1.5 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.
- 1.6 DELIVERY, STORAGE, AND HANDLING
 - A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
 - B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and tural components as they are constructed.

C. Coordinate requirements for access panels and doors for plumbing items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

- A. Refer to individual Division 22 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, castiron and steel flanges.
 - 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

2.4 TRANSITION FITTINGS

A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

1. Manufacturers:

- a. Cascade Waterworks Mfg. Co.
- b. Dresser Industries, Inc.; DMD Div.
- c. Ford Meter Box Company, Incorporated (The); Pipe Products Div.
- d. JCM Industries.
- e. Smith-Blair, Inc.
- f. Viking Johnson.

- 2. Underground Piping NPS 2 and Larger: AWWA C219, metal sleeve-type coupling.
- B. Plastic-to-Metal Transition Fittings: CPVC and PVC one-piece manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
 1. Manufacturers: a. Eslon Thermoplastics.
- C. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; """one end withthreaded brass insert, and one solvent-cement-joint end.
- 1. Manufacturers:
 - a. Thompson Plastics, Inc.

D. Plastic-to-Metal Transition Unions: MSS SP-107, CPVC and PVC four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.

1. Manufacturers:

- a. NIBCO INC.
- b. NIBCO, Inc.; Chemtrol Div.
- Flexible Transition Couplings for Underground Nonpressure\Drainage Piping: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal bandon each end.
- 1. Manufacturers:

Ε.

- a. Cascade Waterworks Mfg. Co.
- b. Fernco, Inc.
- c. Mission Rubber Company.
- d. Plastic Oddities, Inc.

2.5 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weldneck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250- psig minimum working pressure at 180 deg F.

1. Manufacturers:

- a. Capitol Manufacturing Co.
- b. Central Plastics Company.
- c. Epco Sales, Inc.
- d. Watts Industries, Inc.; Water Products Div.
- e. Zurn Industries, Inc.; Wilkins Div.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

1. Manufacturers:

- a. Capitol Manufacturing Co.
- b. Central Plastics Company.
- c. Epco Sales, Inc.
- d. Watts Industries, Inc.; Water Products Div.
- E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 - 1. Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Central Plastics Company.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.
- F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
 - 1. Manufacturers:
 - a. Calpico, Inc.
 - b. Lochinvar Corp.

- G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F. 1.
 - Manufacturers:
 - Perfection Corp. a.
 - Precision Plumbing Products, Inc. b.
 - Sioux Chief Manufacturing Co., Inc. C.
 - Victaulic Co. of America. d.

2.6 MECHANICAL SLEEVE SEALS

1.

- Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe Α. and sleeve.
 - Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.

2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

3. Pressure Plates: Stainless steel. Include two for each sealing element.

4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.7 SLEEVES

- Α. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- Β. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring D. and bolts and nuts for membrane flashing.
 - Underdeck Clamp: Clamping ring with set screws. 1.

2.8 ESCUTCHEONS

- Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around Α. pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- Β. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
 - Finish: Polished chrome-plated. 1.
- D. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.
- E. One-Piece, Floor-Plate Type: Cast-iron floor plate.

2.9 GROUT

Α.

- Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and 1. recommended for interior and exterior applications.
 - Design Mix: 5000-psi, 28-day compressive strength. 2.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- Install piping according to the following requirements and Division 22 Sections specifying piping systems. Α.
- Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Β. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or D. parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- Install piping above accessible ceilings to allow sufficient space for ceiling panel removal. Ε.
- F. Install piping to permit valve servicing.
- Install piping at indicated slopes. G.

H. Install piping free of sags and bends.

L.

- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
 - Install escutcheons for penetrations of walls, ceilings, and floors according to the following: 1. New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type with spring clips.

d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polishedchrome-plated finish.

e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.

f. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chromeplated finish.

- g. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
- h. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
- M. Sleeves are not required for core-drilled holes.
- N. Permanent sleeves are not required for holes formed by removable PE sleeves.
- O. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
- P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
 - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
 - 1) Seal space outside of sleeve fittings with grout.
 - 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- Q. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 - 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
 - 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- R. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- S. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
- T. Verify final equipment locations for roughing-in.
- U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.3 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 - 3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.5 PAINTING

- A. Painting of plumbing systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.6 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 - 1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
 - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
 - 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 - 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 - 7. Use 3000-psi , 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in- Place Concrete."

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Metal Fabrications" for structural steel.

- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

3.8 GROUTING

- A. Mix and install grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

END OF SECTION 220500

SECTION 22 05 23

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01
- Specification Sections, apply to this Section.
- 1.2 SUMMARY
- A. Section Includes:
- 1. Bronze angle valves.
- 2. Bronze ball valves.
- 3. Iron, single-flange butterfly valves.
- 4. Bronze lift check valves.
- 5. Bronze swing check valves.
- 6. Iron swing check valves.
- 7. Iron swing check valves with closure control.
- 8. Bronze gate valves.
- 9. Iron gate valves.
- 10. Bronze globe valves.
- 11. Iron globe valves.
- 12. Lubricated plug valves.
- 13. Chainwheels.
- B. Related Sections:
- 1. Division 22 plumbing piping Sections for specialty valves

applicable to those Sections only.

2. Division 22 Section "Identification for Plumbing Piping and

Equipment" for valve tags and schedules.

- 3. Division 33 water distribution piping Sections for generalduty
- and specialty valves for site construction piping.
- 1.3 DEFINITIONS
- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Nonrising stem.
- E. OS&Y: Outside screw and yoke.
- F. RS: Rising stem.
- G. SWP: Steam working pressure.
- **1.4 SUBMITTALS**

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

1.5 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.

2. ASME B31.1 for power piping valves.

3. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Prepare valves for shipping as follows:
- 1. Protect internal parts against rust and corrosion.
- 2. Protect threads, flange faces, grooves, and weld ends.

3. Set angle, gate, and globe valves closed to prevent rattling.

- 4. Set ball and plug valves open to minimize exposure of functional surfaces.
- 5. Set butterfly valves closed or slightly open.
- 6. Block check valves in either closed or open position.
- B. Use the following precautions during storage:
- 1. Maintain valve end protection.

 Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
 Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.
B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
C. Valve Sizes: Same as upstream piping unless otherwise

indicated.

D. Valve Actuator Types:

1. Gear Actuator: For quarter-turn valves NPS 8 and larger.

2. Handwheel: For valves other than quarter-turn types.

3. Handlever: For quarter-turn valves NPS 6 and smaller.

4. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every 5 plug valves, for each size square plug-valve head.

5. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator; of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Gate Valves: With rising stem.

2. Ball Valves: With extended operating handle of nonthermalconductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

a. Basis-of-Design Product: Subject to compliance with requirements, provide Nibco Nib-Seal Handle Extension

or comparable product by one of the following:

1) Conbrco Industries Inc.; Apollo Division.

3. Butterfly Valves: With extended neck.

F. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.

2. Solder Joint: With sockets according to ASME B16.18.

3. Threaded: With threads according to ASME B1.20.1.

G. Valve Bypass and Drain Connections: MSS SP-45.

H. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted. 2.2 BRONZE ANGLE VALVES

A. Class 125, Bronze Angle Valves with Nonmetallic Disc:

1. Basis-of-Design Product: Subject to compliance with

requirements, provide Nibco Model S-311-Y or T-311-Y or comparable product by one of the following:

a. American Valve, Inc.

b. Milwaukee Valve.

c. Crane Co.; Crane Valve Group; Crane Valves.

2. Description:

a. Standard: MSS SP-80, Type 2.

b. CWP Rating: 200 psig.

c. Body Material: ASTM B 62, bronze with integral seat

and screw-in bonnet.

d. Ends: Threaded or Solder.

e. Stem: Copper- Silicon Bronze.

f. Disc: PTFE or TFE.

g. Packing: Asbestos free.

h. Handwheel: Malleable iron.

2.3 BRASS BALL VALVES

2.4 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: 1. Basis-of-Design Product: Subject to compliance with requirements, provide Nibco Model T-585-70 or S-585-70 or comparable product by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.

b. Hammond Valve.

c. Milwaukee Valve Company.

2. Description:

- a. Standard: MSS SP-110.
- b. SWP Rating: 150 psig.

c. CWP Rating: 600 psig.

d. Body Design: Two piece with threaded body packnut design (no threaded stem designs allowed) with

adjustable stem packing.

e. Body Material: Bronze.

f. Ends: Threaded or Solder.

g. Seats: PTFE or TFE.

h. Stem: Bronze.

i. Ball: Chrome-plated brass.

j. Port: Full.

2.5 IRON, SINGLE-FLANGE BUTTERFLY VALVES

A. 200 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Aluminum-Bronze Disc:

1. Basis-of-Design Product: Subject to compliance with

requirements, provide Nibco Model LD-2000-3/5 and LD-1000-5

or comparable product by one of the following:

a. Cooper Cameron Valves; a division of Cooper Cameron Corporation.

b. Crane Co.; Crane Valve Group; Jenkins Valves.

c. Tyco International, Ltd.; Tyco Valves & Controls.

2. Description:

a. Standard: MSS SP-67, Type I.

b. CWP Rating: 200 psig.

c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.

d. Body Material: ASTM A 536, ductile iron.

e. Seat: EPDM.

f. Stem: One- or two-piece stainless steel.

g. Disc: Aluminum bronze.

2.6 BRONZE LIFT CHECK VALVES

A. Class 125, Lift Check Valves with Nonmetallic Buna-N Disc: 1. Basis-of-Design Product: Subject to compliance with requirements, provide Nibco Model S-480 or T-480 or comparable product by one of the following:

a. Hammond Valve.

b. Milwaukee Valve Company.

c. Mueller Steam Specialty; a division of SPX Corporation.

2. Description:

a. Standard: MSS SP-80, Type 2.

b. CWP Rating: 200 psig.

c. Body Design: Vertical flow.

- d. Body Material: ASTM B 584 Alloy C844, bronze.
- e. Ends: Threaded or Solder.
- f. Disc: Buna-N.
- 2.7 BRONZE SWING CHECK VALVES
- A. Class 125, Bronze Swing Check Valves with Bronze Disc:

1. Basis-of-Design Product: Subject to compliance with

requirements, provide Nibco Model S-413-B or T-413-B or comparable product by one of the following:

- a. Crane Co.; Crane Valve Group; Crane Valves.
- b. Hammond Valve.
- c. Milwaukee Valve Company.
- 2. Description:
- a. Standard: MSS SP-80, Type 3.
- b. CWP Rating: 200 psig.
- c. Body Design: Y-Pattern Horizontal flow.
- d. Body Material: ASTM B 62, bronze.
- e. Ends: Threaded or Solder.
- f. Disc: Bronze.

2.8 IRON SWING CHECK VALVES

A. Class 125, Iron Swing Check Valves with Metal Seats:

1. Basis-of-Design Product: Subject to compliance with

requirements, provide Nibco Model F-918-B or comparable product by one of the following:

- a. Crane Co.; Crane Valve Group; Crane Valves.
- b. Milwaukee Valve Company.
- c. Powell Valves.
- 2. Description:
- a. Standard: MSS SP-71, Type I.
- b. CWP Rating: 200 psig.
- c. Body Design: Clear or full waterway.
- d. Body Material: ASTM A 126, gray iron with bolted bonnet.
- e. Ends: Flanged.
- f. Trim: Bronze.
- g. Gasket: Asbestos free.
- h. Disc: Cast Bronze.

2.9 IRON SWING CHECK VALVES WITH CLOSURE CONTROL

A. Class 125, Iron Swing Check Valves with Lever- and Spring-Closure Control:

1. Basis-of-Design Product: Subject to compliance with

requirements, provide Nibco Model F-918-B-L&S or comparable product by one of the following:

- a. NIBCO INC.
- b. Powell Valves
- c. Milwaukee Valve Company .
- 2. Description:
- a. Standard: MSS SP-71, Type I.
- b. CWP Rating: 200 psig.
- c. Body Design: Clear or full waterway.
- d. Body Material: ASTM A 126, gray iron with bolted bonnet.
- e. Ends: Flanged.
- f. Trim: Bronze.
- g. Gasket: Asbestos free.

h. Closure Control: Factory-installed, exterior lever and spring.

2.10 BRONZE GATE VALVES

A. Class 125, NRS Bronze Gate Valves:

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide Nibco Model S-113 or T-113 or comparable product by one of the following:
- a. Crane Co.; Crane Valve Group; Crane Valves.
- b. Milwaukee Valve Company.
- c. Powell Valves.
- 2. Description:
- a. Standard: MSS SP-80, Type 1.
- b. CWP Rating: 200 psig.
- c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
- d. Ends: Threaded or solder joint.
- e. Stem: Copper-Silicon Bronze.
- f. Disc: Solid wedge; bronze.
- g. Packing: Asbestos free.
- 2.11 IRON GATE VALVES
- A. Class 125, OS&Y, Iron Gate Valves:
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide Nibco Model F-617-0 or comparable product by one of the following:
- a. Crane Co.; Crane Valve Group; Crane Valves.
- b. Milwaukee Valve Company.
- c. Powell Valves.
- 2. Description:
- a. Standard: MSS SP-70, Type I.
- b. CWP Rating: 200 psig.
- c. Body Material: ASTM A 126, gray iron with bolted bonnet.
- d. Ends: Flanged.
- e. Trim: Bronze.
- f. Disc: Solid wedge.
- g. Packing and Gasket: Asbestos free.
- 2.12 BRONZE GLOBE VALVES
- A. Class 125, Bronze Globe Valves with Bronze Disc:
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide Nibco Model S-211-B or T-211-B or comparable product by one of the following:
- a. Crane Co.; Crane Valve Group; Crane Valves.
- b. Milwaukee Valve Company.
- c. Powell Valves.
- 2. Description:
- a. Standard: MSS SP-80, Type 1.
- b. CWP Rating: 200 psig.
- c. Body Material: ASTM B 62, bronze with integral seat
- and screw-in bonnet.
- d. Ends: Threaded or solder joint.
- e. Stem and Disc: Copper-Silicon.
- f. Packing: Asbestos free.
- g. Handwheel: Malleable iron, bronze.

2.13 IRON GLOBE VALVES

- A. Class 125, Iron Globe Valves:
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide Nibco Model F-718-b or comparable product by one of the following:
- a. Crane Co.; Crane Valve Group; Crane Valves.
- b. Milwaukee Valve Company.
- c. Powell Valves.
- 2. Description:
- a. Standard: MSS SP-85, Type I.
b. CWP Rating: 200 psig.

- c. Body Material: ASTM A 126, gray iron with bolted bonnet.
- d. Ends: Flanged.

e. Trim: Bronze.

f. Packing and Gasket: Asbestos free.

2.14 CHAINWHEELS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Babbitt Steam Specialty Co.

2. Roto Hammer Industries.

3. Trumbull Industries.

B. Description: Valve actuation assembly with sprocket rim, brackets, and chain.

1. Brackets: Type, number, size, and fasteners required to mount actuator on valve.

2. Sprocket Rim with Chain Guides: Ductile iron , of type and size required for valve. Include zinc coating.

3. Chain: Hot-dip, galvanized steel , of size required to fit sprocket rim.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed.Examine guides and seats made accessible by such operations.C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from

defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install chainwheels on operators for gate valves NPS 4 and larger and more than 96 inches above floor. Extend chains to 60 inches above finished floor.

F. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.

2. Lift Check Valves: With stem upright and plumb.

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, butterfly, or gate valves.

2. Butterfly Valve Dead-End Service: Single-flange (lug) type.

3. Throttling Service: Globe or angle valves.

4. Pump-Discharge Check Valves:

a. NPS 2 and Smaller: Bronze swing check valves with bronze disc.

b. NPS 2-1/2 and Larger for Domestic Water: Iron swing check valves with lever and weight or with spring ,metal -seat check valves.

c. NPS 2-1/2 and Larger for Sanitary Waste and Storm Drainage: Iron swing check valves with lever and weight or spring.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.

2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.

3. For Copper Tubing, NPS 5 and Larger: Flanged ends.

4. For Steel Piping, NPS 2 and Smaller: Threaded ends.

5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve

schedules below.

6. For Steel Piping, NPS 5 and Larger: Flanged ends.

3.5 LOW-PRESSURE, COMPRESSED-AIR VALVE SCHEDULE (150 PSIG OR LESS)

A. Pipe NPS 2 and Smaller:

1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.

2. Ball Valves: Two piece, full port, bronze with

bronze trim.

3. Bronze Lift Check Valves: Class 125, nonmetallic disc.

B. Pipe NPS 2-1/2 and Larger:

1. Iron Valves, NPS 2-1/2 to NPS 4: May be provided with

threaded ends instead of flanged ends.

2. Iron, Single-Flange Butterfly Valves: 200 CWP, Buna-N

seat, aluminum-bronze disc.

3. Iron Swing Check Valves: Class 125, metal seats.

3.6 HIGH-PRESSURE, COMPRESSED-AIR VALVE SCHEDULE (Not used))

3.7 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze Valves: May be provided with solder-joint ends

instead of threaded ends.

2. Bronze Angle Valves: Class 125, nonmetallic disc.

3. Ball Valves: Two piece, full port, bronze with

bronze trim.

4. Bronze Swing Check Valves: Class 125, bronze disc.

- 5. Bronze Gate Valves: Class 125, NRS.
- 6. Bronze Globe Valves: Class 125 , bronze disc.
- B. Pipe NPS 2-1/2 and Larger:
- 1. Iron Valves, NPS 2-1/2 to NPS 3: May be provided with
- threaded ends instead of flanged ends.
- 2. Iron, Single-Flange Butterfly Valves: 200 CWP, EPDM seat,
- aluminum-bronze disc.
- 3. Iron Swing Check Valves: Class 125, metal seats.
- 4. Iron Swing Check Valves with Closure Control: Class 125, lever and spring .
- 5. Iron Gate Valves: Class 125, OS&Y.
- 6. Iron Globe Valves: Class 125 .
- 3.8 SANITARY-WASTE AND STORM-DRAINAGE VALVE SCHEDULE
- A. Pipe NPS 2 and Smaller:
- 1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
- 2. Bronze Angle Valves: Class 125, nonmetallic disc.
- 3. Ball Valves: Two piece, full port, bronze with
- bronze trim.
- 4. Bronze Swing Check Valves: Class 125 , bronze disc.
- 5. Bronze Gate Valves: Class 125, NRS.
- B. Pipe NPS 2-1/2 and Larger:
- 1. Iron Valves, NPS 2-1/2 to NPS 3: May be provided with
- threaded ends instead of flanged ends.
- 2. Iron Swing Check Valves with Closure Control: Class 125, lever and spring .
- 3. Iron Gate Valves: Class 125, OS&Y.

END OF SECTION 220523

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following hangers and supports for plumbing system piping and equipment:

- 1. Steel pipe hangers and supports.
- 2. Trapeze pipe hangers.
- 3. Metal framing systems.
- 4. Thermal-hanger shield inserts.
- 5. Fastener systems.
- 6. Pipe stands.
- 7. Pipe positioning systems.
- 8. Equipment supports.

B. Related Sections include the following:

1. Division 05 Section "Metal Fabrications" for structuralsteel shapes and plates for trapeze hangers for pipe and equipment supports.

- 2. Division 21 Section "Water-Based Fire-Suppression Systems"
- for pipe hangers for fire-suppression piping.

3. Division 22 Section "Expansion Fittings and Loops for

Plumbing Piping" for pipe guides and anchors.

4. Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for vibration isolation devices.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 PERFORMANCE REQUIREMENTS

A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

C. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 SUBMITTALS

- A. Product Data: For the following:
- 1. Steel pipe hangers and supports.
- 2. Thermal-hanger shield inserts.
- 3. Powder-actuated fastener systems.
- 4. Pipe positioning systems.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following:

- 1. Trapeze pipe hangers. Include Product Data for components.
- 2. Metal framing systems. Include Product Data for

components.

- 3. Pipe stands. Include Product Data for components.
- 4. Equipment supports.
- C. Welding certificates.

1.6 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX.B. Welding: Qualify procedures and personnel according to the following:

1. ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 STEEL PIPE HANGERS AND SUPPORTS

A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types. B. Manufacturers:

- 1. Carpenter & Paterson, Inc.
- 2. Grinnell Corp.
- 3. Tolco Inc.

