

project manual

TIOGA CENTRAL SCHOOL DISTRICT 2025 Capital Improvement Project - Phase 1

SED Project No.: 60-09-03-04-3-005-001 (Maintenance Building)
60-09-03-04-5-026-006 (New Bus Garage)

project no. 26-44-9206

April 6, 2026

Issued for Bid – June 1, 2026

volume 1 of 1

set no.

PROJECT MANUAL

PROJECT

**Tioga Central School District
2025 Capital Improvement Project – Phase I**

Maintenance Building SED No.: 60-09-03-04-3-005-001

New Bus Garage SED No.: 60-09-03-04-5-026-006

ARCHITECT

KING + KING ARCHITECTS LLP

358 West Jefferson Street
Syracuse, New York 13202
(315) 671-2400



License Expiration Date: 5/31/2029

CONSULTING ENGINEERS

Mechanical/Electrical/Plumbing Engineer:
Salas O'Brien Consulting and Engineering Group of New York Inc.
(FKA M/E Engineering)
300 Trolley Boulevard
Rochester, New York 14606
(585) 288-5590



Reg. Exp: 04/30/2026
Cert. of Auth: 0018443



License Expiration Date 09/30/2026

Structural Engineer
St. Germain & Aupperle, PLLC
5711 West Genessee Street
Camillus, New York 13031
(315) 488-3550

Landscape Architect
Appel Osborne
102 West Division Street Suite 100
Syracuse, New York 13204
(315) 476-1022



Registration current through 9/30/2028

To the best of our knowledge, information and belief, the plans and project manual are in accordance with applicable requirements of the 2025 New York State Uniform Fire Prevention and Building Code, the 2025 State Energy Conservation Construction Code, construction standards of the State Education Department, and, if applicable, the New York State Department of Labor Industrial Code Rule #56.

Date: April 6, 2026

Digital reproductions of this Project Manual shall not be posted to web sites without the direct written permission of the Architect.

It is a violation of the State Education Law for any person, unless under the direction of a licensed Architect, to alter this document in any way. Alterations must have the seal affixed along with the description of the alteration and signature and date. Copyright © 2026.

INDEX

PROJECT MANUAL AND DRAWINGS
FOR
PROJECT

**Tioga Central School District
2025 Capital Improvement Project – Phase I
Maintenance Building & New Bus Garage**

KING + KING ARCHITECTS LLP
358 West Jefferson Street
Syracuse, New York 13202

Date: April 6, 2026
Issued for Bid: June 1, 2026

PROJECT MANUAL INDEX

BIDDING REQUIREMENTS

Sections	Advertisement - Invitation to Bid Instructions to Bidders (AIA-A701) Bid Forms: - Site Contract (SC) - General Contract (GC) - Roofing Contract (RC) - Mechanical Contract (MC) - Plumbing Contract (PC) - Electrical Contract (EC) Non-Collusive Bidding Certification (included with bid forms)

CONDITIONS AND CONTRACT FORMS

Sections	General Conditions of the Contract (AIA-A232) - Form of Agreement (AIA-A132) Selected AIA Documents ACORD Form Information Available to Bidders - Pre-Renovation Survey for Asbestos Containing Materials

DIVISION 1 – GENERAL REQUIREMENTS

Sections	010000 Labor Rates 010640 Safety Requirements 011200 Multiple Contract Summary 011200a Tioga CSD Phase 1 – Bid Schedule 012100 Allowances 012200 Unit Prices 012500 Substitution Procedures 012900 Payment Procedures

013100	Project Management and Coordination
013120	Project Meetings
013300	Submittal Procedures
013400	NYSED Requirements
013410	Contractor Use of Premises
013420	Site Conditions
013430	Project Procedures for Renovations
013440	Work Under Special Conditions
014530	Testing Laboratory Services
014533	Special Inspections and Testing
014533a	Structural Statement of Special Inspections and Testing
015100	Temporary Facilities
015700	Erosion and Sediment Control
017300	Selective Demolition
017329	Cutting and Patching
017400	Progress Cleaning
017700	Project Closeout
017800	Project Record Documents
017810	Operation Maintenance Demo Training
017820	Warranties and Guarantees
019113	General Commissioning Requirements

DIVISION 2 – EXISTING CONDITIONS

Sections	028213	Asbestos Abatement

DIVISION 3 – CONCRETE

Sections	033100	Structural Concrete

DIVISION 4 – MASONRY

Sections	Not Used	

DIVISION 5 – METALS

Section	051200	Structural Steel

DIVISION 6 – WOOD, PLASTICS AND COMPOSITES

Section	061000	Rough Carpentry

DIVISION 7 – THERMAL AND MOISTURE PROTECTION

Sections	074100	Preformed Roof Wall Panels
	075323	Ethylene-Propylene-Diene-Monomer (EPDM) Roofing
	076200	Steel Metal Flashing
	079200	Joint Sealants

DIVISION 8 – OPENINGS

Sections	Not Used	

DIVISION 9 – FINISHES

Sections	092900	Gypsum Board

DIVISION 10 – SPECIALTIES

Sections Not Used

DIVISION 11 – EQUIPMENT

Sections Not Used

DIVISION 12 – FURNISHINGS

Sections Not Used

DIVISION 13 – SPECIAL CONSTRUCTION

Sections Not Used

DIVISION 14 – CONVEYING SYSTEMS

Sections Not Used

DIVISION 22 – PLUMBING

Sections	220500	Basic Plumbing Requirements
	220523	Valves
	220553	Plumbing Identification
	220580	Excavation and Backfill
	220700	Insulation
	221010	Piping Systems and Accessories
	221020	Underground Piping and Accessories
	221100	Water Supply
	221300	Sanitary, Waste and Storm Drainage Systems
	223010	Equipment

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING

Sections	230500	Basic Mechanical Requirements
	230504	Electric Wiring
	230513	Motors
	230519	Gauges And Thermometers
	230523	Valves
	230530	Roof Curbs
	230550	Wind Restraint For HVAC Systems
	230553	Mechanical Identification
	230593	Testing, Adjusting And Balancing
	230710	Insulation
	230923	Building Management System - DDC Logic
	232010	Piping Systems And Accessories
	232110	Water Systems Specialties
	232123	Pumps
	233100	Sheet Metal and Ductwork Accessories Construction
	233101	Mechanical Cleaning Of HVAC Systems
	233313	Fire Dampers
	233713	Registers and Diffusers
	233723.16	Louvers and Penthouses
	235100	Prefabricated Flue Gas Venting System
	236213	Air-Cooled Condensing Units

237313	Unit Heaters Units Indoor
238239	Unit Heaters (Hydronic)

DIVISION 26 – ELECTRICAL

Sections	260500	Basic Electrical Requirements
	260501	Basic Material And Methods
	260526	Grounding
	262000	Electric Distribution
	262913	Motor Controllers
	265000	Lighting

DIVISION 27 – COMMUNICATIONS

Sections	Not Used

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

Sections	283102	Analog Addressable Fire Alarm System

DIVISION 31 – EARTHWORK

Sections	311201	Site Preparation
	312201	Site Earthwork
	312501	Erosion, Sediment and Pollution Control

DIVISION 32 – EXTERIOR IMPROVEMENTS

Sections	321201	Asphalt Paving
	323001	Traffic Signs
	329201	Seeded Lawns

DIVISION 33 – UTILITIES

Sections	334001	Storm Drainage

DRAWING INDEX

VOLUME 1 – MAINTENANCE BUILDING (C)

COVERPAGE

GENERAL

C G0.01 CODE COMPLIANCE PLAN

ENVIRONMENTAL

C X0.01 ASBESTOS ABATEMENT PLAN

STRUCTURAL

C ST1.01 ROOF FRAMING PLAN

ARCHITECTURAL

C A0.00 LEGENDS, SYMBOLS, AND DETAILS

C A1.01 FIRST FLOOR & ROOF PLANS AND DETAILS

MECHANICAL

C H0.01 DEMOLITION PLANS - FIRST FLOOR AND ROOF

C H1.01 CONSTRUCTION PLANS - FIRST FLOOR AND ROOF

C H9.01 SYMBOLS LIST, DETAILS AND SCHEDULES

PLUMBING

C P0.01 DEMOLITION PLANS - FIRST FLOOR AND ROOF

C P1.01 CONSTRUCTION PLANS - FIRST FLOOR AND ROOF

C P9.01 SCHEDULES, DETAILS, GENERAL NOTES AND SYMBOLS LIST

ELECTRICAL

C E1.01 CONSTRUCTION PLANS - FIRST FLOOR AND SECOND FLOOR

C E9.01 DETAILS, RISER DIAGRAMS, SCHEDULES AND GENERAL
NOTES AND SYMBOLS LIST

VOLUME 2 – NEW BUS GARAGE (D)