C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components. B. Manufacturers:

1. Power-Strut Div.; Tyco International, Ltd.

- 2. Tolco Inc.
- 3. Unistrut Corp.; Tyco International, Ltd.

C. Coatings: Manufacturer's standard finish unless bare metal

surfaces are indicated.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.5 THERMAL-HANGER SHIELD INSERTS

A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.

- B. Manufacturers:
- 1. Carpenter & Paterson, Inc.
- 2. Pipe Shields, Inc.
- 3. Rilco Manufacturing Company, Inc.

C. Insulation-Insert Material for Cold Piping: Water-repellent

treated, ASTM C 533, Type I calcium silicate or ASTM C 552,

Type II cellular glass with vapor barrier.

D. Insulation-Insert Material for Hot Piping: Water-repellent

treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.

E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers:

a. Hilti, Inc.

b. ITW Ramset/Red Head.

c. Powers Fasteners.

B. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated steel, for use in hardened portland cement concrete with pullout, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers:

a. Hilti, Inc.

b. ITW Ramset/Red Head.

c. Powers Fasteners.

2.7 PIPE STAND FABRICATION

A. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roofmounted piping.

B. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.

1. Manufacturers:

a. MIRO Industries.

C. High-Type, Single-Pipe Stand: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.

1. Manufacturers:

a. ERICO/Michigan Hanger Co.

b. MIRO Industries.

c. Portable Pipe Hangers.

2. Base: Stainless steel.

3. Vertical Members: Two or more cadmium-plated-steel or

stainless-steel, continuous-thread rods.

4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe

support.

D. High-Type, Multiple-Pipe Stand: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.

1. Manufacturers:

a. Portable Pipe Hangers.

2. Bases: One or more plastic.

3. Vertical Members: Two or more protective-coated-steel channels.

4. Horizontal Member: Protective-coated-steel channel.

5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.E. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe support made from structural-steel shape, continuous-thread

rods, and rollers for mounting on permanent stationary roof

curb.

2.8 PIPE POSITIONING SYSTEMS A. Description: IAPMO PS 42, system of metal brackets, clips, and straps for positioning piping in pipe spaces for plumbing fixtures for commercial applications.

B. Manufacturers:

1. C & S Mfg. Corp.

2. HOLDRITE Corp.; Hubbard Enterprises.

3. Samco Stamping, Inc.

2.9 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.10 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.

2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.
B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.
C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.
D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use padded hangers for piping that is subject to scratching. F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.

2. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30, from 2 rods if longitudinal movement caused by expansion and contraction might occur.

Adjustable Roller Hangers (MSS Type 43): For suspension of pipes, NPS 2-1/2 to NPS 20, from single rod if horizontal movement caused by expansion and contraction might occur.
 Adjustable Pipe Roll and Base Units (MSS Type 46): For

support of pipes, NPS 2 to NPS 30, if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.

H. Building Attachments: Unless otherwise indicated and except as

specified in piping system Sections, install the following Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.

2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.

3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.

4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.

5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.

6. C-Clamps (MSS Type 23): For structural shapes.

7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.

8. Side-Beam Clamps (MSS Type 27): For bottom of steel Ibeams.

9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For

attaching to bottom of steel I-beams for heavy loads.

10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.

11. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.

12. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:

a. Light (MSS Type 31): 750 lb.

b. Medium (MSS Type 32): 1500 lb.

c. Heavy (MSS Type 33): 3000 lb.

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.

15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

I. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.

2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.

3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

J. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections. K. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

L. Use powder-actuated fastenersmechanical-expansion anchors instead of building attachments where required in concrete construction.

M. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

3.2 HANGER AND SUPPORT INSTALLATION

A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments

as required to properly support piping from building structure. B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.

2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powderactuated tool manufacturer's operating manual.

2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.

2. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. Refer to Division 07 Section "Roof Accessories" for curbs.

G. Pipe Positioning System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. Refer to Division 22 Section "Plumbing Fixtures" for plumbing fixtures.

H. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

I. Equipment Support Installation: Fabricate from weldedstructuralsteel shapes.

J. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

K. Install lateral bracing with pipe hangers and supports to prevent swaying.

L. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at

concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

M. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

N. Pipe Slopes: Install hangers and supports to provide indicated

pipe slopes and so maximum pipe deflections allowed by ASME B31.9 (for building services piping) are not exceeded.

O. Insulated Piping: Comply with the following:

1. Attach clamps and spacers to piping.

a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.

b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.

c. Do not exceed pipe stress limits according to

ASME B31.9 for building services piping. 2. Install MSS SP-58, Type 39, protection saddles if

insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following: a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.

b. NPS 4: 12 inches long and 0.06 inch thick.

c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.

d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.

e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood inserts.

6. Insert Material: Length at least as long as protective shield.

7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangersequipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches .

3.6 PAINTING

A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 220529

Section 22 05 53

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
- 1. Equipment labels.
- 2. Warning signs and labels.
- 3. Pipe labels.
- 4. Stencils.
- 5. Valve tags.
- 6. Warning tags.

1.3 SUBMITTALS

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

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment and Piping Label Schedule: Include a listing of all and piping equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufactures offering products that may be incorporated into the Work include, but are not limited to, the following:

- 1. W.H. Brady Co.
- 2. Seton Nameplate Corp.
- 3. Emedco.

2.2 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.

 Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

4. Fasteners: Stainless-steel self-tapping screws.

5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

2. Letter Color: White.

3. Background Color: Black.

4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

7. Fasteners: Stainless-steel self-tapping screws.

8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.3 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: Orange

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering twothirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.4 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

2.5 STENCILS

A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; and minimum letter height of 3/4 inch for access panel and door labels, equipment labels, and similar operational instructions.

1. Stencil Material: Fiberboard or metal.

2. Stencil Paint: Exterior, gloss, acrylic enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.

3. Identification Paint: Exterior, acrylic enamel in colors according to ASME A13.1 unless otherwise indicated.

2.6 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware. 2. Fasteners: Brass wire-link or beaded chain; or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

2.7 WARNING TAGS

A. Warning Tags: Preprinted or partially preprinted, accidentprevention tags, of plasticized card stock with matte finish suitable for writing.

1. Size: 4 inches wide by 7 inches high...

2. Fasteners: Brass grommet and wire.

3. Nomenclature: Large-size primary caption such as "DANGER,"

"CAUTION," or "DO NOT OPERATE."

4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Division 09 Section "Interior Painting High-Performance Coatings."

B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option.

Install stenciled pipe labels , complying with ASME A13.1, on each piping system.

- 1. Identification Paint: Use for contrasting background.
- 2. Stencil Paint: Use for pipe marking.

C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.

2. Near each branch connection, excluding short takeoffs for fixtures. Where flow pattern is not obvious, mark each pipe at branch.

3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.

4. At access doors, manholes, and similar access points that permit view of concealed piping.

5. Near major equipment items and other points of origination and termination.

6. Spaced at maximum intervals of 20 feet along each run. Reduce intervals to 10 feet in areas of congested piping and equipment.

7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

D. Pipe Label Color Schedule:

- 1. Low-Pressure, Compressed-Air Piping:
- a. Background Color: Blue.
- b. Letter Color: White.
- 2. Medium-Pressure, Compressed-Air Piping:
- a. Background Color: Blue.
- b. Letter Color: White.
- 3. Domestic Water Piping:
- a. Background Color: Green.
- b. Letter Color: White.
- 4. Sanitary Waste Piping:
- a. Background Color: .Green.
- b. Letter Color: .White.
- 3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

- 1. Valve-Tag Size and Shape:
- a. Cold Water: 1-1/2 inches, hexagon.
- b. Hot Water: 1-1/2 inches, hexagon.
- c. Low-Pressure Compressed Air: 1-1/2 inches, hexagon.
- d. High-Pressure Compressed Air: 1-1/2 inches, hexagon.
- 2. Valve-Tag Color:
- a. Cold Water: Natural.
- b. Hot Water: Natural.
- c. Low-Pressure Compressed Air: Natural.
- d. High-Pressure Compressed Air: Natural.
- 3. Letter Color:
- a. Cold Water: Black.
- b. Hot Water: Black.
- c. Low-Pressure Compressed Air: Black.
- d. High-Pressure Compressed Air: Black.
- 3.5 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 220553

PLUMBING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
- 1. Insulation Materials:
- a. Calcium silicate.
- b. Cellular glass.
- c. Mineral fiber.
- 2. Insulating cements.
- 3. Adhesives.
- 4. Mastics.
- 5. Lagging adhesives.
- 6. Sealants.
- 7. Factory-applied jackets.
- 8. Field-applied jackets.
- 9. Tapes.
- B. Related Sections include the following:
- 1. Division 21 Section "Fire-Suppression Systems Insulation."
- 2. Division 23 Section "HVAC Insulation."

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

- B. Shop Drawings:
- 1. Detail application of protective shields, saddles, and
- inserts at hangers for each type of insulation and hanger. 2. Detail attachment and covering of heat tracing inside

insulation.

3. Detail insulation application at pipe expansion joints for each type of insulation.

4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.

- 5. Detail removable insulation at piping specialties,
- equipment connections, and access panels.
- 6. Detail application of field-applied jackets.
- 7. Detail application at linkages of control devices.
- 8. Detail field application for each equipment type.
- C. Qualification Data: For qualified Installer.

D. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per

ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

 Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 Insulation Installed Outdoors: Flame-spread index of 75 or

less, and smoke-developed index of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
B. Coordinate clearance requirements with piping Installer for piping insulation application and equipment Installer for equipment insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
C. Coordinate installation and testing of heat tracing.

1.7 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction. PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Calcium Silicate

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Industrial Insulation Group (The); Thermo-12 Gold.

2. Preformed Pipe Sections: Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.

3. Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.

4. Prefabricated Fitting Covers: Comply with ASTM C 450 and ASTM C 585 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.

G. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factoryapplied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Cell-U-Foam Corporation; Ultra-CUF.

b. Pittsburgh Corning Corporation; Foamglas Super K.

2. Block Insulation: ASTM C 552, Type I.

3. Special-Shaped Insulation: ASTM C 552, Type III.

4. Board Insulation: ASTM C 552, Type IV.

5. Preformed Pipe Insulation without Jacket: Comply with

ASTM C 552, Type II, Class 1.

6. Preformed Pipe Insulation with Factory-Applied ASJ or ASJSSL:

Comply with ASTM C 552, Type II, Class 2.

7. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.

H. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements,

available products that may be incorporated into the Work

include, but are not limited to, the following:

a. CertainTeed Corp.; Duct Wrap.

b. Johns Manville: Microlite.

c. Knauf Insulation; Duct Wrap.

d. Manson Insulation Inc.; Alley Wrap.

e. Owens Corning; All-Service Duct Wrap.

I. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For equipment applications, provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements.

available products that may be incorporated into the Work

include, but are not limited to, the following:

a. CertainTeed Corp.; Commercial Board.

b. Johns Manville; 800 Series Spin-Glas.

c. Knauf Insulation; Insulation Board.

d. Owens Corning; Fiberglas 700 Series.

J. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements,

available products that may be incorporated into the Work

include, but are not limited to, the following:

a. Fibrex Insulations Inc.; Coreplus 1200.

b. Johns Manville: Micro-Lok.

c. Knauf Insulation; 1000(Pipe Insulation.

d. Manson Insulation Inc.; Alley-K.

e. Owens Corning; Fiberglas Pipe Insulation.

2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547,

Type I, Grade A, with factory-applied ASJ or with factoryapplied

ASJ-SSL. Factory-applied jacket requirements are

specified in "Factory-Applied Jackets" Article.

K. Mineral-Fiber. Pipe and Tank Insulation: Mineral or glass

fibers bonded with a thermosetting resin. Semirigid board

material with factory-applied ASJ complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h

x sq. ft. x deg F or less. Factory-applied jacket requirements

are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. CertainTeed Corp.; CrimpWrap.

b. Johns Manville; MicroFlex.

c. Knauf Insulation; Pipe and Tank Insulation.

d. Manson Insulation Inc.; AK Flex.

e. Owens Corning; Fiberglas Pipe and Tank Insulation.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

1. Products: Subject to compliance with requirements,

available products that may be incorporated into the Work

include, but are not limited to, the following:

a. Insulco, Division of MFS, Inc.; Triple I.

b. P. K. Insulation Mfg. Co., Inc.; Super-Stik.

B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. P. K. Insulation Mfg. Co., Inc.; Thermal-V-Kote.

C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.

1. Products: Subject to compliance with requirements,

available products that may be incorporated into the Work include, but are not limited to, the following:

a. Insulco, Division of MFS, Inc.; SmoothKote.

b. P. K. Insulation Mfg. Co., Inc.; PK No. 127, and Quik-Cote.

c. Rock Wool Manufacturing Company; Delta One Shot.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
B. Calcium Silicate Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of 50 to 800 deg F.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Products, Division of ITW; CP-97.

b. Foster Products Corporation, H. B. Fuller Company; 81-27/81-93.

C. Cellular-Glass, Phenolic, Polyisocyanurate, and Polystyrene Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Products, Division of ITW; CP-96.

b. Foster Products Corporation, H. B. Fuller Company; 81-33.

D. Flexible Elastomeric and Polyolefin Adhesive: Comply with MILA-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements,

available products that may be incorporated into the Work include, but are not limited to, the following:

a. Aeroflex USA Inc.; Aeroseal.

b. Foster Products Corporation, H. B. Fuller Company; 85-75.

E. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Products, Division of ITW; CP-82.

b. Foster Products Corporation, H. B. Fuller Company; 85-20.

F. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Products, Division of ITW; CP-82.

b. Foster Products Corporation, H. B. Fuller Company; 85-20.

G. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Chemical Company (The); 739, Dow Silicone.

b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II. B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Products, Division of ITW; CP-35.

b. Foster Products Corporation, H. B. Fuller Company; 30-90.

2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.

3. Service Temperature Range: Minus 20 to plus 180 deg F.

4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.

5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Products: Subject to compliance with requirements,

available products that may be incorporated into the Work

include, but are not limited to, the following:

a. Childers Products, Division of ITW; CP-10.

b. Foster Products Corporation, H. B. Fuller Company; 35-00.

2. Water-Vapor Permeance: ASTM F 1249, 3 perms at 0.0625-inch dry film thickness.

3. Service Temperature Range: Minus 20 to plus 200 deg F.

4. Solids Content: 63 percent by volume and 73 percent by weight.

5. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Products, Division of ITW; CP-52.

b. Foster Products Corporation, H. B. Fuller Company; 81-42.

2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over equipment and pipe insulation.

Service Temperature Range: Minus 50 to plus 180 deg F.
 Color: White.

2.6 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Cellular-Glass, Phenolic, and Polyisocyanurate Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Products, Division of ITW; CP-76.

b. Foster Products Corporation, H. B. Fuller Company; 30-45.

2. Materials shall be compatible with insulation materials, jackets, and substrates.

3. Permanently flexible, elastomeric sealant.

- 4. Service Temperature Range: Minus 100 to plus 300 deg F.
- 5. Color: White or gray.
- B. FSK and Metal Jacket Flashing Sealants:
- 1. Products: Subject to compliance with requirements,
- available products that may be incorporated into the Work include, but are not limited to, the following:
- a. Childers Products, Division of ITW; CP-76-8.
- 2. Materials shall be compatible with insulation materials, jackets, and substrates.
- 3. Fire- and water-resistant, flexible, elastomeric sealant.
- 4. Service Temperature Range: Minus 40 to plus 250 deg F.
- 5. Color: Aluminum.

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Products, Division of ITW; CP-76.

2. Materials shall be compatible with insulation materials, jackets, and substrates.

3. Fire- and water-resistant, flexible, elastomeric sealant.

4. Service Temperature Range: Minus 40 to plus 250 deg F.

5. Color: White.

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

 ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.8 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. Metal Jacket:

1. Products: Subject to compliance with requirements,

available products that may be incorporated into the Work

include, but are not limited to, the following:

a. Childers Products, Division of ITW; Metal Jacketing Systems.

b. PABCO Metals Corporation; Surefit.

C.

2. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005,

3105 or 5005, Temper H-14.

a. Factory cut and rolled to size.

b. Finish and thickness are indicated in field-applied jacket schedules.

c. Moisture Barrier for Outdoor Applications: 3-milthick,

heat-bonded polyethylene and kraft paper.

d. Factory-Fabricated Fitting Covers:

1) Same material, finish, and thickness as jacket.

2) Preformed 2-piece or gore, 45- and 90-degree,

short- and long-radius elbows.

3) Tee covers.

4) Flange and union covers.

5) End caps.

6) Beveled collars.

7) Valve covers.

8) Field fabricate fitting covers only if factoryfabricated

fitting covers are not available.

C. Underground Direct-Buried Jacket: 125-mil- thick vapor barrier and waterproofing membrane consisting of a rubberized bituminous resin reinforced with a woven-glass fiber or polyester scrim and laminated aluminum foil.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Pittsburgh Corning Corporation; Pittwrap.

b. Polyguard; Insulrap No Torch 125.

2.9 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
a. Avery Dennison Corporation, Specialty Tapes Division;

Fasson 0835.

b. Compac Corp.; 104 and 105.

c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.

d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches.

3. Thickness: 11.5 mils.

- 4. Adhesion: 90 ounces force/inch in width.
- 5. Elongation: 2 percent.
- 6. Tensile Strength: 40 lbf/inch in width.

7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

2.10 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Products; Bands.

b. PABCO Metals Corporation; Bands.

2. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing seal.

B. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding,0.135-inch diameter shank, length to suit depth of insulation indicated.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the

Work include, but are not limited to, the following:

1) AGM Industries, Inc.; CWP-1.

2) GEMCO; CD.

3) Midwest Fasteners, Inc.; CD.

2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitordischarge welding,0.135-inch diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) AGM Industries, Inc.; CWP-1.

2) GEMCO; Cupped Head Weld Pin.

3) Midwest Fasteners, Inc.; Cupped Head.

3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) AGM Industries, Inc.; Tactoo Insul-Hangers, Series T.

2) GEMCO; Perforated Base.

3) Midwest Fasteners, Inc.; Spindle.

b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.

c. Spindle: Copper- or zinc-coated, low carbon steel, fully annealed, 0.106-inch diameter shank, length to suit depth of insulation indicated.

d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

4. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements: a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following: 1) GEMCO; Nylon Hangers.

2) Midwest Fasteners, Inc.; Nylon Insulation Hangers.

b. Baseplate: Perforated, nylon sheet, 0.030 inch thick

by 1-1/2 inches in diameter.

c. Spindle: Nylon, 0.106-inch diameter shank, length to

suit depth of insulation indicated, up to 2-1/2 inches. d. Adhesive: Recommended by hanger manufacturer. Product

with demonstrated capability to bond insulation hanger

securely to substrates indicated without damaging

insulation, hangers, and substrates.

5. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) AGM Industries, Inc.; RC-150.

2) GEMCO; R-150.

3) Midwest Fasteners, Inc.; WA-150.

b. Protect ends with capped self-locking washers

incorporating a spring steel insert to ensure permanent

retention of cap in exposed locations.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch wide, stainless steel or Monel.

D. Wire: 0.080-inch nickel-copper alloy.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. C & F Wire.

b. Childers Products.

c. PABCO Metals Corporation.

2.11 CORNER ANGLES

A. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105 or 5005; Temper H-14.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.

2. Verify that surfaces to be insulated are clean and dry.

3. Proceed with installation only after unsatisfactory

conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating

temperature range.

2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.H. Install insulation with tight longitudinal seams and end joints.Bond seams and joints with adhesive recommended by insulation

material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.

2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.

3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.

2. Cover circumferential joints with 3-inch wide strips, of same material as insulation jacket. Secure strips with

adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.

3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.

5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions.

Repair joint separations and cracking due to thermal movement. O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above ambient services, do not install insulation to the following:

1. Vibration-control devices.

- 2. Testing agency labels and stamps.
- 3. Nameplates and data plates.
- 4. Manholes.
- 5. Handholes.
- 6. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.

2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.

3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.

4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall

Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.

2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.

3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.

4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition

Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Division 07 Section "Penetration Firestopping"irestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.

2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.5 EQUIPMENT, TANK, AND VESSEL INSULATION INSTALLATION A. Mineral Fiber, Pipe and Tank Insulation Installation for Tanks and Vessels: Secure insulation with adhesive and anchor pins and speed washers.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of tank and vessel surfaces.

2. Groove and score insulation materials to fit as closely as possible to equipment, including contours. Bevel insulation edges for cylindrical surfaces for tight joints. Stagger end joints.

3. Protect exposed corners with secured corner angles.

4. Install adhesively attached or self-sticking insulation hangers and speed washers on sides of tanks and vessels as follows:

a. Do not weld anchor pins to ASME-labeled pressure vessels.

b. Select insulation hangers and adhesive that are compatible with service temperature and with substrate.c. On tanks and vessels, maximum anchor-pin spacing is 3 inches from insulation end joints, and 16 inches o.c. in both directions.

d. Do not overcompress insulation during installation.

e. Cut and miter insulation segments to fit curved sides and domed heads of tanks and vessels.

f. Impale insulation over anchor pins and attach speed washers.

g. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

5. Secure each layer of insulation with stainless-steel or aluminum bands. Select band material compatible with insulation materials.

6. Where insulation hangers on equipment and vessels are not permitted or practical and where insulation support rings are not provided, install a girdle network for securing insulation. Stretch prestressed aircraft cable around the diameter of vessel and make taut with clamps, turnbuckles, or breather springs. Place one circumferential girdle around equipment approximately 6 inches from each end. Install wire or cable between two circumferential girdles 12 inches o.c. Install a wire ring around each end and around outer periphery of center openings, and stretch prestressed aircraft cable radially from the wire ring to nearest circumferential girdle. Install additional circumferential girdles along the body of equipment or tank at a minimum spacing of 48 inches o.c. Use this network for securing insulation with tie wire or bands.

 Stagger joints between insulation layers at least 3 inches.
 Install insulation in removable segments on equipment access doors, manholes, handholes, and other elements that require frequent removal for service and inspection.

9. Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.

10. For equipment with surface temperatures below ambient, apply mastic to open ends, joints, seams, breaks, and punctures in insulation.

B. Insulation Installation on Pumps:

1. Fabricate metal boxes lined with insulation. Fit boxes around pumps and coincide box joints with splits in pump casings. Fabricate joints with outward bolted flanges. Bolt flanges on 6-inch centers, starting at corners. Install 3/8-inch diameter fasteners with wing nuts. Alternatively, secure the box sections together using a latching mechanism.

2. Fabricate boxes from galvanized steel, at least 0.040 inch thick.

3. For below ambient services, install a vapor barrier at seams, joints, and penetrations. Seal between flanges with replaceable gasket material to form a vapor barrier.

3.6 GENERAL PIPE INSULATION INSTALLATION
A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

 Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive.
 Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.

4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is

thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier. 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vaporbarrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant. D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.

 When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.

4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.7 CALCIUM SILICATE INSULATION INSTALLATION A. Insulation Installation on Domestic Water Boiler Breechings: 1. Secure single-layer insulation with stainless-steel bands at 12-inch intervals and tighten bands without deforming insulation material.

2. Install 2-layer insulation with joints tightly butted and staggered at least 3 inches. Secure inner layer with wire spaced at 12-inch intervals. Secure outer layer with stainless-steel bands at 12-inch intervals.

3. On exposed applications without metal jacket, finish insulation surface with a skim coat of mineral-fiber, hydraulic-setting cement. When cement is dry, apply flood coat of lagging adhesive and press on one layer of glass cloth. Overlap edges at least 1 inch. Apply finish coat of lagging adhesive over glass cloth. Thin finish coat to achieve smooth, uniform finish.

3.8 CELLULAR-GLASS INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:
1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.

3. For insulation with factory-applied jackets on above ambient services, secure laps with outward clinched staples at 6 inches o.c.

4. For insulation with factory-applied jackets on below ambient services, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vaporbarrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.

2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.

3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.

4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.

2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:1. Install preformed sections of cellular-glass insulation to valve body.

2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.

3. Install insulation to flanges as specified for flange insulation application.

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.

2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.

3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.

4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vaporbarrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.

2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.

3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.

4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.

2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:1. Install preformed sections of same material as straight segments of pipe insulation when available.

2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.

3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.

4. Install insulation to flanges as specified for flange insulation application.

3.10 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.

2. Embed glass cloth between two 0.062-inch thick coats of lagging adhesive.

3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints. A. Equipment and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof. a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
C. Do not field paint aluminum or stainless-steel jackets.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect field-insulated equipment, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each type of equipment defined in the "Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance. 2. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article. D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.13 DOMESTIC WATER BOILER BREECHING INSULATION SCHEDULE

A. Round, exposed breeching and connector insulation shall be one of the following:

1. Calcium Silicate: 2 inches thick. k=0.8@200F, 12pcf

3.14 EQUIPMENT INSULATION SCHEDULE

A. Insulation materials and thicknesses are identified below. If more than one material is listed for a type of equipment, selection from materials listed is Contractor's option.

B. Insulate indoor and outdoor equipment in paragraphs below that is not factory insulated.

C. Domestic water, domestic chilled-water (potable), and domestic hot-water hydropneumatic tank insulation shall be one of the following:

1. Mineral-Fiber Board: 1 inch thick and 6-lb/cu. ft. nominal density.

D. Domestic hot-water storage tank insulation shall be the following, :

1. Mineral-Fiber Board: 1-1/2" thick, 6-lb/cu. ft. k-

0.225@75F nominal density.

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option. B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following: 1. Drainage piping located in crawl spaces. 2. Underground piping. 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury. 3.16 INDOOR PIPING INSULATION SCHEDULE A. Domestic Cold Water: 1. NPS 1-1/4 and Smaller: Insulation shall be the following: a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick, k=0.23 with factory applied jacket. 2. NPS 1-1/2 and Larger: Insulation shall be the following: a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick, k-0.23 with factory applied jacket. B. Domestic Hot and Recirculated Hot Water: 1. NPS 2 and Smaller: Insulation shall be the following: a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick with factory applied jacket. 2. NPS 2 and Larger: Insulation shall be the following: a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inch thick with factory applied jacket. C. Stormwater and Overflow: 1. All Pipe Sizes: Insulation shall be the following: a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick with factory applied jacket. D. Roof Drain and Overflow Drain Bodies: 1. All Pipe Sizes: Insulation shall be the following: a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick with factory applied jacket. E. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities: 1. All Pipe Sizes: Insulation shall be the following: a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick with factory applied jacket. F. Sanitary Waste Piping Where Heat Tracing Is Installed: 1. All Pipe Sizes: Insulation shall be the following: a. Mineral-Fiber. Preformed Pipe Insulation. Type I: 1-1/2 inches thick with factory applied jacket. G. Condensate and Equipment Drain Water below 60 Deg F: 1. All Pipe Sizes: Insulation shall be the following: a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick with factory applied jacket.

the factory-applied jacket.B. If more than one material is listed, selection from materials listed is Contractor's option.C. Piping, Concealed:1. None.D. Piping, Exposed:1. None.

END OF SECTION 220700

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Under-building slab and aboveground domestic water pipes, tubes, fittings, and specialties inside the building.

- 2. Encasement for piping.
- 3. Flexible connectors.
- 4. Water meters.
- 5. Escutcheons.
- 6. Sleeves and sleeve seals.
- B. Related Section:

1. Division 22 Section "Facility Water Distribution Piping" for water-service piping and water meters outside the building from source to the point where water-service piping enters the building.

1.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Domestic water piping and support and installation shall withstand effects of earthquake motions determined according to ASCE/SEI 7.

1.4 SUBMITTALS

- A. Product Data: For the following products:
- 1. Transition fittings.
- 2. Dielectric fittings.
- 3. Flexible connectors.
- 4. Water meters.
- 5. Backflow preventers and vacuum breakers.
- 6. Escutcheons.
- 7. Sleeves and sleeve seals.

B. Coordination Drawings: For piping in equipment rooms and other congested areas, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

- 1. Fire-suppression-water piping.
- 2. Domestic water piping.
- 3. HVAC hydronic piping.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 61 for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
1. Cast-Copper Solder-Joint Fittings: ASME B16.18, pressure fittings.

2. Wrought-Copper Solder-Joint Fittings: ASME B16.22,

wrought-copper pressure fittings.

3. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

4. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonalstock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

5. Grooved-Joint Copper-Tube Appurtenances:

a. Manufacturers: Subject to compliance with

requirements, available manufacturers offering products

that may be incorporated into the Work include, but are

not limited to, the following:

1) Anvil International.

2) Shurjoint Piping Products.

3) Victaulic Company.

b. Copper Grooved-End Fittings: ASTM B 75 copper tube or ASTM B 584 bronze castings.

c. Grooved-End-Tube Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, EPDM-rubber gaskets suitable for hot and cold water, and bolts and nuts.

2.3 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.

1. Standard-Pattern, Mechanical-Joint Fittings: AWWA C110, ductile or gray iron.

2.4 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free, unless otherwise indicated; full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include

water-flushable flux according to ASTM B 813.

D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copperphosphorus alloys for general-duty brazing unless otherwise indicated.

2.5 ENCASEMENT FOR PIPING

A. Standard: ASTM A 674 or AWWA C105.

B. Form: Sheet or Tube.

C. Material: LLDPE film of 0.008-inch minimum thickness or highdensity,

cross-laminated PE film of 0.004-inch minimum

D. Color: Black or Natural.

2.6 TRANSITION FITTINGS

A. General Requirements:

- 1. Same size as pipes to be joined.
- 2. Pressure rating at least equal to pipes to be joined.
- 3. End connections compatible with pipes to be joined.
- B. Fitting-Type Transition Couplings: Manufactured piping coupling
- or specified piping system fitting.

C. Sleeve-Type Transition Coupling: AWWA C219.

1. Manufacturers: Subject to compliance with requirements,

available manufacturers offering products that may be

incorporated into the Work include, but are not limited to,

the following:

a. Cascade Waterworks Manufacturing.

b. Dresser, Inc.; Dresser Piping Specialties.

c. Viking Johnson; c/o Mueller Co.

D. Plastic-to-Metal Transition Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Charlotte Pipe and Foundry Company.

b. Harvel Plastics, Inc.

c. Spears Manufacturing Company.

2. Description: CPVC or PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert and one solvent-cement-socket end.

E. Plastic-to-Metal Transition Unions:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Colonial Engineering, Inc.

b. NIBCO INC.

c. Spears Manufacturing Company.

2. Description: CPVC or PVC four-part union. Include brass or stainless-steel threaded end, solvent-cementjoint or threaded plastic end, rubber O-ring, and union nut.

2.7 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.

B. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. EPCO Sales, Inc.

b. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

c. Zurn Plumbing Products Group; Wilkins Water Control Products.

2. Description:

a. Pressure Rating: 150 psig at 180 deg F.

b. End Connections: Solder-joint copper alloy and

threaded ferrous.

C. Dielectric Flanges:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. EPCO Sales, Inc.
- b. Watts Regulator Co.; a division of Watts Water
- Technologies, Inc.
- 2. Description:
- a. Factory-fabricated, bolted, companion-flange assembly.
- b. Pressure Rating: 175 psig minimum.

c. End Connections: Solder-joint copper alloy and

threaded ferrous; threaded solder-joint copper alloy

D. Dielectric-Flange Kits:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Calpico, Inc.

b. Central Plastics Company.

c. Pipeline Seal and Insulator, Inc.

2. Description:

a. Nonconducting materials for field assembly of companion flanges.

b. Pressure Rating: 150 psig.

- c. Gasket: Neoprene or phenolic.
- d. Bolt Sleeves: Phenolic or polyethylene.
- e. Washers: Phenolic with steel backing washers.
- E. Dielectric Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. Calpico, Inc.
- b. Lochinvar Corporation.
- 2. Description:
- a. Galvanized-steel coupling.
- b. Pressure Rating: 300 psig at 225 deg F.
- c. End Connections: Female threaded.
- d. Lining: Inert and noncorrosive, thermoplastic.
- F. Dielectric Nipples:

1. Manufacturers: Subject to compliance with requirements,

available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Perfection Corporation; a subsidiary of American Meter Company.

- b. Precision Plumbing Products, Inc.
- c. Victaulic Company.
- 2. Description:
- a. Electroplated steel nipple complying with ASTM F 1545.
- b. Pressure Rating: 300 psig at 225 deg F.
- c. End Connections: Male threaded or grooved.
- d. Lining: Inert and noncorrosive, propylene.

2.8 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- 1. Flexicraft Industries.
- 2. Hyspan Precision Products, Inc.
- 3. Metraflex, Inc.

B. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.

1. Working-Pressure Rating: Minimum 200 psig.

2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.

3. End Connections NPS 2-1/2 and Larger: Flanged copper alloy.

C. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainlesssteel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.

1. Working-Pressure Rating: Minimum 200 psig.

2. End Connections NPS 2 and Smaller: Threaded steel-pipe nipple.

3. End Connections NPS 2-1/2 and Larger: Flanged steel nipple.

2.9 ESCUTCHEONS

A. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.

B. One Piece, Cast Brass: Polished, chrome-plated or rough-brass finish with setscrews.

C. One Piece, Deep Pattern: Deep-drawn, box-shaped brass with chrome-plated finish.

D. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

2.10 SLEEVES

A. Cast-Iron Wall Pipes: Fabricated of cast iron, and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

C. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.11 SLEEVE SEALS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Advance Products & Systems, Inc.

2. Metraflex, Inc.

3. Pipeline Seal and Insulator, Inc.

B. Description: Modular sealing element unit, designed for field

assembly, used to fill annular space between pipe and sleeve.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

2. Pressure Plates: Stainless steel.

2. Pressure Plates: Stainless steel.

3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.12 GROUT

A. Standard: ASTM C 1107, Grade B, post-hardening and volumeadjusting,

dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and

exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate

friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.

D. Install underground ductile-iron pipe in PE encasement according to ASTM A 674 or AWWA C105.

E. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages and Division 22 Section "Domestic Water Piping Specialties" for drain valves and strainers.

F. Install shutoff valve immediately upstream of each dielectric fitting.

G. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

H. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

I. Install seismic restraints on piping. Comply with requirements in Division 22 Section "Vibration and Seismic Controls for

Plumbing Piping and Equipment" for seismic-restraint devices. J. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

K. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

L. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

M. Install piping adjacent to equipment and specialties to allow service and maintenance.

N. Install piping to permit valve servicing.

O. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.

P. Install piping free of sags and bends.

Q. Install fittings for changes in direction and branch connections.

R. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

S. Install pressure gages on suction and discharge piping from each plumbing pump and packaged booster pump. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages.

T. Install thermostats in hot-water circulation piping. Comply with requirements in Division 22 Section "Domestic Water Pumps" for thermostats.

U. Install thermometers on inlet and outlet piping from each water heater. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for thermometers.

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of

pipes, tubes, and fittings before assembly.

C. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

D. Copper-Tubing Grooved Joints: Roll groove end of tube. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings according to AWWA C606 for roll-grooved joints.

E. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

F. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.4 VALVE INSTALLATION

A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.

B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.

C. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."

1. Hose-End Drain Valves: At low points in water mains, risers, and branches.

2. Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.

D. Install balancing valve in each hot-water circulation return branch and discharge side of each pump and circulator. Set balancing valves partly open to restrict but not stop flow. Use ball valves for piping NPS 2 and smaller and butterfly valves for piping NPS 2-1/2 and larger. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves.

E. Install calibrated balancing valves in each hot-water circulation return branch and discharge side of each pump and circulator. Set calibrated balancing valves partly open to restrict but not stop flow. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for calibrated balancing valves.

3.5 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. NPS 1-1/2 and Smaller: Fitting-type coupling.

2. NPS 2 and Larger: Sleeve-type coupling.

C. Transition Fittings in Aboveground Domestic Water PipingNPS 2 and Smaller: Plastic-to-metal transition fittingsunions.

3.6 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric

couplings couplings or nipplesnipplesunions.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4 : Use dielectric

flangesflange kitsnipples.

D. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.7 FLEXIBLE CONNECTOR INSTALLATION

A. Install flexible connectors in suction and discharge piping connections to each domestic water pump and in suction and discharge manifold connections to each domestic water booster pump.

B. Install bronze-hose flexible connectors in copper domestic water tubing.

C. Install stainless-steel-hose flexible connectors in steel domestic water piping.

3.8 WATER METER INSTALLATION

A. Rough-in domestic water piping , and install water meters according to utility company's requirements.

B. Install water meters according to AWWA M6, utility company's requirements, and the following:

C. Install remote registration system according to standards of utility company and of authorities having jurisdiction.

3.9 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismicrestraint devices.

B. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support products and installation.

1. Vertical Piping: MSS Type 8 or 42, clamps.

2. Individual, Straight, Horizontal Piping Runs:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.

c. Longer Than 100 Feet If Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.

4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.

2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.

3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.

4. NPS 2-1/2: 108 inches with 1/2-inch rod.

5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.

6. NPS 6: 10 feet with 5/8-inch rod.

7. NPS 8: 10 feet with 3/4-inch rod.

F. Install supports for vertical copper tubing every 10 feet.

G. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.

2. NPS 1-1/2: 108 inches with 3/8-inch rod.

3. NPS 2: 10 feet with 3/8-inch rod.

4. NPS 2-1/2: 11 feet with 1/2-inch rod.

5. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.

6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.

7. NPS 6: 12 feet with 3/4-inch rod.

8. NPS 8 to NPS 12: 12 feet with 7/8-inch rod.

H. Install supports for vertical steel piping every 15 feet.

I. Install vinyl-coated hangers for CPVC piping with the following

maximum horizontal spacing and minimum rod diameters:

1. NPS 1 and Smaller: 36 inches with 3/8-inch rod.

2. NPS 1-1/4 to NPS 2: 48 inches with 3/8-inch rod.

3. NPS 2-1/2 to NPS 3-1/2: 48 inches with 1/2-inch rod.

4. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.

5. NPS 6: 48 inches with 3/4-inch rod.

6. NPS 8: 48 inches with 7/8-inch rod.

J. Install supports for vertical CPVC piping every 60 inches for NPS 1 and smaller, and every 72 inches for NPS 1-1/4 and larger. K. Install vinyl-coated hangers for PEX piping with the following

maximum horizontal spacing and minimum rod diameters:

1. NPS 1 and Smaller: 32 inches with 3/8-inch rod.

L. Install hangers for vertical PEX piping every 48 inches. M. Install vinyl-coated hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2 and Smaller: 48 inches with 3/8-inch rod.

1. NPS 2 and Smaller. 46 inches with 3/6-inch 100.

2. NPS 2-1/2 to NPS 3-1/2: 48 inches with 1/2-inch rod.

3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.

4. NPS 6: 48 inches with 3/4-inch rod.

5. NPS 8: 48 inches with 7/8-inch rod.

N. Install supports for vertical PVC piping every 48 inches.

O. Support piping and tubing not listed in this article according

to MSS SP-69 and manufacturer's written instructions.

3.10 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.

2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.

3. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.

4. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.11 ESCUTCHEON INSTALLATION

A. Install escutcheons for penetrations of walls, ceilings, and floors.

B. Escutcheons for New Piping:

1. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.

2. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.

3. Bare Piping at Ceiling Penetrations in Finished Spaces:

One piece, cast brass with polished chrome-plated finish.

4. Bare Piping in Unfinished Service Spaces: One piece, cast brass with polished chrome-plated finish.

5. Bare Piping in Equipment Rooms: One piece, cast brass.

6. Bare Piping at Floor Penetrations in Equipment Rooms: Onepiece floor plate.

3.12 SLEEVE INSTALLATION

A. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and B. Sleeves are not required for core-drilled holes.

C. Permanent sleeves are not required for holes formed by removable PE sleeves.

D. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.

E. Install sleeves in new partitions, slabs, and walls as they are built.

F. For interior wall penetrations, seal annular space between sleeve and pipe or pipe insulation using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.

G. For exterior wall penetrations above grade, seal annular space between sleeve and pipe using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.

H. For exterior wall penetrations below grade, seal annular space between sleeve and pipe using sleeve seals specified in this Section.