COVERPAGE

GENERAL

D G0.01 CODE COMPLIANCE PLANS

SITE

D L0.01 SITE SURVEY AND PREPARATION PLAN

D L0.02 TRAFFIC AND RIGHT OF WAY WORK PLAN (NYS ROUTE 17C)

D L1.01 SITE GRADING AND EROSION CONTROL PLAN

D L1.02 SITE LAYOUT PLAN

D L9.01 SITE DETAILS

STRUCTURAL

D ST1.01 PARTIAL FOUNDATION PLAN

ARCHITECTURAL

D A0.00 LEGENDS, SYMBOLS, AND DETAILS

D A0.01 DEMOLITION PLAN - FIRST FLOOR

D A1.01 CONSTRUCTION PLAN & REFLECTED CEILING PLAN FIRST FLOOR

MECHANICAL

D H0.01 FIRST FLOOR AND ROOF - KEYPLANS

D H1.01 DEMOLITION AND CONSTRUCTION PLANS - FIRST FLOOR AND MEZZANINE - AREA A

D H1.02 DEMOLITION AND CONSTRUCTION PLANS - FIRST FLOOR AND MEZZANINE - AREA B

D H4.01 DEMOLITION AND CONSTRUCTION PLANS - FIRST FLOOR - AREA A

D H9.01 SYMBOLS LIST AND DETAILS

D H9.02 DETAILS AND SCHEDULES

PLUMBING

D P0.01 FIRST FLOOR AND ROOF - KEYPLANS

D P0.02 DEMOLITION PLANS - FIRST FLOOR - AREAS A AND B

D P1.01 CONSTRUCTION PLANS - FIRST FLOOR - AREAS A AND B

D P9.01 SCHEDULES, DETAILS, GENERAL NOTES AND SYMBOLS LIST

ELECTRICAL

D E0.01 FIRST FLOOR AND MEZZANINE - KEYPLANS

D E1.01 DEMOLITION AND CONSTRUCTION PLANS - FIRST FLOOR AND MEZZANINE

D E9.01 DETAILS, RISER DIAGRAMS AND SCHEDULES

D E9.02 GENERAL NOTES AND SYMBOLS LIST

ADVERTISEMENT
INVITATION FOR BIDS

The Tioga Central School District invites sealed bids, in duplicate, for:

Site Construction (SC)
General Construction (GC)
Roofing Construction (RC)
Mechanical Construction (MC)
Plumbing Construction (PC)
Electrical Construction (EC)

For: **2025 Capital Improvement Project – Phase I – Bus Garage & Maintenance Building**

SUBMISSION OF BIDS

Bids will be received by the Owner until **1:00 PM**, Local Time, **THURSDAY, JUNE 25, 2026** by Superintendent Mr. Joshua Roe at the Tioga CSD District Office (located within the High School), 27 5th Ave, Tioga Center, NY 13845.

Contractors should refer to the 2008 Wicks Reform and New York State Labor Law Section 220-i for additional bid submission procedures and requirements not otherwise outlined in the contract documents.

OPENING OF BIDS

Bids will be opened and read aloud at 1:05 PM, Local Time, Thursday, June 25, 2026 at the Tioga CSD District Office, 27 5th Ave, Tioga Center, NY 13845.

EXAMINATION OF CONTRACT DOCUMENTS

Contract Documents may be examined at the following locations:

King + King Architects, LLP
358 West Jefferson Street
Syracuse, NY 13202
315.671.2400
315.671.5500 (f)

Plan & Print Systems, Inc.
6160 Eastern Avenue
Syracuse, NY 13211
315.437.5111
315.463.1510 (f)

Builders Exchange of the Southern Tier
15 Belden Street
Binghamton, NY 13903
607.771.7000
607.771.7001 (f)

Eastern Contractors Association
6 Airline Drive
Albany, NY 12205
518.869.0961
518.869.2378 (f)

Builders Exchange of Rochester
180 Linden Oaks
Suite 100
Rochester, NY 14625
585.586.5460
585.586.1580 (f)

Syracuse Builders Exchange
6563 Ridings Road
Syracuse, NY 13206
315.437.9936
315.437.5044 (f)

Tri-County Builders Exchange Plan Room, c/o
Pickett Building Management
6459 State Highway 23
Oneonta, NY 13820

Mohawk Valley Builders Exchange
10 Main Street, Suite 202
Whitesboro, NY 13492
315.736.2441

607.432.6641
607.433.6284 (f)

315.736.2445 (f)
info@mvbe.com / www.mvbe.com

Northern NY Builders Exchange
22074 Fabco Road
Watertown, NY 13601
315.788.1330
315.788.9357 (f)

Dodge Data & Analytics
www.construction.com

OBTAINING ELECTRONIC CONTRACT DOCUMENTS

Contract Documents may be downloaded from the Plan and Print Systems, Inc. website for a **non-refundable** cost of \$49.00. Electronic Contract Documents on a flash drive may also be obtained from Plan & Print (Telephone: 315.437.5111, Fax: 315.463.1510) upon payment of a **non-refundable** \$49.00 plus shipping and handling per flash drive. Contact Plan & Print for shipping and handling costs. Checks shall be made payable to **Plan & Print Systems, Inc.**

OBTAINING PAPER CONTRACT DOCUMENTS

Contract Documents may be obtained at Plan & Print Systems, Inc., 6160 Eastern Ave, Syracuse, NY 13211 (Telephone: 315.437.5111, Fax: 315.463.1510) upon receipt of a \$100.00 deposit per set. Checks for deposit for Contract Documents shall be made payable to TIOGA CENTRAL SCHOOL DISTRICT. Cash will not be accepted as a deposit. Prospective Bidders will be issued a maximum of two (2) sets each. Subcontractors, Material Suppliers, etc., will be issued a maximum of one (1) set each.

Contract documents will be delivered via UPS Ground service upon request and receipt of an additional non-refundable delivery and handling charge, payable by separate check to Plan & Print Systems, Inc. Contact Plan & Print for shipping and handling costs.

Any sets required in excess of the above-mentioned maximums are to be obtained directly by interested parties at the full cost of printing, **at their cost**, directly from Plan and Print Systems.

Only complete sets will be issued.

At the time the order is placed, plan holder shall advise Plan and Print Systems of status as to prime bidder, subcontractor, or material supplier and to trade affiliation. Postal address, telephone number, fax number, and email will also be required.

ADDENDA

Addenda for this project will be emailed to each plan holder of record, except as noted. Addenda containing full sized drawings will be issued in hard copy format only and sent via UPS. It is the responsibility of each prospective bidder to submit an accurate email address when requesting Bidding/Contract Documents and to download each addendum. Addenda will be sent to the e-mail address on record.

RETURN OF CONTRACT DOCUMENTS

Upon returning sets promptly and in re-usable condition to **Plan & Print Systems, Inc.** within **30 days** after the date of the Bid opening, deposits will be refunded as follows:

1. Any Bidder will be refunded his or her deposit in full.

2. All other persons receiving any or all the Contract Documents, including Subcontractors and Material Suppliers, will be refunded their deposit in full.

All Contract Documents received (except for Documents held by Successful Bidders) must be returned to **Plan & Print Systems, Inc.**, at the above address.

For Contract Documents which are not returned to the printer within this 30-day period, deposits will NOT be refunded.

RIGHT TO WAIVE OR REJECT

The Owner reserves the right to waive any informality in or to reject any or all Bids.

BID SECURITY

Each Bidder must deposit with its Bid, security in an amount and form subject to the conditions provided in the Contract Documents.

WITHDRAWAL OF BIDS

Withdrawal of Bids will be subject to the conditions provided in the Instructions to Bidders.