I. Seal space outside of sleeves in concrete slabs and walls with grout.

J. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated.

K. Install sleeve materials according to the following applications:

1. Sleeves for Piping Passing through Concrete Floor Slabs: Steel pipe.

2. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Steel pipe.

a. Extend sleeves 2 inches above finished floor level.

b. For pipes penetrating floors with membrane

waterproofing, extend cast-iron sleeve fittings below

floor slab as required to secure clamping ring if ring

is specified. Secure flashing between clamping

flanges. Install section of cast-iron soil pipe to

extend sleeve to 2 inches above finished floor level.

Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim" for flashing.

3. Sleeves for Piping Passing through Gypsum-Board Partitions:

a. Steel pipe sleeves for pipes smaller than NPS 6.

b. Galvanized-steel sheet sleeves for pipes NPS 6 and larger.

c. Exception: Sleeves are not required for water supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.

4. Sleeves for Piping Passing through Concrete Roof Slabs: Steel pipe.

5. Sleeves for Piping Passing through Exterior Concrete Walls:

a. Steel pipe sleeves for pipes smaller than NPS 6.

b. Cast-iron wall pipe sleeves for pipes NPS 6 and larger.

c. Install sleeves that are large enough to provide 1-inch annular clear space between sleeve and pipe or pipe insulation when sleeve seals are used.

d. Do not use sleeves when wall penetration systems are used.

6. Sleeves for Piping Passing through Interior Concrete Walls:

a. Steel pipe sleeves for pipes smaller than NPS 6.

b. Galvanized-steel sheet sleeves for pipes NPS 6 and larger.

L. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestop materials and installations.

3.13 SLEEVE SEAL INSTALLATION

A. Install sleeve seals in sleeves in exterior concrete walls at water-service piping entries into building.

B. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.14 IDENTIFICATION

A. Identify system components. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for identification materials and installation.
B. Label pressure piping with system operating pressure.

3.15 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Piping Inspections:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.

2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughingin and before setting fixtures.

b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.

4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

C. Piping Tests:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.

2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.

3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.

4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.

5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.

6. Prepare reports for tests and for corrective action required.

D. Domestic water piping will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.16 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.

2. Open shutoff valves to fully open position.

3. Open throttling valves to proper setting.

4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

a. Manually adjust ball-type balancing valves in hotwatercirculation return piping to provide flow of hot water in each branch.

b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for

temporary sealing of piping during installation.

6. Remove and clean strainer screens. Close drain valves and replace drain plugs.

7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.

8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.17 CLEANING

standing time.

A. Clean and disinfect potable and non-potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.

2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below: a. Flush piping system with clean, potable water until dirty water does not appear at outlets.

b. Fill and isolate system according to either of the following:

 Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 c. Flush system with clean, potable water until no chlorine is in water coming from system after the d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Prepare and submit reports of purging and disinfecting activities.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.18 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Under-building-slab, domestic water, building-service piping,

NPS 4 to NPS 8 and larger, shall be the following:

1. Mechanical-joint, ductile-iron pipe; standard- pattern

mechanical-joint fittings; and mechanical joints.

D. Under-building-slab, domestic water piping, NPS 2 and smaller, shall be the following:

1. copper tube, ASTM B 88, Type K without joints; .

E. Aboveground domestic water piping, NPS 3 and smaller, shall be the following:

1. Hard copper tube, ASTM B 88, Type L ; cast- or wroughtcopper solder-joint fittings; and soldered joints.

F. Aboveground domestic water piping, NPS 3" and larger, shall be one of the following:

1. Hard copper tube, ASTM B 88, Type L ; cast- or wroughtcopper solder-joint fittings; and soldered joints.

2. Hard copper tube, ASTM B 88, Type L ; grooved-joint coppertube appurtenances; and grooved joints.

3.19 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
1. Shutoff Duty: Use ball or gate valves for piping NPS 2 and smaller. Use butterfly, ball, or gate valves with flanged

ends for piping NPS 2-1/2 and larger.

2. Throttling Duty: Use ball or globe valves for piping NPS 2 and smaller. Use butterfly or ball valves with flanged

ends for piping NPS 2-1/2 and larger.

3. Hot-Water Circulation Piping, Balancing Duty:

CalibratedMemory-stop balancing valves.

4. Drain Duty: Hose-end drain valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

C. Iron grooved-end valves may be used with grooved-end piping.

D. valves matching piping materials may be used.

END OF SECTION 221116

SECTION 22 11 19 DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following domestic water piping specialties:

- 1. Vacuum breakers.
- 2. Backflow preventers.
- 3. Water pressure-reducing valves.
- 4. Balancing valves.
- 5. Temperature-actuated water mixing valves.
- 6. Strainers.
- 7. Outlet boxes.
- 8. Hose stations.
- 9. Hose bibbs.
- 10. Wall hydrants.
- 11. Drain valves.
- 12. Water hammer arresters.
- 13. Air vents.
- 14. Trap-seal primer valves.
- 15. Trap-seal primer systems.
- B. Related Sections include the following:

1. Division 22 Section "Meters and Gages for Plumbing Piping" for thermometers, pressure gages, and flow meters in

domestic water piping.

2. Division 22 Section "Domestic Water Piping" for water meters.

3. Division 22 Section "Domestic Water Filtration Equipment" for water filters in domestic water piping.

4. Division 22 Section "Healthcare Plumbing Fixtures" for thermostatic mixing valves for sitz baths, thermostatic mixing-valve assemblies for hydrotherapy equipment, and outlet boxes for dialysis equipment.

5. Division 22 Section "Emergency Plumbing Fixtures" for water tempering equipment.

6. Division 22 Section "Drinking Fountains and Water Coolers" for water filters for water coolers.

1.3 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

1.4 SUBMITTALS

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

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency

acceptable to authorities having jurisdiction, and marked for intended use.

B. NSF Compliance:

 Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components.
 Comply with NSF 61, "Drinking Water System Components -Health Effects; Sections 1 through 9."

PART 2 - PRODUCTS

2.1 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers : 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Ames Co.

- b. Cash Acme.
- c. Conbraco Industries, Inc.
- d. FEBCO; SPX Valves & Controls.
- e. Rain Bird Corporation.
- f. Toro Company (The); Irrigation Div.
- g. Watts Industries, Inc.; Water Products Div.
- h. Zurn Plumbing Products Group; Wilkins Div.
- 2. Standard: ASSE 1001.
- 3. Size: NPS 1/4 to NPS 3, as required to match connected piping.

4. Body: Bronze.

- 5. Inlet and Outlet Connections: Threaded.
- 6. Finish: Rough bronze.
- B. Hose-Connection Vacuum Breakers :
- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- a. Arrowhead Brass Products, Inc.
- b. Cash Acme.
- c. Conbraco Industries, Inc.
- d. Legend Valve.
- e. MIFAB, Inc.
- f. Prier Products, Inc.
- g. Watts Industries, Inc.; Water Products Div.
- h. Woodford Manufacturing Company.
- i. Zurn Plumbing Products Group; Light Commercial Operation.
- j. Zurn Plumbing Products Group; Wilkins Div.
- 2. Standard: ASSE 1011.
- 3. Body: Bronze, nonremovable, with manual drain.
- 4. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
- 5. Finish: Chrome or nickel plated.
- C. Pressure Vacuum Breakers :
- 1. Basis-of-Design Product: Subject to compliance with
- requirements, provide the product indicated on Drawings or
- a comparable product by one of the following:
- a. Ames Co.
- b. Conbraco Industries, Inc.
- c. FEBCO; SPX Valves & Controls.
- d. Flomatic Corporation.
- e. Toro Company (The); Irrigation Div.
- f. Watts Industries, Inc.; Water Products Div.
- g. Zurn Plumbing Products Group; Wilkins Div.

D. Laboratory-Faucet Vacuum Breakers :

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. Conbraco Industries, Inc.
- b. Watts Industries, Inc.; Water Products Div.
- c. Woodford Manufacturing Company.

d. Zurn Plumbing Products Group; Wilkins Div.

e.

- 2. Standard: ASSE 1035.
- 3. Size: NPS 1/4 or NPS 3/8 matching faucet size.
- 4. Body: Bronze.
- 5. End Connections: Threaded.
- 6. Finish: Chrome plated.
- E. Spill-Resistant Vacuum Breakers :

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. Conbraco Industries, Inc.
- b. Watts Industries, Inc.; Water Products Div.

C.

- 2. Standard: ASSE 1056.
- 3. Operation: Continuous-pressure applications.
- 4. Accessories:
- a. Valves: Ball type, on inlet and outlet.

2.2 BACKFLOW PREVENTERS

A. Intermediate Atmospheric-Vent Backflow Preventers :

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Cash Acme.

- b. Conbraco Industries, Inc.
- c. FEBCO; SPX Valves & Controls.
- d. Honeywell Water Controls.
- e. Legend Valve.
- f. Watts Industries, Inc.; Water Products Div.
- g. Zurn Plumbing Products Group; Wilkins Div.
- 2. Standard: ASSE 1012.
- 3. Operation: Continuous-pressure applications.
- 4. Size: NPS 1/2 or NPS 3/4.
- 5. Body: Bronze.
- 6. End Connections: Union, solder joint.
- 7. Finish: Chrome plated.
- B. Reduced-Pressure-Principle Backflow Preventers :
- 1. Basis-of-Design Product: Subject to compliance with
- requirements, provide the product indicated on Drawings or
- a comparable product by one of the following:
- a. Ames Co.
- b. Conbraco Industries, Inc.
- c. FEBCO; SPX Valves & Controls.
- d. Flomatic Corporation.
- e. Watts Industries, Inc.; Water Products Div.
- f. Zurn Plumbing Products Group; Wilkins Div.
- C. Double-Check Backflow-Prevention Assemblies :
- 1. Basis-of-Design Product: Subject to compliance with
- requirements, provide the product indicated on Drawings or
- a comparable product by one of the following:

- a. Ames Co.
- b. Conbraco Industries, Inc.
- c. FEBCO; SPX Valves & Controls.
- d. Flomatic Corporation.
- e. Watts Industries, Inc.; Water Products Div.
- f. Zurn Plumbing Products Group; Wilkins Div.
- D. Beverage-Dispensing-Equipment Backflow Preventers :

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. Conbraco Industries, Inc.
- b. Watts Industries, Inc.; Water Products Div.
- c. Zurn Plumbing Products Group; Wilkins Div.
- 2. Standard: ASSE 1022.
- 3. Operation: Continuous-pressure applications.
- 4. Size: NPS 1/4 or NPS 3/8.
- 5. Body: Stainless steel.
- 6. End Connections: Threaded.

E. Carbonated-Beverage-Dispenser, Dual-Check-Valve Backflow Preventers :

- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- a. Cash Acme.
- b. Lancer Corporation.
- c. Watts Industries, Inc.; Water Products Div.
- 2. Standard: ASSE 1032.
- 3. Operation: Continuous-pressure applications.
- 4. Size: NPS 1/4 or NPS 3/8.
- 5. Body: Stainless steel.
- 6. End Connections: Threaded.
- F. Reduced-Pressure-Detector, Fire-Protection Backflow-Preventer Assemblies :
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or
- a comparable product by one of the following:
- a. Ames Co.
- b. Conbraco Industries, Inc.
- c. FEBCO; SPX Valves & Controls.
- d. Watts Industries, Inc.; Water Products Div.
- e. Zurn Plumbing Products Group; Wilkins Div.
- G. Double-Check, Detector-Assembly Backflow Preventers :
- 1. Basis-of-Design Product: Subject to compliance with
- requirements, provide the product indicated on Drawings or a comparable product by one of the following:
- a. Ames Co.
- b. Conbraco Industries, Inc.
- c. FEBCO; SPX Valves & Controls.
- d. Watts Industries, Inc.; Water Products Div.
- e. Zurn Plumbing Products Group; Wilkins Div.
- H. Hose-Connection Backflow Preventers :
- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- a. Conbraco Industries, Inc.
- b. Watts Industries, Inc.; Water Products Div.
- c. Woodford Manufacturing Company.
- 2. Standard: ASSE 1052.

- 3. Operation: Up to 10-foot head of water back pressure.
- 4. Inlet Size: NPS 1/2 or NPS 3/4.
- 5. Outlet Size: Garden-hose thread complying with ASME B1.20.7.
- 6. Capacity: At least 3-gpm flow.
- 2.3 WATER PRESSURE-REDUCING VALVES
- A. Water Regulators :
- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- a. Cash Acme.
- b. Conbraco Industries, Inc.
- c. Honeywell Water Controls.
- d. Watts Industries, Inc.; Water Products Div.
- e. Zurn Plumbing Products Group; Wilkins Div.
- 2. Standard: ASSE 1003.
- 3. Pressure Rating: Initial working pressure of 150 psig.
- 4. Size: As indicated on drawings.
- 5. Design Flow Rate: As indicated on drawings.
- 6. Design Inlet Pressure: As indicated on drawings.
- 7. Design Outlet Pressure Setting: As indicated on drawings.
- 8. Body: Bronze with chrome-plated finish for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3.
- 9. Valves for Booster Heater Water Supply: Include integral
- bypass.
- 10. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and NPS 3.
- B. Water Control Valves :
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or
- a comparable product by one of the following:
- a. CLA-VAL Automatic Control Valves.
- b. Flomatic Corporation.
- c. OCV Control Valves.
- d. Watts Industries, Inc.; Ames Fluid Control Systems.
- e. Watts Industries, Inc.; Watts ACV.
- f. Zurn Plumbing Products Group; Wilkins Div.

2.4 BALANCING VALVES

- A. Memory-Stop Balancing Valves :
- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- a. Conbraco Industries, Inc.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Crane Co.; Crane Valve Group; Jenkins Valves.
- d. Crane Co.; Crane Valve Group; Stockham Div.
- e. Hammond Valve.
- f. Milwaukee Valve Company.
- g. NIBCO INC.
- h. Red-White Valve Corp.
- 2. Standard: MSS SP-110 for two-piece, copper-alloy ball valves.
- 3. Pressure Rating: 400-psig minimum CWP.
- 4. Size: NPS 2 or smaller.
- 5. Body: Copper alloy.
- 6. Port: Standard or full port.

- 7. Ball: Chrome-plated brass.
- 8. Seats and Seals: Replaceable.
- 9. End Connections: Solder joint or threaded.
- 10. Handle: Vinyl-covered steel with memory-setting device.
- 2.5 TEMPERATURE-ACTUATED WATER MIXING VALVES
- A. Water-Temperature Limiting Devices :
- 1. Basis-of-Design Product: Subject to compliance with
- requirements, provide the product indicated on Drawings or
- a comparable product by one of the following:
- a. Armstrong International, Inc.
- b. Cash Acme.
- c. Conbraco Industries, Inc.
- d. Honeywell Water Controls.
- e. Legend Valve.
- f. Leonard Valve Company.
- g. Powers; a Watts Industries Co.
- h. Symmons Industries, Inc.
- i. Taco, Inc.
- j. Watts Industries, Inc.; Water Products Div.
- k. Zurn Plumbing Products Group; Wilkins Div.
- 2. Standard: ASSE 1017.
- 3. Pressure Rating: 125 psig.
- 4. Type: Thermostatically controlled water mixing valve.
- 5. Material: Bronze body with corrosion-resistant interior components.
- 6. Connections: Threaded or union inlets and outlet.
- 7. Accessories: Check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
- B. Primary, Thermostatic, Water Mixing Valves :
- 1. Basis-of-Design Product: Subject to compliance with
- requirements, provide the product indicated on Drawings or a comparable product by one of the following:
- a. Armstrong International, Inc.
- b. Lawler Manufacturing Company, Inc.
- c. Leonard Valve Company.
- d. Powers; a Watts Industries Co.
- e. Symmons Industries, Inc.
- 2. Standard: ASSE 1017.
- 3. Pressure Rating: 125 psig.

4. Type: Exposed-mounting or Cabinet-type, thermostatically controlled water mixing valve.

5. Material: Bronze body with corrosion-resistant interior components.

6. Connections: Threaded or union inlets and outlet.

7. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperaturecontrol handle.

8. Valve Pressure Rating: 125 psig minimum, unless otherwise indicated.

- 9. Selected Valve Flow Rate at 45-psig Pressure Drop:
- 10. Pressure Drop at Design Flow Rate:
- 11. Cabinet: Factory-fabricated, stainless steel, for recessed
- or surface mounting and with hinged, stainless-steel door.
- C. Manifold, Thermostatic, Water-Mixing-Valve Assemblies :

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

- a. Leonard Valve Company.
- b. Powers; a Watts Industries Co.
- c. Symmons Industries, Inc.
- 2. Description: Factory-fabricated, cabinet-type or exposedmounting,

thermostatically controlled, water-mixing-valve assembly in two or three-valve parallel arrangement. 3. Large-Flow Parallel: Thermostatic water mixing valve and downstream pressure regulator with pressure gages on inlet and outlet.

4. Intermediate-Flow Parallel: Thermostatic water mixing valve and downstream pressure regulator with pressure gages on inlet and outlet.

5. Small-Flow Parallel: Thermostatic water mixing valve.

6. Thermostatic Mixing Valves: Comply with ASSE 1017. Include check stops on hot- and cold-water inlets and shutoff valve on outlet.

7. Water Regulator(s): Comply with ASSE 1003. Include pressure gage on inlet and outlet.

8. Component Pressure Ratings: 125 psig minimum, unless otherwise indicated.

9. Cabinet: Factory-fabricated, stainless steel, for [recessed][surface] mounting and with hinged, stainless steel door.

D. Individual-Fixture, Water Tempering Valves :

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Cash Acme.

b. Conbraco Industries, Inc.

c. Honeywell Water Controls.

d. Lawler Manufacturing Company, Inc.

e. Leonard Valve Company.

f. Powers; a Watts Industries Co.

g. Watts Industries, Inc.; Water Products Div.

h. Zurn Plumbing Products Group; Wilkins Div.

2. Standard: ASSE 1016, thermostatically controlled water tempering valve.

3. Pressure Rating: 125 psig minimum, unless otherwise indicated.

4. Body: Bronze body with corrosion-resistant interior components.

5. Temperature Control: Adjustable.

6. Inlets and Outlet: Threaded.

7. Finish: Rough or chrome-plated bronze.

E. Primary Water Tempering Valves :

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Heat-Timer Corporation.

b. Holby Valve Co., Inc.

2. Standard: ASSE 1017, thermostatically controlled tempering valve, listed as tempering valve.

3. Pressure Rating: 125 psig minimum, unless otherwise indicated.

4. Body: Bronze.

5. Temperature Control: Manual.

6. Inlets and Outlet: Threaded.

2.6 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers :

1. Pressure Rating: 125 psig minimum, unless otherwise indicated.

2. Body: Bronze for NPS 2 and smaller; cast iron for NPS 2-1/2 and larger. 3. End Connections: Threaded for NPS 2 and smaller; flanged

- for NPS 2-1/2 and larger.
- 4. Screen: Stainless steel with round perforations, unless
- otherwise indicated.
- 5. Perforation Size:
- a. StrainersNPS 2 and Smaller: 0.020 inch.
- b. Strainers NPS 2-1/2 to NPS 4: 0.045 inch.
- c. Strainers NPS 5 and Larger: 0.10 inch.
- 6. Drain: Factory-installed, hose-end drain valve.