COMPLETION TIME

The work of this project shall be completed by the dates set forth in Section 011100 entitled "Summary of Work."

PRE-BID MEETING

A Pre-Bid Meeting will be held to answer questions that may arise during the bidding period. The meeting will be held at 1:00 P.M. on THURSDAY, JUNE 11, 2026 at the Bus Garage (located behind the south end of K-12 building), 27 5th Ave, Tioga Center, NY 13845.

INSPECTION OF SITE

Bidders will be able to visit the Site at the convenience of the Tioga Central School District with a minimum of forty-eight hours prior notification to Jeff Bond, LeChase, Project Manager by telephone at 607-857-1620.

REQUESTS FOR INFORMATION

Requests for interpretation, information or clarification (RFI) of the Contract Documents must be made in writing to King + King Architects and LeChase Construction. Responses to RFIs will not be made over the telephone. Responses to RFIs will be advisory only and will not modify the Contract Documents. The Contract Documents stand as published except as modified by written Addenda before bid and Modifications after execution of the Agreement.

RFIs may be emailed to both:

Mr. Michael James, Project Manager
mjames@kingarch.com
King + King Architects LLP
358 W. Jefferson Street
Syracuse, New York 13202

Mr. Jeff Bond, Project Manager
Jeff.bond@leCHASE.com
LeChase Construction
11849 East Corning Rd
Corning, New York 14830

Deadline for RFI's is Thursday, June 18, 2026.

AIA® Document A701® – 2018

Instructions to Bidders

for the following Project:

THE OWNER:

THE ARCHITECT:

King + King Architects, LLP
358 West Jefferson Street
Syracuse, New York 13202
Telephone Number: 315-671-2400

TABLE OF ARTICLES

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

ADDITIONS AND DELETIONS:

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

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

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

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

ARTICLE 1 DEFINITIONS

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

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

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

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

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

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

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

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

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

ARTICLE 2 BIDDER'S REPRESENTATIONS

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

- .1 the Bidder has read and understands the Bidding Documents;
- .2 the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- .3 the Bid complies with the Bidding Documents;
- .4 the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
- .5 the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

§ 2.2 Conditions Affecting the Work: All Bidders shall visit the site and take such other steps as may be necessary to ascertain the nature and location of the Work, and the general and local conditions which can affect the Work or the cost thereof. All visits must be made with arrangements as specified in the Advertisement or Invitation to Bid. The site visitation shall be limited to those persons or firms who are "Plan holders of Record" or accompanied by "Planholders of Record." In addition, Bidders shall examine all Contract Documents in relation to the site, the structure and condition of the ground, the obstacles which may be encountered and all other conditions having a bearing upon the performance of the Work, superintendence of the Work, requirements for heat, time of completion and all other relevant matters. Failure to take such steps shall not relieve Bidders from responsibility for estimating properly the difficulty or cost of successfully performing the work. The Owner assumes no responsibility for any understanding or representations concerning conditions made by any of its agents, representatives or employees prior to the execution of the Contract, unless included in the Contract Documents.

§ 2.3 The Bidder's attention has been directed to the fact that all applicable state laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the Contract throughout, and they will be deemed to be included in the Contract the same as though herein written out in full.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

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

(Paragraph deleted)

§ 3.1.2 Any required deposit shall be refunded to Bidders as specified in the Advertisement or Invitation to Bid. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

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

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

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

§ 3.2 Modification or Interpretation of Bidding Documents

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

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least ten (10) or more business days prior to the date for receipt of
(Paragraphs deleted)

Bids, or earlier if more time may be required, to permit all necessary investigation and to allow sufficient time for a reply to reach all perspective Bidders before submission of their Bids.

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them. Oral explanations or instructions given before award of the Contract will not be binding upon the Owner, the Architect or their representatives.

§ 3.3 Substitutions

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

§ 3.3.2 Substitution Process

§ 3.3.2.1 Substitutions will be considered upon written request as specified in Section 012500, "Equivalency" and as specified in the General Conditions, Article 3, subparagraph 3.4.2 as amended by the Supplementary General Conditions, if any..

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

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

work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

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

§ 3.3.4 Intentionally deleted.