2.7 OUTLET BOXES

- A. Clothes Washer Outlet Boxes :
- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- a. Acorn Engineering Company.
- b. Guy Gray Manufacturing Co., Inc.
- c. IPS Corporation.
- d. LSP Products Group, Inc.
- e. Oatey.
- f. Plastic Oddities; a division of Diverse Corporate Technologies.
- g. Symmons Industries, Inc.
- h. Watts Industries, Inc.; Water Products Div.
- i. Whitehall Manufacturing; a div. of Acorn Engineering Company.
- j. Zurn Plumbing Products Group; Light Commercial Operation.
- 2. Mounting: Recessed.
- 3. Material and Finish: Stainless-steel box and faceplate.
- 4. Faucet: Combination, valved fitting or separate hot- and cold-water, valved fittings complying with ASME A112.18.1. Include garden-hose thread complying with ASME B1.20.7 on outlets.
- 5. Supply Shutoff Fittings: NPS 1/2 gate, globe, or ball valves and NPS 1/2 copper, water tubing.
- 6. Drain: NPS 1-1/2 standpipe and P-trap for direct waste connection to drainage piping.
- 7. Inlet Hoses: Two 60-inch long, rubber household clothes washer inlet hoses with female, garden-hose-thread couplings. Include rubber washers.
- 8. Drain Hose: One 48-inch long, rubber household clothes washer drain hose with hooked end.
- B. Icemaker Outlet Boxes :
- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- a. Acorn Engineering Company.
- b. IPS Corporation.
- c. LSP Products Group, Inc.
- d. Oatey.
- e. Plastic Oddities; a division of Diverse Corporate Technologies.
- 2. Mounting: Recessed.
- 3. Material and Finish: Stainless-steel box and faceplate.
- 4. Faucet: Valved fitting complying with ASME A112.18.1. Include NPS 1/2 or smaller copper tube outlet.
- 5. Supply Shutoff Fitting: NPS 1/2 gate, globe, or ball valve and NPS 1/2 copper, water tubing.

2.8 HOSE STATIONS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- 1. ARCHON Industries, Inc.
- 2. Armstrong International, Inc.
- 3. Cooney Brothers, Inc.
- 4. DynaFluid Ltd.
- 5. Leonard Valve Company.
- 6. Strahman Valves, Inc.
- 7. T & S Brass and Bronze Works, Inc.
- B. Single-Temperature-Water Hose Stations :
- 1. Standard: ASME A112.18.1.
- 2. Cabinet: Stainless-steel enclosure with exposed valve handle, hose connection, and hose rack. Include thermometer in front.
- 3. Hose-Rack Material: Stainless steel.
- 4. Body Material: Bronze with stainless-steel wetted parts.
- 5. Body Finish: Rough bronze.
- 6. Mounting: Wall, with reinforcement.
- 7. Supply Fitting: NPS 3/4 gate, globe, or ball valve and check valve and NPS 3/4 copper, water tubing. Omit check valve if check stop is included with fitting.
- 8. Hose: Manufacturer's standard, for service fluid,
- temperature, and pressure; 25 feet long.
- 9. Nozzle: With hand squeeze on-off control.
- 10. Vacuum Breaker: Integral or factory-installed,
- nonremovable, manual-drain-type, hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052; and garden-hose thread complying with ASME B1.20.7 on outlet.
- C. Hot- and Cold-Water Hose Stations :
- 1. Standard: ASME A112.18.1.
- 2. Type Faucet: Thermostatic mixing valve.
- 3. Cabinet: Stainless-steel enclosure with exposed valve handles, hose connection, and hose rack. Include thermometer in front.
- 4. Hose-Rack Material: Stainless steel.
- 5. Body Material: Bronze with stainless-steel wetted parts.
- 6. Body Finish: Rough bronze.
- 7. Mounting: Wall, with reinforcement.
- 8. Supply Fittings: Two NPS 3/4 gate, globe, or ball valves and check valves and NPS 3/4 copper, water tubing. Omit check valves if check stops are included with fitting.
 9. Hose: Manufacturer's standard, for service fluid,
- temperature, and pressure; 50 feet long.
- 10. Nozzle: With hand squeeze on-off control.
- 11. Vacuum Breaker: Integral or factory-installed,
- nonremovable, manual-drain-type, hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052; and garden-hose thread complying with ASME B1.20.7 on outlet.

2. Body Material: Bronze.

3. Seat: Bronze, replaceable.

4. Supply Connections: NPS 1/2 or NPS 3/4 threaded or solderjoint inlet.

5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.

6. Pressure Rating: 125 psig.

7. Vacuum Breaker: Integral nonremovable, drainable, hoseconnection vacuum breaker complying with ASSE 1011.

8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.

9. Finish for Service Areas: Rough bronze.

10. Finish for Finished Rooms: Chrome or nickel plated.

11. Operation for Equipment Rooms: Wheel handle or operating key.

12. Operation for Service Areas: Operating key.

13. Operation for Finished Rooms: Operating key.

14. Include operating key with each operating-key hose bibb.

15. Include integral wall flange with each chrome- or nickelplated hose bibb.

2.10 WALL HYDRANTS

A. Nonfreeze Wall Hydrants :

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or

a comparable product by one of the following:

a. Josam Company.

b. MIFAB, Inc.

c. Prier Products, Inc.

d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.

e. Tyler Pipe; Wade Div.

f. Watts Drainage Products Inc.

g. Woodford Manufacturing Company.

h. Zurn Plumbing Products Group; Light Commercial Operation.

i. Zurn Plumbing Products Group; Specification Drainage Operation.

B. Nonfreeze, Hot- and Cold-Water Wall Hydrants :

1. Basis-of-Design Product: Subject to compliance with

requirements, provide the product indicated on Drawings or a comparable product by one of the following:

a. Josam Company.

b. Prier Products, Inc.

c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.

d. Tyler Pipe; Wade Div.

e. Watts Drainage Products Inc.

f. Woodford Manufacturing Company.

g. Zurn Plumbing Products Group; Specification Drainage Operation.

C. Vacuum Breaker Wall Hydrants :

1. Basis-of-Design Product: Subject to compliance with

requirements, provide the product indicated on Drawings or a comparable product by one of the following:

a. Arrowhead Brass Products, Inc.

b. Mansfield Plumbing Products LLC.

c. McDonald, A. Y. Mfg. Co.

d. Prier Products, Inc.

e. Smith, Jay. R. Mfg. Co.; Division of Smith Industries, Inc.

f. Watts Industries, Inc.; Water Products Div.

- g. Woodford Manufacturing Company.
- h. Zurn Plumbing Products Group; Light Commercial Operation.

2.11 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves :

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.

- 2. Pressure Rating: 400-psig minimum CWP.
- 3. Size: NPS 3/4.
- 4. Body: Copper alloy.
- 5. Ball: Chrome-plated brass.
- 6. Seats and Seals: Replaceable.
- 7. Handle: Vinyl-covered steel.
- 8. Inlet: Threaded or solder joint.
- 9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.
- B. Gate-Valve-Type, Hose-End Drain Valves :
- 1. Standard: MSS SP-80 for gate valves.
- 2. Pressure Rating: Class 125.
- 3. Size: NPS 3/4.
- 4. Body: ASTM B 62 bronze.
- 5. Inlet: NPS 3/4 threaded or solder joint.
- 6. Outlet: Garden-hose thread complying with ASME B1.20.7 and
- cap with brass chain.
- C. Stop-and-Waste Drain Valves :
- 1. Standard: MSS SP-110 for ball valves or MSS SP-80 for gate valves.
- 2. Pressure Rating: 200-psig minimum CWP or Class 125.
- 3. Size: NPS 3/4.
- 4. Body: Copper alloy or ASTM B 62 bronze.
- 5. Drain: NPS 1/8 side outlet with cap.
- 2.12 WATER HAMMER ARRESTERS
- A. Water Hammer Arresters :
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or
- a comparable product by one of the following:
- a. AMTROL, Inc.
- b. Josam Company.
- c. MIFAB, Inc.
- d. PPP Inc.
- e. Sioux Chief Manufacturing Company, Inc.
- f. Smith, Jay R. Mfg. Co.; Division of Smith Industries,
- Inc.
- g. Tyler Pipe; Wade Div.
- h. Watts Drainage Products Inc.
- i. Zurn Plumbing Products Group; Specification Drainage Operation.

2.13 AIR VENTS

- A. Bolted-Construction Automatic Air Vents :
- 1. Body: Bronze.
- 2. Pressure Rating: 125-psig minimum pressure rating at 140 deg F.
- 3. Float: Replaceable, corrosion-resistant metal.
- 4. Mechanism and Seat: Stainless steel.
- 5. Size: NPS 1/2 minimum inlet.
- 6. Inlet and Vent Outlet End Connections: Threaded.
- B. Welded-Construction Automatic Air Vents :
- 1. Body: Stainless steel.

2. Pressure Rating: 150-psig minimum pressure rating.

3. Float: Replaceable, corrosion-resistant metal.

4. Mechanism and Seat: Stainless steel.

5. Size: NPS 3/8 minimum inlet.

6. Inlet and Vent Outlet End Connections: Threaded.

2.14 TRAP-SEAL PRIMER VALVES

A. Supply-Type, Trap-Seal Primer Valves :

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. MIFAB, Inc.

b. PPP Inc.

c. Sioux Chief Manufacturing Company, Inc.

d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.

e. Watts Industries, Inc.; Water Products Div.

2. Standard: ASSE 1018.

3. Pressure Rating: 125 psig minimum.

4. Body: Bronze.

5. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.

6. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.

7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

B. Drainage-Type, Trap-Seal Primer Valves :

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Standard: ASSE 1044, lavatory P-trap with NPS 3/8 minimum, trap makeup connection.

3. Size: NPS 1-1/4 minimum.

4. Material: Chrome-plated, cast brass.

2.15 TRAP-SEAL PRIMER SYSTEMS

A. Trap-Seal Primer Systems :

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following: a. PPP Inc.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.

2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.

3. Do not install bypass piping around backflow preventers.C. Install water regulators with inlet and outlet shutoff valves

and bypass with memory-stop balancing valve. Install pressure gages on inlet and outlet.

D. Install water control valves with inlet and outlet shutoff valves and bypass with globe valve. Install pressure gages on inlet and outlet.

E. Install balancing valves in locations where they can easily be adjusted.

F. Install temperature-actuated water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.

1. Install thermometers and water regulators if specified.

2. Install cabinet-type units recessed in or surface mounted on wall as specified.

G. Install Y-pattern strainers for water on supply side of each control valve, water pressure-reducing valve, and pump. H. Install outlet boxes recessed in wall. Install 2-by-4-inch fire-retardant-treated-wood blocking wall reinforcement between studs. Fire-retardant-treated-wood blocking is specified in Division 06 Section "Rough Carpentry."

I. Install hose stations with check stops or shutoff valves on inlets and with thermometer on outlet.

1. Install shutoff valve on outlet if specified.

2. Install cabinet-type units recessed in or surface mounted on wall as specified. Install 2-by-4-inch fire-retardanttreatedwood blocking wall reinforcement between studs.

Fire-retardant-treated-wood blocking is specified in

Division 06 Section "Rough Carpentry."

J. Install water hammer arresters in water piping according to PDIWH 201.

K. Install air vents at high points of water piping. Install drain piping and discharge onto floor drain.

L. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

M. Install drainage-type, trap-seal primer valves as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.

N. Install trap-seal primer systems with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floordrain body, trap, or inlet fitting. Adjust system for proper flow.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.

B. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

C. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.3 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plasticlaminate equipment nameplate or sign on or near each of the following:

1. Pressure vacuum breakers.

2. Intermediate atmospheric-vent backflow preventers.

- 3. Reduced-pressure-principle backflow preventers.
- 4. Double-check backflow-prevention assemblies.
- 5. Dual-check-valve backflow preventers.
- 6. Reduced-pressure-detector, fire-protection backflowpreventer assemblies.
- 7. Double-check, detector-assembly backflow preventers.
- 8. Water pressure-reducing valves.
- 9. Calibrated balancing valves.
- 10. Primary, thermostatic, water mixing valves.
- 11. Manifold, thermostatic, water-mixing-valve assemblies.
- 12. Primary water tempering valves.
- 13. Outlet boxes.
- 14. Hose stations.
- 15. Supply-type, trap-seal primer valves.
- 16. Trap-seal primer systems.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and prepare test reports:

1. Test each reduced-pressure-principle backflow preventer and double-check, detector-assembly backflow preventer according to authorities having jurisdiction and the device's reference standard.

B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

3.5 ADJUSTING

A. Set field-adjustable pressure set points of water pressurereducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperatureactuated water mixing valves.

END OF SECTION 221119

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following for soil, waste, and vent piping inside the building:

1. Pipe, tube, and fittings.

2. Encasement for underground metal piping.

B. Related Sections include the following:

1. Division 22 Section "Chemical Waste-Systems for Laboratory and Healthcare Facilities" for chemical-waste and vent piping systems.

1.3 DEFINITIONS

A. LLDPE: Linear, low-density polyethylene plastic.

B. PE: Polyethylene plastic.

C. TPE: Thermoplastic elastomer.

1.4 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:
1. Soil, Waste, and Vent Piping: 10-foot head of water .
B. Seismic Performance: Soil, waste, and vent piping and support and installation shall be capable of withstanding the effects of seismic events determined according to

1.5 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Shop Drawings:

1. Design Calculations: Signed and sealed by a qualified professional engineer for selecting seismic restraints.

2. Sovent Drainage System: Include plans, elevations, sections, and details.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping; "NSF-drain" for plastic drain piping; "NSF-tubular" for plastic continuous waste piping; and "NSF-sewer" for plastic sewer piping.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS A. Pipe and Fittings: ASTM A 74, Extra-Heavy class(es).

B. Gaskets: ASTM C 564, rubber.

C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.4 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Sovent Stack Fittings: ASME B16.45 or ASSE 1043, hubless, castiron aerator and deaerator drainage fittings.

C. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.

1. Standard, Shielded, Stainless-Steel Couplings: CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve.

a. Manufacturers:

1) ANACO.

2) Fernco, Inc.

3) Tyler Pipe; Soil Pipe Div.

D. Rigid, Unshielded Couplings: ASTM C 1461, sleeve-type, reducing- or transition-type mechanical coupling molded from ASTM C 1440, TPE material with corrosion-resistant-metal tension band and tightening mechanism on each end. 1. Manufacturers:

a. ANACO.

2.5 SPECIAL PIPE FITTINGS

A. Flexible, Nonpressure Pipe Couplings: Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition pattern. Include shear ring, ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

1. Manufacturers:

a. Fernco, Inc.

b. Mission Rubber Co.

c. NDS, Inc.

2. Sleeve Materials:

a. For Cast-Iron Soil Pipes: ASTM C 564, rubber. b. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.

c. For Dissimilar Pipes: ASTM D 5926, PVC or other

material compatible with pipe materials being joined.

B. Shielded Nonpressure Pipe Couplings: ASTM C 1460, elastomeric

or rubber sleeve with full-length, corrosion-resistant outer

shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

1. Manufacturers:

a. Cascade Waterworks Mfg. Co.

b. Mission Rubber Co.

C. Rigid, Unshielded, Nonpressure Pipe Couplings: ASTM C 1461, sleeve-type reducing- or transition-type mechanical coupling molded from ASTM C 1440, TPE material with corrosion-resistantmetal tension band and tightening mechanism on each end. 1. Manufacturers:

a. ANACO.

D. Wall-Penetration Fittings: Compound, ductile-iron coupling fitting with sleeve and flexing sections for up to 20-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

1. Manufacturers:

a. SIGMA Corp.

2.6 ENCASEMENT FOR UNDERGROUND METAL PIPING A. Description: ASTM A 674 or AWWA C105, high-density, crosslaminated PE film of 0.004-inch LLDPE film of 0.008-inch minimum thickness.

B. Form: Sheet or tube. C. Color: Black or natural.

C. Color: Black or natural

PART 3 - EXECUTION

3.1 EXCAVATION

A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.

B. Aboveground, soil and waste piping NPS 4 and smaller shall be the following:

1. Hubless cast-iron soil pipe and fittings and sovent stack

fittings; standard, shielded, stainless-steelrigid,

unshielded couplings; and hubless-coupling joints.

2. Dissimilar Pipe-Material Couplings:

Flexible, Shielded, Rigid, unshielded, nonpressure pipe couplings for joining dissimilar pipe materials with small difference in OD.

C. Aboveground, vent piping NPS 4 and smaller shall be the following:

1. Hubless cast-iron soil pipe and fittings; standard,

shielded, stainless-steel couplings; and hubless-coupling joints.

2. Dissimilar Pipe-Material Couplings:

Flexible,Shielded,Rigid, unshielded, nonpressure pipe couplings for joining dissimilar pipe materials with small difference in OD.

D. Underground, soil, waste, and vent piping shall be the following:

1. Extra-Heavy class, cast-iron soil piping; gaskets; and gasketed joints.

3.3 PIPING INSTALLATION

A. Sanitary sewer piping outside the building is specified in Division 22 Section "Facility Sanitary Sewers."

B. Basic piping installation requirements are specified in
Division 22 Section "Common Work Results for Plumbing."
C. Install seismic restraints on piping. Seismic-restraint devices are specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."

D. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

E. Install underground, ductile-iron, special pipe fittings according to AWWA C600.

F. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall.

Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 22 Section "Common Work Results for Plumbing."

G. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105.

H. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

I. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

J. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.

2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.

3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

K. Install engineered soil and waste drainage and vent piping systems as follows:

1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.

2. Sovent Drainage System: Comply with ASSE 1043 and sovent fitting manufacturer's written installation instructions.

3. Reduced-Size Venting: Comply with standards of authorities having jurisdiction.

L. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.

M. Install ABS soil and waste drainage and vent piping according to ASTM D 2661.

N. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.

O. Install underground ABS and PVC soil and waste drainage piping according to ASTM D 2321.

P. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

Division 22 Section "Common Work Results for Plumbing." B. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

C. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.

D. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hublesscoupling joints.

E. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

3.5 VALVE INSTALLATION

A. General valve installation requirements are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
B. Check Valves: Install swing check valve, between pump and shutoff valve, on each sewage pump discharge.

C. Backwater Valves: Install backwater valves in piping subject to sewage backflow.

1. Horizontal Piping: Horizontal backwater valves. Use

normally closed type, unless otherwise indicated.

2. Floor Drains: Drain outlet backwater valves, unless drain has integral backwater valve.

3. Install backwater valves in accessible locations.

4. Backwater valve are specified in Division 22 Section

"Sanitary Waste Piping Specialties."

3.6 HANGER AND SUPPORT INSTALLATION

A. Seismic-restraint devices are specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:

1. Vertical Piping: MSS Type 8 or Type 42, clamps.

2. Install individual, straight, horizontal piping runs according to the following:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.

c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.

4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.

- 2. NPS 3: 60 inches with 1/2-inch rod.
- 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
- 4. NPS 6: 60 inches with 3/4-inch rod.
- 5. NPS 8 to NPS 12: 60 inches with 7/8-inch rod.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Install hangers for steel piping with the following maximum

horizontal spacing and minimum rod diameters:

1. NPS 1-1/4: 84 inches with 3/8-inch rod.

2. NPS 1-1/2: 108 inches with 3/8-inch rod.

3. NPS 2: 10 feet with 3/8-inch rod.

4. NPS 2-1/2: 11 feet with 1/2-inch rod.

5. NPS 3: 12 feet with 1/2-inch rod.

6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.

7. NPS 6: 12 feet with 3/4-inch rod.

8. NPS 8 to NPS 12: 12 feet with 7/8-inch rod.

I. Install supports for vertical steel piping every 15 feet.

J. Install hangers for stainless-steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2: 84 inches with 3/8-inch rod.

2. NPS 3: 96 inches with 1/2-inch rod.

3. NPS 4: 108 inches with 1/2-inch rod.

4. NPS 6: 10 feet with 5/8-inch rod.

K. Install supports for vertical stainless-steel piping every 10 feet.

L. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4: 72 inches with 3/8-inch rod.

2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.

3. NPS 2-1/2: 108 inches with 1/2-inch rod.

4. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.

5. NPS 6: 10 feet with 5/8-inch rod.

6. NPS 8: 10 feet with 3/4-inch rod.

M. Install supports for vertical copper tubing every 10 feet.

N. Install hangers for ABS and PVC piping with the following

maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.

2. NPS 3: 48 inches with 1/2-inch rod.

3. NPS 4 and 5: 48 inches with 5/8-inch rod.

4. NPS 6: 48 inches with 3/4-inch rod.

5. NPS 8 to NPS 12: 48 inches with 7/8-inch rod.

O. Install supports for vertical ABS and PVC piping every 48 inches.

P. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes

indicated, but not smaller than required by plumbing code.

2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.

3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.

4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

3.8 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.

2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.

3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug ventstack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

6. Prepare reports for tests and required corrective action.

3.9 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 221316

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following sanitary drainage piping specialties:

- 1. Cleanouts.
- 2. Floor drains.
- 3. Through-penetration firestop assemblies.

4. Miscellaneous sanitary drainage piping specialties.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories.B. Shop Drawings: Show fabrication and installation details for frost-resistant vent terminals.

C. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Exposed Metal Cleanouts :

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

a. Josam Company; Josam Div.

b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.

c. Watts Drainage Products Inc.

d. Zurn Plumbing Products Group; Specification Drainage Operation.

B. Metal Floor Cleanouts :

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

a. Josam Company; Josam Div.

b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.

c. Zurn Plumbing Products Group; Light Commercial Operation.

d. Zurn Plumbing Products Group; Specification Drainage Operation.

C. Cast-Iron Wall Cleanouts :

1. Basis-of-Design Product: Subject to compliance with

requirements, provide the product indicated on Drawings or a comparable product by one of the following:

a. Josam Company; Josam Div.

b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.

c. Watts Drainage Products Inc.

d. Zurn Plumbing Products Group; Specification Drainage Operation.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains :

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

a. Josam Company; Josam Div.

b. Watts Drainage Products Inc.

c. Zurn Plumbing Products Group; Light Commercial Operation.

d. Zurn Plumbing Products Group; Specification Drainage Operation.

B. Stainless-Steel Floor Drains Insert drawing designation if any:

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

a. Josam Company; Josam Div.

b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.

c. Watts Drainage Products Inc.

d. Zurn Plumbing Products Group; Specification Drainage Operation.

2.3 THROUGH-PENETRATION FIRESTOP ASSEMBLIES

A. Through-Penetration Firestop Assemblies :

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. ProSet Systems Inc.

2. Standard: UL 1479 assembly of sleeve and stack fitting with firestopping plug.

3. Size: Same as connected soil, waste, or vent stack.

4. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.

5. Stack Fitting: ASTM A 48/A 48M, gray-iron, hublesspattern, wye branch with neoprene O-ring at base and grayiron plug in thermal-release harness. Include PVC protective cap for plug.

6. Special Coating: Corrosion resistant on interior of fittings.

2.4 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Deep-Seal Traps :

1. Description: Cast-iron or bronze casting, with inlet and outlet matching connected piping and trap guard. Trap guard shall be as specified on below.

2. Size: Same as connected waste piping.

a. NPS 2: 4-inch minimum water seal.

b. NPS 2-1/2 and Larger: 5-inch minimum water seal.

B. Trap Guard:

1. Description: Proset trap guard, elastomeric PVC material insert, open on top with curl closure on bottom.
2. Size: Same to match drain pipe.

C. Air-Gap Fittings :

1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.

2. Body: Bronze or cast iron.

3. Inlet: Opening in top of body.

4. Outlet: Larger than inlet.

5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. Install backwater valves in building drain piping. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.

C. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

 Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 Locate at each change in direction of piping greater than 45 degrees.

3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.

4. Locate at base of each vertical soil and waste stack.

D. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

E. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

F. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.

2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:

a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.

c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
4. Install individual traps for floor drains connected to

sanitary building drain, unless otherwise indicated.

G. Assemble and install ASME A112.3.1, stainless-steel channel drainage systems according to ASME A112.3.1. Install on support devices so that top will be flush with surface.

H. Assemble non-ASME A112.3.1, stainless-steel channel drainage system components according to manufacturer's written instructions. Install on support devices so that top will be flush with adjacent surface.

I. Assemble plastic channel drainage system components according to

manufacturer's written instructions. Install on support devices so that topJ. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.

K. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.

L. Install through-penetration firestop assemblies in plastic conductors and stacks at floor penetrations.

M. Assemble open drain fittings and install with top of hub 2 inches above floor.

N. Install deep-seal traps on floor drains and other waste outlets, if indicated.

O. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.

1. Exception: Fitting may be omitted if trap has trap-seal primer connection.

2. Size: Same as floor drain inlet.

P. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

Q. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

R. Install vent caps on each vent pipe passing through roof.

S. Install wood-blocking reinforcement for wall-mounting-type specialties.

T. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

U. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division

22 Sections. Drawings indicate general arrangement of piping,

fittings, and specialties.

B. Install piping adjacent to equipment to allow service and will be flush with adjacent surface.

C. FOG Disposal Systems: Connect inlet and outlet to unit, connect

flow-control fitting and fresh-air inlet piping to unit inlet

piping, and connect vent piping between trap and media chamber. Connect electrical power.

D. Grease Interceptors: Connect inlet and outlet to unit, and connect flow-control fitting and vent to unit inlet piping. Install valve on outlet of automatic drawoff-type unit.

E. Oil Interceptors: Connect inlet, outlet, vent, and gravity drawoff piping to unit; flow-control fitting and vent to unit inlet piping; and gravity drawoff and suction piping to oil storage tank.

F. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

G. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled FOG disposal systems and grease removal devices and their installation including mining and electrical connections.

installation, including piping and electrical connections, and to assist in testing.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for

leaks. Repair leaks and retest until no leaks exist.

2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain FOG disposal systems and grease removal devices. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 221319

SECTION 22 45 00

EMERGENCY PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following emergency plumbing fixtures:

1. Emergency showers.

2. Eyewash equipment.

- 3. Combination units.
- 4. Water-tempering equipment.

B. Related Sections include the following:

1. Division 22 Section "Domestic Water Piping Specialties" for backflow preventers.

2. Division 22 Section "Sanitary Waste Piping Specialties" for floor drains.

1.3 DEFINITIONS

A. Accessible Fixture: Emergency plumbing fixture that can be approached, entered, and used by people with disabilities.B. Plumbed Emergency Plumbing Fixture: Fixture with fixed, potable-water supply.

C. Self-Contained Emergency Plumbing Fixture: Fixture with flushing-fluid-solution supply.

D. Tepid: Moderately warm.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include flow rates and capacities, furnished specialties, and accessories.B. Operation and Maintenance Data: For emergency plumbing fixtures to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. ANSI Standard: Comply with ANSI Z358.1, "Emergency Eyewash and Shower Equipment."

B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.

C. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Flushing-Fluid Solution: Separate lot and equal to at least 200 percent of amount of solution installed for each self-contained unit.

PART 2 - PRODUCTS
2.1 EMERGENCY SHOWERS
A. Emergency Showers, :
1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

- a. Bradley Corporation.
- b. Guardian Equipment Co.
- c. Haws Corporation.

2.2 EYEWASH EQUIPMENT

- A. Eyewash Equipment, :
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or
- a comparable product by one of the following:
- a. Bradley Corporation.
- b. Guardian Equipment Co.
- c. Haws Corporation.

2.3 SELF-CONTAINED EYEWASH EQUIPMENT

- A. Self-Contained Eyewash Equipment, :
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or
- a comparable product by one of the following:
- a. Bradley Corporation.
- b. Guardian Equipment Co.
- c. Haws Corporation.

2.4 PERSONAL EYEWASH EQUIPMENT

- A. Personal Eyewash Equipment, :
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
- a. Encon Safety Products.
- b. Guardian Equipment Co.

2.5 HAND-HELD DRENCH HOSES

- A. Hand-Held Drench Hoses, :
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
- a. Bradley Corporation.
- b. Guardian Equipment Co.
- c. Haws Corporation.

2.6 COMBINATION UNITS

A. Combination Units, :

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

- a. Bradley Corporation.
- b. Guardian Equipment Co.
- c. Haws Corporation.

2.7 WATER-TEMPERING EQUIPMENT

- A. Water-Tempering Equipment, :
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
- a. Armstrong International, Inc.
- b. Encon Safety Products.
- c. Haws Corporation.

plumbing fixtures by independent testing agency acceptable to authorities having jurisdiction.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water and waste piping systems to verify actual locations of piping connections before plumbed emergency plumbing fixture installation.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EMERGENCY PLUMBING FIXTURE INSTALLATION

A. Assemble emergency plumbing fixture piping, fittings, control valves, and other components.

B. Install fixtures level and plumb.

C. Fasten fixtures to substrate.

D. Install shutoff valves in water-supply piping to fixtures. Use ball, gate, or globe valve if specific type valve is not indicated. Install valves chained or locked in open position if permitted. Install valves in locations where they can easily be reached for operation. Valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."

 Exception: Omit shutoff valve on supply to group of plumbing fixtures that includes emergency plumbing fixture.
 Exception: Omit shutoff valve on supply to emergency equipment if prohibited by authorities having jurisdiction.
 Install shutoff valve and strainer in steam piping and shutoff valve in condensate return piping.

F. Install dielectric fitting in supply piping to fixture if piping and fixture connections are made of different metals. Dielectric fittings are specified in Division 22 Section "Common Work Results for Plumbing."

G. Install thermometers in supply and outlet piping connections to water-tempering equipment. Thermometers are specified in Division 22 Section "Meters and Gages for Plumbing Piping." H. Install trap and waste to wall on drain outlet of fixture receptors that are indicated to be directly connected to drainage system.

I. Install indirect waste piping to wall on drain outlet of fixture receptors that are indicated to be indirectly connected to drainage system. Drainage piping is specified in Division 22 Section "Sanitary Waste and Vent Piping."

J. Install escutcheons on piping wall and ceiling penetrations in exposed, finished locations. Escutcheons are specified in Division 22 Section "Common Work Results for Plumbing."

K. Fill self-contained fixtures with flushing fluid.

L. Install equipment nameplates or equipment markers on fixtures and equipment signs on water-tempering equipment. Identification materials are specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect cold-water-supply piping to plumbed emergency plumbing fixtures not having water-tempering equipment.

C. Connect hot- and cold-water-supply piping to hot- and coldwatertempering equipment. Connect output from water-tempering equipment to emergency plumbing fixtures. D. Connect cold-water and steam supply and condensate return piping to steam and cold-water-tempering equipment. Connect output from water-tempering equipment to emergency plumbing fixtures.
E. Connect cold water and electrical power to electric heating water-tempering equipment.

F. Directly connect emergency plumbing fixture receptors with trapped drain outlet to sanitary drainage and vent piping.
G. Indirectly connect emergency plumbing fixture receptors without trapped drain outlet to sanitary or storm drainage piping.
H. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

I. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Mechanical-Component Testing: After plumbing connections have been made, test for compliance with requirements. Verify ability to achieve indicated capacities and temperatures.
B. Electrical-Component Testing: After electrical circuitry has been energized, test for compliance with requirements.
1. Test and adjust controls and safeties.
C. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.
D. Popert test results in writing.

D. Report test results in writing.

3.5 ADJUSTING

A. Adjust or replace fixture flow regulators for proper flow.B. Adjust equipment temperature settings.END OF SECTION 224500

CHEMICAL-WASTE SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
- 1. Single-wall piping.
- 2. Field-fabrication containment piping.
- 3. Piping specialties.

1.3 DEFINITIONS

A. CR: Chlorosulfonated polyethylene synthetic rubber.B. FPM: Vinylidene fluoride-hexafluoro propylene copolymer rubber.

1.4 PERFORMANCE REQUIREMENTS

A. Single-Wall Piping Pressure Rating: 10 feet head of water . B. Delegated Design: Design seismic restraints for aboveground piping, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Shop Drawings: For neutralization system and leak-detection system. Include plans, elevations, sections, details, and attachments to other work.

1. Detail neutralization-system assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

2. Detail leak-detection-system assemblies and indicate required clearances, method of field assembly, components, and location and size of each field connection.

 Wiring Diagrams: For power, signal, and control wiring.
 Delegated-Design Submittal: For seismic restraints of aboveground piping, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Profile Drawings for Outdoor Underground Piping: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 50 feet and vertical scale of not less than 1 inch equals 5 feet. Indicate underground structures and pipes. Show types, sizes, materials, and elevations of other utilities crossing system piping.

E. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from sewerage system piping. Indicate interface and spatial relationship between piping and proximate structures.

F. Field quality-control test reports.

G. Operation and Maintenance Data: For chemical-waste specialties and neutralization tanks,neutralization systems, to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and

labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application. B. NFPA Compliance: Comply with NFPA 70, "National Electrical Code."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store piping and specialties with sealing plugs in ends or with end protection.

B. Do not store plastic pipe or fittings in direct sunlight.

C. Protect pipe, fittings, and seals from dirt and damage.

1.8 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

PART 2 - PRODUCTS

2.1 SINGLE-WALL PIPE AND FITTINGS

A. PP Drainage Pipe and Fittings: ASTM F 1412, pipe extruded and drainage-pattern fittings molded, with Schedule 40 dimensions, from PP resin with fire-retardant additive complying with ASTM D 4101; with fusion- and mechanical-joint ends. 1. Exception: Pipe and fittings made from PP resin without

fire-retardant additive may be used for underground installation.

2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. IPEX Inc.

b. Orion Fittings, Inc.; a division of Watts Water Technologies, Inc.

c. Sloane, George Fischer Inc.

d. Town & Country Plastics, Inc.

e. Watts Industries (Canada) Inc.

f. Zurn Plumbing Products Group; Chemical Drainage Systems.

B. Adapters and Transition Fittings: Assemblies with combination of clamps, couplings, adapters, and gaskets; compatible with piping and system liquid; made for joining different piping materials.

2.2 JOINING MATERIALS

A. Couplings: Assemblies with combination of clamps, gaskets, sleeves, and threaded or flanged parts; compatible with piping and system liquid; and made by piping manufacturer for joining system piping.

B. Adapters and Transition Fittings: Assemblies with combination of clamps, couplings, adapters, gaskets, and threaded or flanged parts; compatible with piping and system liquid; and made for joining different piping materials.

C. Flanges: Assemblies of companion flanges and gaskets complying with ASME B16.21 and compatible with system liquid, and bolts and nuts.

D. Solvent Cement for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

E. Fiberglass-Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.3 PIPING SPECIALTIES

A. Plastic Dilution Traps:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. IPEX Inc.

b. Orion Fittings, Inc.; a division of Watts Water Technologies, Inc.

c. Sloane, George Fischer Inc.

d. Town & Country Plastics, Inc.

2. Material: Corrosion-resistant PP, with removable base.

3. End Connections: Mechanical joint.

4. Dilution Tanks: 1-gal. capacity, with clear base unless colored base is indicated; with two NPS 1-1/2 top inlets and one NPS 1-1/2 side outlet.

5. Small Dilution Jars: 1-pint capacity, with clear base unless colored base is indicated; with NPS 1-1/2 top inlet and NPS 1-1/2 side outlet.

6. Large Dilution Jars: 1-quart capacity; with NPS 1-1/2 top inlet and NPS 1-1/2 side outlet.

B. Corrosion-Resistant Traps:

1. Type: P-trap or drum trap.

2. Size: NPS 1-1/2 or NPS 2, as required to match connected piping.

3. High-Silicon Iron: ASTM A 861, with horizontal outlet and hub-and-plain or plain ends to match connecting piping.

4. PP5. PVDF: ASTM D 3222, with mechanical-joint pipe connections.

6. Glass: ASTM C 1053, with coupling pipe connections.

C. Stainless-Steel Floor Drains :

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Josam Company; Blucher-Josam Div.

2. Standard: ASME A112.3.1, ASTM A 666, Type 316L.

3. Body: With 8.5-by-8.5-inch top with grate.

4. Outlet: Bottom, of size indicated.

D. PP Floor Drains :

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. IPEX Inc.

b. Orion Fittings, Inc.; a division of Watts Water Technologies, Inc.

c. Schier Products Company.

d. Sloane, George Fischer Inc.

e. Town & Country Plastics, Inc.

f. Watts Industries (Canada) Inc.

2. Body: With 7- to 9-inch top diameter, with flashing flange and weep holes; and with flashing clamp basket strainer funnel attachment and trap-primer connection.

3. Outlet: Bottom, to match connecting pipe, with NPS 2,

NPS 3, NPS 4, or NPS 6 outlet as indicated.

E. Stainless-Steel Cleanouts:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Josam Company; Blucher-Josam Div.

2. Standard: ASME A112.3.1, ASTM A 666, Type 316L, stainless steel.

Aboveground Piping: Cleanout tee of size matching piping.: ASTM D 4101, with mechanical-joint pipe connections.
 Underground and Underslab Piping: Floor access cleanout of

size matching piping.

F. Plastic Backwater Valves:

1. Description: Full-port NPS 3 check valve, PP or PVDF, matching or compatible with system piping and compatible with system liquid, with EPDM seals and flanged ends. a. Exception: PVC material for use with PVC piping systems.

G. PP Sink Outlets:

1. Description: NPS 1-1/2, with clamping device, stopper, and

7-inch high overflow fitting.

2.4 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

B. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness;

round tube closed with welded longitudinal joint.

C. Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B,

Schedule 40, zinc-coated, plain ends.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

2.5 SLEEVE SEALS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. Advance Products & Systems, Inc.

2. Calpico, Inc.

3. Metraflex, Inc.

4. Pipeline Seal and Insulator, Inc.

B. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

2. Pressure Plates: Stainless steel.

3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.6 ESCUTCHEONS

A. General Requirements for Escutcheons: Manufactured wall and ceiling escutcheons and floor plates, with ID to closely fit around pipe and tube and OD that completely covers opening.
B. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Stamped-Steel Escutcheons: With set screw or spring clips and chrome-plated finish.

D. Split-Plate, Stamped-Steel Escutcheons: With concealed hinge, set screw or spring clips, and chrome-plated finish.

E. One-Piece, Floor-Plate Escutcheons: Cast iron.

F. Split-Casting, Floor-Plate Escutcheons: Cast brass with

concealed hinge and set screw.

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic,

dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior and interior.

interior and exterior applications.

2. Design Mix: 5000-psi, 28-day compressive strength.

3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Chemical-Waste Piping Inside the Building:

1. Install piping next to equipment, accessories, and

specialties to allow service and maintenance.

2. Transition and special fittings with pressure ratings at least equal to piping pressure rating may be used unless otherwise indicated.

3. Flanges may be used on aboveground piping unless otherwise indicated.

4. Install underground fiberglass piping according to ASTM D 3839.

5. Install piping in concealed locations unless otherwise

indicated and except in equipment rooms and service areas.

6. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

7. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

8. Install piping at indicated slopes.

9. Install piping free of sags and bends.

10. Install fittings for changes in direction and branch connections.

11. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

a. New Piping:

1) Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.

2) Insulated Piping: One-piece, stamped-steel type with spring clips.

3) Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.4) Bare Piping at Ceiling Penetrations in Finished

Spaces: One-piece, stamped-steel type and set screw.

5) Bare Piping in Unfinished Service Spaces: Onepiece, stamped-steel type with set screw or spring clips.

6) Bare Piping in Equipment Rooms: One-piece,

stamped-steel type with set screw or spring clips. 7) Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

12. Sleeves are not required for core-drilled holes.

13. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

14. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

a. Cut sleeves to length for mounting flush with both surfaces.

1) Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend castiron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

b. Install sleeves in new walls and slabs as new walls and slabs are constructed.

c. Install sleeves that are large enough to provide 1/4inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

 Steel Pipe Sleeves: For pipes smaller than NPS 6.
 Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum board partitions.

3) Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.

4) Seal space outside of sleeve fittings with grout.
d. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.

15. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals. a. Install steel pipe for sleeves smaller than 6 inches in diameter.

b. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.

c. Sleeve-Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

16. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

a. Sleeve-Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

17. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.

18. Verify final equipment locations for roughing-in.

3.3 PIPING SPECIALTY INSTALLATION

A. Embed floor drains in 4-inch minimum depth of concrete around bottom and sides. Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for concrete.

B. Fasten grates to drains if indicated.

C. Set floor drains with tops flush with pavement surface. D. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use fittings of same material as sewer pipe at branches for cleanouts and riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in pipe. 1. Set cleanout bodies in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding grade. Set cleanout plugs in concrete pavement with tops flush with pavement surface. Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for formwork, reinforcement, and concrete requirements.

E. Install backwater valves in horizontal position. Include riser to cleanout at grade.

3.4 JOINT CONSTRUCTION

A. Chemical-Waste Piping Inside the Building:

1. Plastic-Piping Electrofusion Joints: Make polyolefin

drainage-piping joints according to ASTM F 1290.

2. Dissimilar-Material Piping Joints: Make joints using

adapters compatible with both system materials.

3. Join high-silicon-iron, hub-and-plain-end piping with

calked joints using acid-resistant packing and lead.

4. Join high-silicon-iron, mechanical-joint piping with

coupled joints using clamps and sleeves.

3.5 HANGER AND SUPPORT INSTALLATION

A. Pipe sizes in this article refer to aboveground, single-wall

piping and carrier piping of containment piping.

B. Comply with requirements in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismicrestraint devices.

C. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices. Install the following:

1. Vertical Piping: MSS Type 8 or MSS Type 42, riser clamps.

2. Individual, Straight, Horizontal Piping Runs:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.

c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.

4. Base of Vertical Piping: MSS Type 52, spring hangers.

D. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for installation of supports.

E. Support horizontal piping and tubing within 12 inches of each fitting and coupling.

F. Support vertical piping and tubing at base and at each floor. G. Rod diameter may be reduced 1 size for double-rod hangers, to minimum of 3/8 inch.

H. Install vinyl-coated hangers for PP piping with the following

maximum horizontal spacing and minimum rod diameters:

- 1. NPS 2: 33 inches with 3/8-inch rod.
- 2. NPS 2-1/2 and NPS 3: 42 inches with 1/2-inch rod.
- 3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
- 4. NPS 6: 48 inches with 3/4-inch rod.
- 5. NPS 8: 48 inches with 7/8-inch rod.
- I. Install supports for vertical PP piping every 72 inches.
- J. Install vinyl-coated hangers for PVC piping with the following

maximum horizontal spacing and minimum rod diameters:

- 1. NPS 1-1/4: 36 inches with 3/8-inch rod.
- 2. NPS 1-1/2 and NPS 2: 42 inches with 3/8-inch rod.
- 3. NPS 2-1/2 and NPS 3: 42 inches with 1/2-inch rod.
- 4. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
- 5. NPS 6: 48 inches with 3/4-inch rod.
- 6. NPS 8 to NPS 12: 48 inches with 7/8-inch rod.
- K. Install supports for vertical PVC piping every 48 inches.
- L. Install vinyl-coated hangers for PVDF piping with the following
- maximum horizontal spacing and minimum rod diameters:
- 1. All Sizes: Install continuous support for piping with
- liquid waste at temperatures above 140 deg F.
- 2. NPS 1/2 and Smaller: 30 inches with 3/8-inch rod.
- 3. NPS 3/4 to NPS 1-1/2: 36 inches with 3/8-inch rod.
- 4. NPS 2: 36 inches with 3/8-inch rod.
- 5. NPS 2-1/2 and NPS 3: 42 inches with 1/2-inch rod.
- 6. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
- 7. NPS 6: 48 inches with 3/4-inch rod.
- M. Install supports for vertical PVDF piping NPS 1-1/2 every 48
- inches and NPS 2 and larger every 72 inches.
- N. Install vinyl-coated hangers for fiberglass piping with the
- following maximum horizontal spacing and minimum rod diameters:
- 1. NPS 2 and Smaller: 10 feet with 3/8-inch rod.
- 2. NPS 2-1/2 and NPS 3: 10 feet with 1/2-inch rod.
- 3. NPS 4 and NPS 5: 10 feet with 5/8-inch rod.
- 4. NPS 6: 10 feet with 3/4-inch rod.
- 5. NPS 8 to NPS 12: 12 feet with 7/8-inch rod.
- O. Install supports for vertical fiberglass piping every 12 feet.
- P. Install hangers for stainless-steel drainage piping with the
- following maximum horizontal spacing and minimum rod diameters:
- 1. NPS 2: 10 feet with 3/8-inch rod.
- 2. NPS 2-1/2: 11 feet with 1/2-inch rod.
- 3. NPS 3: 12 feet with 1/2-inch rod.
- 4. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
- 5. NPS 6: 12 feet with 3/4-inch rod.
- Q. Install supports for vertical stainless-steel drainage piping every 15 feet.
- R. Install hangers for high-silicon-iron piping with the following maximum horizontal spacing and minimum rod diameters:
- 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
- 2. NPS 3: 60 inches with 1/2-inch rod.
- 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
- 4. NPS 6: 60 inches with 3/4-inch rod.
- 5. NPS 8 to NPS 12: 60 inches with 7/8-inch rod.
- 6. NPS 15: 60 inches with 1-inch rod.
- 7. Spacing for horizontal pipe in 84-inch lengths may be increased to 84 inches. Spacing for fittings is limited to 60 inches.
- S. Install supports for vertical high-silicon-iron piping every 15 feet.
- T. Install vinyl-coated hangers for glass piping with the following maximum horizontal spacing and minimum rod diameters: 1. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.

2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.

3. NPS 3: 96 inches with 1/2-inch rod.

4. NPS 4 and NPS 6: 96 inches with 5/8-inch rod.

U. Install supports for vertical glass piping every 96 inches.

V. Support piping and tubing not listed above according to MSS SP-69.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and
B. Make connections to existing piping so finished Work complies as nearly as practical with requirements specified for new Work.
C. Use commercially manufactured wye fittings for sewerage piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

D. Protect existing piping to prevent concrete or debris from entering while making connections. Remove debris or other extraneous material that may accumulate.

E. Install piping adjacent to equipment to allow service and maintenance.

3.7 LABELING AND IDENTIFICATION

A. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for labeling of equipment and piping.

1. Use warning tape or detectable warning tape over ferrous piping.

2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.8 FIELD QUALITY CONTROL

A. Inspect interior of sewerage piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place and again at completion of Project.

1. Defects requiring correction include the following:

a. Alignment: Less than full diameter of inside of pipe

is visible between inspection points.

b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.

c. Crushed, broken, cracked, or otherwise damaged piping.

d. Hydrostatic Tests for Drainage Piping:

1) Allowable leakage is a maximum of 50 gal./inch of nominal pipe size per mile of pipe, during 24-hour period.

2) Close openings in system and fill with water.

3) Purge air and refill with water.

4) Disconnect water supply.

5) Test and inspect joints for leaks.

e. Air Tests for Drainage Piping: Comply with UNI-B-6.

2. Leaks and loss in test pressure constitute defects that must be repaired.

3. Submit separate reports for each test.

B. Replace leaking sewerage piping using new materials, and repeat testing until leakage is within allowances specified.

C. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

D. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

E. Tests and Inspections:

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect assembled neutralization systems and leak-detection systems and their installation, including piping and electrical connections, and to assist in testing.

2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

F. Chemical-waste piping will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

3.9 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service for neutralization systems.

1. Complete installation and startup checks according to

manufacturer's written instructions.

2. Neutralization Systems:

a. Verify that neutralization system is installed and connected according to the Contract Documents.b. Verify that electrical wiring installation complies

with manufacturer's submittal and installation

requirements in Division 26 Sections.

c. Install neutralizing solutions and limestone.

d. Energize circuits.

e. Start and run systems through complete sequence of operations.

f. Adjust operating controls.

3. Leak-Detection Systems:

a. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 26 Sections.

b. Energize circuits.

c. Adjust operating controls.

3.10 ADJUSTING

A. Adjust neutralization-system set points.

B. Adjust leak-detection-system control and device settings.

3.11 CLEANING

A. Use procedures prescribed by authorities having jurisdiction or, if not prescribed, use procedures described below:
1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Clean piping by flushing with potable water.

3.12 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain neutralization systems and leak-detection systems.

3.13 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below unless otherwise indicated. B. Aboveground Chemical-Waste Piping: Use the following piping materials for each size range:1. NPS 1-1/2 to NPS 6: PP drainage piping and electro fusion joints.

END OF SECTION 226600

SECTION 26 05 00 COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Electrical equipment coordination and installation.
- 2. Sleeves for raceways and cables.
- 3. Sleeve seals.
- 4. Grout.
- 5. Common electrical installation requirements.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.
- 1.4 SUBMITTALS
 - A. Product Data: For sleeve seals.

1.5 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping and conduit installed at required slope.
 - 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Furnish and Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08, and shall be installed by division 08 contractor.
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."."

2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast Iron Pipe Sleeves: Cast or fabricated" wall pipe," Equivalent to ductile –iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel.
 - 1. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
 - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
- 2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
- 3. Pressure Plates: Plastic. Include two for each sealing element.
- 4. Connecting Bolts and Nuts: Carbon steel with corrosion resistant

coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factorypackaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

- 3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION
 - A. Comply with NECA 1.
 - B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
 - C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and

equipment to provide maximum possible headroom consistent with these requirements.

- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
 F. Extend sleeves installed in floors 2 inches above finished floor level unless otherwise noted on drawings.
- G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry

1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping.

3.3 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- 3.4 FIRESTOPPING
- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- 1.2 SUMMARY
- A. This Section includes methods and materials for grounding systems and equipment.
- 1.3 SUBMITTALS
- A. Product Data: For each type of product indicated.
- B. Qualification Data: For testing agency and testing agency's field supervisor.
- C. Field quality-control test reports.
- 1.4 QUALITY ASSURANCE
- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association to supervise on-site testing specified in Part 3.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

- 2.1 CONDUCTORS
- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG

conductor, 1/4 inch in diameter.

- 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
- 6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
- 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTORS

- A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

PART 3 – EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.
- B. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

3.3 INSTALLATION

- Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code.
 Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.

3. Use exothermic-welded connectors for outdoor locations, but If a disconnect-type connection is required, use a bolted clamp.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing and inspecting agency to perform the following field tests and inspections and prepare test reports:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
- B. Report measured ground resistances that exceed the following values:
 - 1. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).
- C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 26 05 33 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- 1.2 SUMMARY
- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- 1.3 DEFINITIONS
- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. EPDM: Ethylene-propylene-diene terpolymer rubber.
- D. FMC: Flexible metal conduit.
- E. IMC: Intermediate metal conduit.
- F. LFMC: Liquidtight flexible metal conduit.
- G. LFNC: Liquidtight flexible nonmetallic conduit.
- H. NBR: Acrylonitrile-butadiene rubber.
- I. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Under cabinet lighting
 - 2. All new and relocated power receptacles
 - 3. Under cabinet power raceway
 - 4. Wall mounted power raceways

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 – PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Alflex Inc.
 - 3. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - 4. Anamet Electrical, Inc.; Anaconda Metal Hose. Electri-Flex Co.
 - 6. Manhattan/CDT/Cole-Flex.
 - 7. Maverick Tube Corporation.
 - 8. O-Z Gedney; a unit of General Signal.
 - 9. Wheatland Tube Company.
- B. EMT: ANSI C80.3.
- C. FMC: Zinc-coated steel or aluminum.
- D. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
 - 2. Fittings for EMT: Steel or die-cast, compression type.
 - 3. Coating for Fittings for PVC-Coated Conduit: Minimum Thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.
- E. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.
- 2.2 NONMETALLIC CONDUIT AND TUBING
- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 3. Arnco Corporation.
 - 4. CANTEX Inc.
 - 5. CertainTeed Corp.; Pipe & Plastics Group.
 - 6. Condux International, Inc.
 - 7. ElecSYS, Inc.
 - 8. Electri-Flex Co.
 - 9. Lamson & Sessions; Carlon Electrical Products.
 - 10. Manhattan/CDT/Cole-Flex.
 - 11. RACO; a Hubbell Company.
 - 12. Thomas & Betts Corporation.

- C. ENT: NEMA TC 13.
- D. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- E. LFNC: UL 1660.
- F. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.
- G. Fittings for LFNC: UL 514B.
- 2.3 METAL WIREWAYS
- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Cooper B-Line, Inc.
 - 2. Hoffman.
 - 3. Square D; Schneider Electric.
- B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, unless otherwise indicated.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Screw-cover type.
- E. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Hoffman.
 - 2. Lamson & Sessions; Carlon Electrical Products.
- B. Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- 2.5 SURFACE RACEWAYS
- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to,

the following:

- a. Thomas & Betts Corporation.
- b. Walker Systems, Inc.; Wiremold Company (The).
- c. Wiremold Company (The); Electrical Sales Division.

2.6 BOXES, ENCLOSURES, AND CABINETS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 - 2. EGS/Appleton Electric.
 - 3. Erickson Electrical Equipment Company.
 - 4. Hoffman.

5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.

- 6. O-Z/Gedney; a unit of General Signal.
- 7. RACO; a Hubbell Company.
- 8. Robroy Industries, Inc.; Enclosure Division.
- 9. Scott Fetzer Co.; Adalet Division.
- 10. Spring City Electrical Manufacturing Company.
- 11. Thomas & Betts Corporation.
- 12. Walker Systems, Inc.; Wiremold Company (The).
- 13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- D. Metal Floor Boxes: Cast or sheet metal, fully adjustable, rectangular.
- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- F. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- G. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuoushinge cover with flush latch, unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
- H. Cabinets:
 - 1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.
 - 5. Accessory feet where required for freestanding equipment.

PART 3 – EXECUTION

- 1. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
- 2. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Comply with the following indoor applications, unless otherwise indicated:
 - 1. Exposed, Not Subject to Physical Damage: EMT.
 - 2. Exposed, Not Subject to Severe Physical Damage: EMT.
 - 3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit or IMC. Includes raceways in the following locations:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts,
 - forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 - 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 - 6. Damp or Wet Locations: Rigid steel conduit or IMC.
 - 7. Raceways for Optical Fiber or Communications Cable in Spaces Used for Environmental Air: Plenum-type, optical fiber/communications cable raceway.
 - Raceways for Optical Fiber or Communications Cable Risers in Vertical Shafts: Riser-type, optical fiber/communications cable raceway.
 - 9. Raceways for Concealed General Purpose Distribution of Optical Fiber or Communications Cable: Plenum-type, optical fiber/communications cable raceway.
 - 10. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
 - 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.
- E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.
- F. Do not install aluminum conduits in contact with concrete.

3.2 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on

Drawings or in this Article are stricter.

- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- H. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Change from RNC, Type EPC-40-PVC, to rigid steel conduit, or IMC before rising above the floor.
- I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- L. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
 - 1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
 - 2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
 - 3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
- M. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound.

For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

- Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 Where otherwise required by NFPA 70.
- N. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - 1. Use LFMC in damp or wet locations subject to severe physical damage.
 - 2. Use LFMC in damp or wet locations not subject to severe physical damage.
- O. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.
- P. Set metal floor boxes level and flush with finished floor surface.
- Q. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
- 3.3 PROTECTION
- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26053

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Identification for raceways.
- 2. Identification of power and control cables.
- 3. Identification for conductors.
- 4. Equipment identification labels.
- 5. Miscellaneous identification products.

1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and IEEE C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces wher devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- D. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie astener.

- E. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosionresistant grommet and cable tie for attachment to conductor or cable.
 - Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
- 2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS
 - A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
 - B. Colors for Raceways Carrying Circuits at 600 V and Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
 - C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.4 CONDUCTOR IDENTIFICATION MATERIALS

1.

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- B. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosionresistant grommet and cable tie for attachment to conductor or cable.
 - Marker for Tags: Machine-printed, permanent waterproof, black ink marker recommended by printer manufacturer.

2.5 EQUIPMENT IDENTIFICATION LABELS

1.

- A. Adhesive Film Label: Machine printed, in black, by thermal
 - transfer or equivalent process. Minimum letter height shall be 3/8 inch.
- B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.
- C. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.
- D. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.
- E. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

- Paint: Comply with requirements in Division 09 painting
 Sections for paint materials and application requirements.
 Select paint system applicable for surface material and location(exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.

- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of twocolor markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- G. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
- H. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.
- 3.2 IDENTIFICATION SCHEDULE
 - A. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Snap-around labels. Install labels at 10-foot maximum intervals.
 - B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
 - Emergency Power.
 Power.
 - 3. UPS.
 - C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in pull and junction and boxes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branchcircuitconductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
b. Colors for 208/120-V Circuits:

- 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
- c. Colors for 480/277-V Circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.

d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

- E. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.
- F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

- 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory installed connections.
- 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- G. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- H. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
 - 1. Comply with 29 CFR 1910.145.
 - 2. Identify system voltage with black letters on an orange background.
 - 3. Apply to exterior of door, cover, or other access.
 - For equipment with multiple power or control sources, apply to door or cover of equipment including, but notlimited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
- I. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical

systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

- J. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background withminimum3/8inch- high letters for emergency instructions at equipment used for power transfer.
- K. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment,central or master units, control panels, control stations,terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 1. Labeling Instructions:
 - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch-highletters on 1-1/2-inch-high label; where two lines oftext are required, use labels 2 inches high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
 - c. Elevated Components: Increase sizes of labels and
 - letters to those appropriate for viewing from the floor.
 - d. Unless provided with self-adhesive means of attachment,fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

Equipment to Be Labeled:

2.

- a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label.
- b. Enclosures and electrical cabinets.
- c. Access doors and panels for concealed electrical
- d. Switchgear.
- e. Switchboards.

items.
- f. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary. g.
 - Substations.
- h. Emergency system boxes and enclosures.
- i. Motor-control centers.
- j. Enclosed switches.
- k. Enclosed circuit breakers.
- I. Enclosed controllers.
- m. Variable-speed controllers.
- n. Push-button stations.
- o. Power transfer equipment.
- p. Contactors.
- q. Remote-controlled switches, dimmer modules, and control devices.
- r. Battery-inverter units.
- s. Battery racks.
- t. Power-generating units.
- u. Monitoring and control equipment.
- v. UPS equipment.

END OF SECTION 260553

SECTION 26 08 00

COMMISSIONING OF ELECTRICAL

PART 1 – GENERAL

- 1.1 RELATED DOCUMENTS
 - A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- 1.2 SUMMARY
 - A. Section includes commissioning process requirements for electrical systems.
 - B. Related Sections:
 - 1. 019113 Building System Commissioning
 - 2. Division 26 Sections
- 1.3 SCOPE
 - Commissioning requires the participation of Division 26, Electrical, to ensure that all systems are operating in a manner consistent with the Contract Documents. The general

commissioning requirements and coordination are detailed in

Section 019113. Division 26, Electrical, shall be familiar with Section 019113 and the Commissioning Plan issued by the Commissioning Agent (CA) and shall execute all commissioning responsibilities assigned to them in the Contract Documents.

- 1.4 SYSTEMS TO BE COMMISSIONED
 - A. The following Electrical systems will be commissioned on this project:

1. Mechanical Equipment controls and wiring / Interlocks (fans, hoods, terminal boxes).

- 1.5 RESPONSIBILITIES
 - A. Electrical Contractor: Commissioning responsibilities applicable to the Electrical contractor of Division 26 are as described in Section 019113, Paragraph 1.10-I.
- 1.6 OPERATION AND MAINTENANCE (O&M) MANUALS
 - A. Compile and prepare documentation for all equipment and systems covered in Division 26, Electrical, and deliver to Construction Manager for inclusion in O&M Manuals in accordance with Division 1.
 - B. Provide the Commissioning Agent with a copy of O&M Manuals for review.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. Provide test equipment necessary to fulfill testing requirements Of Divisions 26, Electrical.
- B. Refer to Section 019113 and Division 26 specification for other additional Division 26, Electrical requirements.

PART 3 - EXECUTION

3.1 PREFUNCTIONAL CHECKLISTS AND STARTUP

- A. Prefunctional tests and checklists (PFT's) are important to ensure that the equipment and systems are connected properly and are operational. PFT's ensure that functional performance testing may proceed without unnecessary delays. The Contractor shall be responsible for performing Prefunctional testing. EVERY piece of equipment receives a full Prefunctional checkout.
 - B. Division 26, Electrical, has start-up responsibility and is required to complete systems and sub-systems so they are fully functional, meeting design objectives of Contract Documents. Commissioning procedures and functional testing do not relieve or lessen this responsibility or shift that responsibility partially to CA or Owner.

3.2 FUNCTIONAL PERFORMANCE TESTS

- A. Functional testing is intended to begin upon completion of a system. Functional testing may proceed prior to completion of systems or sub-systems at discretion of CA and CM. Beginning system testing before full completion does not relieve Contractor from fully completing system as soon as possible, including prefunctional checklists.
- B. Functional performance testing requirements are in addition to and do not replace any testing required by Code or listed elsewhere in Division 26.
- C. Functional performance testing procedures will be performed on but not limited to the following system types and equipment. Final functional testing requirements and procedures will be developed based on approved equipment shop drawings.
 - 1. Equipment:
 - a. Mechanical Equipment Controls and Wiring / Interlocks (fans, hoods, terminal boxes)

3.3 ISSUES AND DEFICIENCIES

- A. Refer to Section 019113 for details relating to resolution of issues and deficiencies.
- 3.4 TRAINING OF OWNER PERSONNEL
 - A. Contractor shall be responsible for training coordination and scheduling and ultimately to ensure that training is completed. Refer to Section 019113 for details.

B. Duration of Training: Electrical Contractor shall provide raining on each piece of equipment according to the following Schedule:

System	Minimum Training Hours
Mechanical Systems	4
Total Training Time	4 Hours

:

WIRING DEVICES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Snap Switches.
 - 3. Wall Plates.
 - 4. Communications outlets.
 - 5. Multi-outlet Assemblies.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branchcircuit conductor.
- D. RFI: Radio-frequency interference.
- E. TVSS: Transient voltage surge suppressor.
- F. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

1.6 COORDINATION

A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1. Cord and Plug Sets: Match equipment requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
 - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 3. Leviton Mfg. Company Inc. (Leviton).
 - 4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).
- 2.2 STRAIGHT BLADE RECEPTACLES
 - A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
 - 1. Available Products: Subject to compliance with Requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; 5351 (single), 5352 (duplex).
 - b. Hubbell; HBL5351 (single), CR5352 (duplex).
 - c. Leviton; 5891 (single), 5352 (duplex).
 - d. Pass & Seymour; 5381 (single), 5352 (duplex).

2.3 GFCI RECEPTACLES

- A. General Description: Straight blade, feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; GF20.
 - b. Pass & Seymour; 2084.

2.4 SNAP SWITCHES

- A. Comply with NEMA WD 1 and UL 20.
- B. Switches, 120/277 V, 20 A:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; 2221 (single pole), 2222 (two pole), 2223 (three way), 2224 (four way).
 - b. Hubbell; CS1221 (single pole), CS1222 (two pole), CS1223 (three way), CS1224 (four way).
 - c. Leviton; 1221-2 (single pole), 1222-2 (two pole), 1223-2 (three way), 1224-2 (four way).
 - d. Pass & Seymour; 20AC1 (single pole), 20AC2 (two pole), 20AC3 (three way), 20AC4 (four way).
- 2.5 COMMUNICATIONS OUTLETS

A. Data Outlet:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

a. Cooper;

b. Leviton;

2. Description: Double RJ-45 jack for terminating 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1; complying with Category 6. Comply with UL 1863.

2.6 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

- 1. Plate-Securing Screws: Metal with head color to match plate finish.
- 2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
- 3. Material for Unfinished Spaces: Smooth, high-impact thermoplastic.
- 4. Material for Damp Locations: Thermoplastic with spring loaded lift cover, and listed and labeled for use in "wet locations."

2.7 MULTIOUTLET ASSEMBLIES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Hubbell Incorporated; Wiring Device-Kellems.
 - 2. Wiremold Company (The).
- B. Components of Assemblies: Products from a single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.
- C. Raceway Material: Metal, with manufacturer's standard finish.
- D. Wire: No. 12 AWG.

2.8 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.
 - 1. Wiring Devices Connected to Normal Power System: As selected by Architect, unless otherwise indicated or required by NFPA 70 or device listing.
- 2. Wiring Devices Connected to Emergency Power System: Red.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:

- 1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
- 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
- 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
- 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 - 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailing existing conductors is permitted provided the outlet box is large enough.
- D. Device Installation:
 - 1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
 - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
 - 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
 - 6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
 - 7. When conductors larger than No. 12 AWG are installed on 15or 20-A circuits, splice No. 12 AWG pigtails for device connections.
 - 8. Tighten unused terminal screws on the device.
 - 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.
- E. Receptacle Orientation:
 - 1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.

- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.
- H. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

- 1. In healthcare facilities, prepare reports that comply with recommendations in NFPA99.
- 2. Test Instruments: Use instruments that comply with UL 1436.
- 3. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.

B. Tests for Convenience Receptacles:

- 1. Line Voltage: Acceptable range is 105 to 132 V.
- 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
- 3. Ground Impedance: Values of up to 2 ohms are acceptable.
- 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
- 5. Using the test plug, verify that the device and its outlet box are securely mounted.
- 6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

C. Test straight blade for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz. (115 g).

END OF SECTION 262726

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Nonfusible switches.
 - 2. Molded-case circuit breakers (MCCBs).

1.3 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.5 SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
 - 1. Enclosure types and details for types other than NEMA 250, Type 1.
 - 2. Current and voltage ratings.
 - 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
 - Include evidence of NRTL listing for series rating of installed devices.
 - 5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
- B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Wiring Diagrams: For power, signal, and control wiring.
- C. Field quality-control reports.

1. Test procedures used.

2. Test results that comply with requirements.

3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

- D. Manufacturer's field service report.
- E. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
 - 2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Comply with NFPA 70.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).
 - 2. Altitude: Not exceeding 6600 feet (2010 m).

1.8 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 – PRODUCTS

- 2.1 NONFUSIBLE SWITCHES
- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be

incorporated into the Work include, but are not limited to, the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.

2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.

3. Siemens Energy & Automation, Inc.

4. Square D; a brand of Schneider Electric.

- B. Type GD, General Duty, Single Throw, 600 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.
- C. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- D. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Auxiliary Contact Kit: Two NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
 - 4. Hookstick Handle: Allows use of a hookstick to operate the handle.
 - 5. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.2 MOLDED-CASE CIRCUIT BREAKERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- D. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
- E. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.
- F. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.
- G. Features and Accessories:

- Standard frame sizes, trip ratings, and number of poles. 10 August 2011 SUNY Purchase College Construction Document Issue Natural Science Building Contract No. ARI-R2-0963031 Biology Lab Suite Renovations NKGD0110 26 28 16 - 5 ENCLOSED SWITCHES AND CIRCUIT BREAKERS
- 2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
- 3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
- 4. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
- PART 3 EXECUTION
 - 3.1 EXAMINATION
 - A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
 - B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes,

channels, and brackets and temporary blocking of moving parts from enclosures and components.

C. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminatedplastic nameplate.

3.4 FIELD QUALITY CONTROL

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

- B. Acceptance Testing Preparation:
 - Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
 - 3. Test continuity of each circuit.
 - 4.
- C. Tests and Inspections:

1.

- 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- 2. Correct malfunctioning units on-site, where possible, and

retest to demonstrate compliance; otherwise, replace with new units and retest.

- 3. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each enclosed switch and circuit breaker 11 months after date of Substantial Completion.
 - c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

- D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges.

END OF SECTION 262816

Appendix 1

Specifications for Asbestos & Hazardous Materials

Appendix 2

IT Scope of Work

Part 5: Scope of Work:

1) Scope of Work

Contractor shall supply all necessary parts and labor for installation of cabling and accessories to support data/telephone and security systems as described in this Scope of Work.

1.1) General

- 1.1.1) Contractor shall furnish and install cables, terminals, connectors, patch panels, and miscellaneous hardware required for delivery of a complete and working cable plant as described herein.
- 1.1.2) Contractor shall furnish and install raceway, duct, conduit, J-hooks, straps, and cable tray to supplement existing pathways where necessary, and as described herein.
- 1.1.3) Contractor shall provide for test the installed cabling system and submit results to Purchase College as described in this Specification, and as described herein.
- 1.1.4) Contractor shall provide as-built document of the installed cabling systems to Purchase College as described herein
- 1.1.5) Data/Telecommunications Cabling System

The Category-6 portion of the Data/Telecommunications Cabling System shall support 1000BASE-T Gigabit Ethernet as per IEEE 802.3ab, 100BASE-T Fast Ethernet as per IEEE 802.3u, Voice-Over-IP telephony (VOIP) as per TIA-TR41, digital telephony as per TIA-810-B, and analog telephony as per TIA 470-C.

1.1.6) Fiber-optic Cabling

The fiber-optic portion of the Data/Telecommunications Cabling System shall support 1000BASE-LX and 10GBASE-LR as per IEEE 802.3.

1.2) Patch Cables

1.2.1) Category-6 Booted Patch Cables

Contractor shall supply (furnish only) a number of **Category-6 booted patch cables** equal to twice the number of Category-6 data/telecommunications cables installed.

Patch cables shall be shipped to Purchase College in boxes, and shall be sized as follows:

- 1.2.1.1) One quarter (25%) of the total number of Category-6 booted patch cables supplied shall be two (2) feet in length
- 1.2.1.2) One quarter (25%) of the total number of Category-6 booted patch cables supplied shall be three (3) feet in length.
- 1.2.1.3) One half (50%) of the total number of Category-6 booted patch cables supplied shall be seven (7) feet in length.

1.2.2) Fiber-optic Patch Cables

Not Required.

1.3) Data/telecommunications Closet

Supply and install the following components in all specified data/telecommunications closets.

Prepare closets for installation of cables and equipment.

- 1.3.1) Racks/Cabinets Not Required.
- 1.3.2) Ladder Cable Tray Not Required.
- 1.3.3) Plywood Backboard Not Required.
- 1.4) Main Pathway

Arlington 'The Loop' cable supports shall be used as cable support as appropriate on hallway ceiling of Natural Science (NS) building, when main pathway is not available.

J-hooks shall be used as cable support as appropriate when main pathway is not available.

Main is pathway to be installed as follows:

- 1.4.1) Basket Tray Not Required
- 1.4.2) Core Drilled Penetrations Not Required
- 1.4.3) Riser
- 1.5) Fiber-Optic Cable

Not required.

1.6) Category-3 Telecommunications Feeder Cable and Patch Panel

Not required.

- 1.7) Category-6 Cable Installation
 - 1.7.1) Workstation Outlets

Supply and install a grand total of (**32**) Category-6 data/telecommunications outlets in as follows:

- 1.7.1.1) Supply and install a total of (16) Category-6 data/telecommunications outlets for workstations in Natural Science (NS) room #2014.
- 1.7.1.2) Supply and install a total of (2) Category-6 data/telecommunications outlet for workstations in Natural Science (NS) room #2014A.

- 1.7.1.3) Supply and install a total of (7) Category-6 data/telecommunications outlets for workstations in Natural Science (NS) room #2017.
- 1.7.1.4) Supply and install a total of (2) Category-6 data/telecommunications outlets for workstations in Natural Science (NS) room #2019.
- 1.7.1.5) Supply and install a total of **(5)** Category-6 data/telecommunications outlets for workstations in Natural Science room #2021.

See architectural & engineering drawings for port locations.

1.7.2) Wireless access point outlets

Supply and install a total of **four (4)** Category-6 cables for wireless access points in **rooms #2014 and #2019** as per **Engineering Drawings #E3.1**. Each wireless access point outlet location shall have two cables run to it, with 30' of slack on each cable coiled near destination. Place outlets in surface-mount box above ceiling in location as per diagram.

NOTE: ports shall be labeled using equipment type "MJ" (faceplate), as described in following list:

1.7.2.1) NS2014—MJ99-02 1.7.2.2) NS2014—MJ99-01 1.7.2.3) NS2019—MJ99-01 1.7.2.4) NS2019—MJ99-02

1.7.2.5) Spare Cables

Not Required

1.8) Wireless Access Point Enclosures

Provide and install wireless access point enclosures of the following types in the specified location.

Wireless Access Points shall be provided by Purchase College. Contractor shall mount access point and connect wireless access points to designated wireless access point data outlets after enclosures are installed:

1.8.1) Ceiling-mount

Precise location for mounting shall be field-directed, with approval by Purchase College CTS.

1.8.1.1) NS2014 1.8.1.2) NS2019

1.8.1.3) Hard-Lid Ceiling-Mount - Not Required.

1.8.1.4) Wall-Mount - Not Required.

1.9) Attachments

See attached diagrams and documentation for further description of Scope of Work.

*** END OF DOCUMENT ***

Appendix 3

Laboratory & Demonized Water System

Section 5.22.60 LABORATORY & DEIONIZED WATER SYSTEMS DESIGN AND CONSTRUCTION STANDARD

PART 1: GENERAL

1.01 <u>Codes and Standards:</u>

A. Plumbing Code Compliance: Comply with applicable portions of International Plumbing Code pertaining to selection and installation of plumbing materials and products.

1.02 <u>Requirements</u>:

- A. The Purchase College Natural Science building has a de-ionized water (DW) tank on the 3rd floor. (For historical reasons, DW i is often referred to as distilled water.) The DW is carried in tin lined copper lines for distribution into the building.
- B. The central reverse osmosis/demineralizer system is designed to produce water that meets the following quality specifications:
 - 1. Conductivity < 15 micro ohms/cm
 - 2. pH of 6.0 to 9.0
 - 3. Nonvolatile TOC content < 1.0 ppm
- C. If project requirements demand water quality in excess of that listed above, provide supplemental point-of-use "polishing" systems necessary to provide a continuous supply of water that meets individual water purity requirements.
- D. For buildings requiring DW, provide a 1" PVC 80 line from the tunnel DW main up to a non-pressurized DW tank in the attic. Provide a stainless-steel orifice in the line (1/4" for buildings with large DW demand, 1/8" for buildings with small demand) to limit the amount of makeup to the tank. Provide a valved bypass line around the orifice to allow expedited system refill after being drained.
- E. Provide a stainless-steel solenoid valve to maintain the level in the DW tank. Provide a larger PVC line (often 2 inch) to allow DW flow by gravity or booster pump system from the tank to the building uses. Booster pump systems shall be required to provide adequate pressure to upper floors and building areas with high volume demand equipment.
- F. An ultraviolet sterilizer shall be installed in the piping downstream of the DW

storage tank.

- G. DW Storage tank shall be provided with tank level sight glass. Sight glass shall be piped external to tank and be provided with isolation service valves at top and bottom of glass. Sight glass shall be equipped with high and low level switches. Switches shall be located within the section of sight glass isolated by service valves. Switches shall provide dry contacts for reporting conditions to BAS/FCMS system.
- H. Provide means of flushing DW system from each end of main system feed on each floor of building with access. New or modified systems shall be designed to incorporate the means to maintain the integrity of water quality to prevent any system contamination. Care shall also be taken to prevent contamination to materials stored or in transit. Any modifications to the system piping or equipment shall require prior notification and preapproval from UT Facilities Services. Design shall provide for future remodeling and incorporate the flexibility to accommodate future changes in research having minimal effect on adjacent labs and research programs and the means to maintain the integrity of water quality during any system modifications to prevent system contamination.
- I. Provide each riser connection serving a building floor or area with section valves for isolation with access. Provide each branch connection to main feed serving a floor or area with section valves for isolation with access. Branch connections from main feeds shall be from top of header.
- J. Provide de-ionized water piping loop to minimize "dead legs". Dead legs over 12" shall not be allowed.
- K. Provide circulation in all de-ionized water loops at three feet per second minimum, with a target pipe velocity of five feet per second.

PART 2: PRODUCTS

- 2.01 <u>Standards for Basic Identification</u>:
 - A. <u>General</u>: Piping identification Standard at the University is ANSI A13.1 "Scheme for Identification of Piping Systems. All piping shall have flow arrows indicating direction of flow.

2.02 <u>De-Ionized Water Piping, Valves and Fittings</u>:

- A. Pipe valves and fittings for purified water service shall be Schedule 80, Flame Retardant natural virgin, unpigmented Polypropylene with socket thermo seal fusion fittings.
- B. Installation practices, including support spacing and joint fusion, shall be in compliance with manufacturer's printed recommendations.
- C. Materials from which pipe, fittings and valves are manufactured shall have been tested and approved for conveying potable water by the National Sanitation

Foundation (NSF). All pipe, fittings and valves shall bear the NSF hallmark indicating that the material has been tested and approved for conveying deionized water by the national Sanitation Foundation.

- D. To ensure installation uniformity, all system piping components shall be the products of one manufacturer.
- E. All piping shall be thoroughly rinsed and flushed to remove all dirt and debris before installation. After installation the Contractor shall flush the entire piping system with de-ionized water to the satisfaction of the Owner.
- F. All piping exposed within plenums shall have a smoke-developed index of no more than 50 and flame-spread index of no more than 25. All non-conforming piping material located in plenums shall be sleeved. Contractor shall provide a sleeved system through the installation of grooved Schedule 10 galvanized piping and couplings. The sleeve piping shall be no less than 2 inches greater diameter than the polypropylene piping contained within it. Only rolled groove piping may be used. The Victaulic "Fit" fittings and piping system, or any similar set screw type fitting system is specifically prohibited. Vic-Let and Vic-O-Well or similar type fitting is required, then a reducing tee or regular tee with bell reducer shall be used. If any of the above described prohibited materials or installation methods are used, then the material or installation method shall be corrected at the contractor's expense.
- G. Valves shall be ball valve type and shall be manufactured of the same virgin, unpigmented molding compound as the fittings to assure compatibility.
- H. All ball valves shall have Viton seals, and PTFE seats. Ball valves shall carry a pressure rating of 150 psi at a minimum of 68F, and shall be of True Union design.
- 2.03 DEIONIZED WATER PUMPS:
- A. Pumps shall be heavy duty plastic or stainless steel duplex, centrifugal type.
- B. Pump heads, sleeve and impeller shall be polypropylene or stainless steel. Seal shall be mechanical type.
- C. Each pump shall be provided with a fused safety switch and a magnetic starter providing overload and under voltage protection. A mechanical alternator shall automatically alternate the operation of the pumps.
- D. Pumps shall be furnished completed with Vinton, or approved equal, suction and discharge pressure gauge isolator-activators to separate gauge from deionized water.

2.04 LEVEL CONTROLLER

- A. Level controller shall be full plastic body type with no metal parts in contact with deionized water.
- 2.05 PRESSURE TANKS:

- A. Furnish and install heavy duty plastic pressure tanks with interior rubber sleeve.
- B. Tanks shall be suitable for 75 PSI pressure and 120 degree F. temperature.
- C. Tanks shall be Hydro-cell type tanks.

2.06 FLOW CONTROL VALVES:

- A. Provide a 3/8 inch PP flow control valve in each and every deionized water outlet that limits the flow to 1/2 GPM. Provide a 2 GPM a natural, virgin, unpigmented polypropylene flow control valve in each de-ionized water connection to equipment.
- B. Flow control valves shall maintain a constant flow regardless of inlet pressure changes between 15 and 100 psig. No metal shall be in contact with the liquid.

2.07 PRESSURE REGULATING VALVES

- A. Contractor shall supply and install, where shown on the drawings, socket fusion natural, virgin, unpigmented polypropylene pressure regulating valves.
- B. Valves shall accurately reduce and regulate steady or varying inlet pressures and maintain a constant predetermined outlet pressure.

2.12 PRESSURE GAGES

A. Pressure GAGES shall be 2-1/2 inch diameter, dual calibrated for 0 to 100 PSI and SI units, having 316 stainless steel bourdon tube. Provide gages with inline dead-leg gage guards where possible.

2.08 PURIFIED WATER STORAGE TANK:

A. Tank shall be vertical cylindrical type, stainless steel or FRP-jacketed polyethylene, with dished or conical bottom. Tank shall have a tight-fitting removable cover, a steel floor stand, an air filter capable of removing particles as small as 0.5 micron, and rounded interior corners. All tank penetrations shall be factory made. Stainless steel tanks shall be No. 4 finish; polyethylene tanks shall be made of FDA approved resin.

2.09 LEVEL SENSORS

- A. Level sensors shall have only stainless steel and Viton in contact with the fluid. Each shall have a snap action switch rated for 125 volts, with an adjustable deadband initially set at 3 inches.
- B. One level sensor shall be wired with the solenoid valve to automatically maintain the liquid level in the tank. The other is to be connected to the BAS system.

Manufacturers: Subject to compliance with requirements, provide products by one of the following or equivalent:

- 1-Orion High Purity Piping Systems
- 2 CORRTECH Inc.

PART 3 EXECUTION

3.01 INSTALLATION

- A. At every floor penetration a cast in sleeve or other monolithic curbing at least 2 inches high shall be provided to help contain water spills or leaks.
- B. Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.
- C. New Polypropylene piping must be connected to the existing DW main tin lined copper piping with all applicable codes and standards.
- D. Provision for future use should be provided with a T-connect at the main DW tin lined copper piping, all applicable codes and standards must be followed

END OF STANDARD Section 5.22.60