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

§ 3.4 Addenda

§ 3.4.1

(Paragraphs deleted)

The Architect will endeavor to mail or electronically notify every plan holder of record of any addenda issued. However, it shall be the Bidder's responsibility to make inquiry as to any addenda issued. All such addenda shall become part of the Contract Documents and shall be bound by such addenda whether or not received by the bidders..

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

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

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

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

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

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

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

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

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

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

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

(Paragraph deleted)

§ 4.1.8 Contractor certifies that it and each of its subcontractors have completed the required New York State Public Work Contractor and Subcontractor Registry in accordance with the New York State Department of Labor requirements, as amended from time to time, and **shall submit with its bid, a copy of its Contractor Certificate of Registration and copies of the Certificates of Registration for its subcontractors.** Contractor acknowledges that acceptable proof of registration is required as part of the Contractor's bid submission and the Contractor's failure to provide such proof shall

be cause for rejection of its bid or termination of the contract for cause. The Contractor shall comply with all requirements of the Labor Law Section 220-j, as amended, regarding mandatory electronic submission of certified payroll records.

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

§ 4.2 Bid Security

§ 4.2.1 Each Bid shall be accompanied by
(Paragraphs deleted)

Bid security in the form of a Certified Check of the Bidder or a Bid Bond duly executed by the Bidder as principal and having a Surety Company thereon qualified to do business in the State of the project, in an amount not less than 5% of the amount of the Base Bid, pledging that the Bidder will enter into a Contract with the Owner on the terms stated in the Contract Documents and will, if required, furnish Bonds as described in Article 7 covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract within 10 days after he has been offered a Contract or fails to furnish such bonds, if required, the amount of the Bid security shall be forfeited to the Owner as liquidated damages, not as penalty. The amount of the Bid security shall not be forfeited to the Owner in the event the Owner fails to comply with Subparagraph 6.2.

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

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

§ 4.2.4 The Owner will have the right to retain the bid security of the three lowest Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) forty-five (45) days after formal Bid opening, so long as Bidder has not been notified of the acceptance of its Bid; or (c) all Bids have been rejected.

§ 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:
(Paragraph deleted)

As specified in the Advertisement or Invitation to Bid.

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

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

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

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

§ 4.4 Modification or Withdrawal of Bid

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

of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

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

§ 4.4.3

(Paragraphs deleted)

Bidder shall not modify, withdraw or cancel his Bid or any part thereof for forty-five (45) days after the time designated for the receipt of Bids in the Advertisement or Invitation to Bid and the Bidder so agrees in submitting his Bid.

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

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

§ 5.2 Rejection of Bids

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

§ 5.3 Acceptance of Bid (Award)

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

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

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

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

§ 6.2 Owner's Financial Capability

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

§ 6.3 Submittals

§ 6.3.1 Within fourteen days of issuance of the Letter of Intent/Notice to Proceed, prior to the Owner's execution of contract, the Contractor shall submit the following information to the Architect in writing:

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

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

§ 6.3.2.1 Within seven (7) days of issuance of the Letter of Intent/Notice to Proceed, submit names of superintendent, project manager, or any other corporate representative that will be directly involved in execution of the project.

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

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

§ 6.3.5 Within seven (7) days of issuance of the letter of Intent/Notice to Proceed the Contractor shall submit required Insurance certificates.

§ 6.3.6 Submission of any proposed equivalents shall follow guidelines as indicated in Specification Section 012500 - "Equivalency".

§ 6.3.7 Cost Breakdown: Within twenty-four (24) hours of receipt of bids, the three (3) low bidders shall provide a cost breakdown of their bid into Costs associated for each building.

§ 6.3.8 Submission of information in relation to subcontractors, materials, costs, etc., shall be as specified in the Supplementary General Conditions of the Contract Documents, unless directed otherwise.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

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

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

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

§ 7.1.4 The Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.
(Paragraphs deleted)

§ 7.2 Time of Delivery and Form of Bonds

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

§ 7.2.2 Unless otherwise provided, the bonds shall be written on a modified AIA Document A312, Performance Bond and Payment Bond, as required under Article 11 in the General Conditions.

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

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

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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

.1 AIA Document A132-2019, Standard Form of Agreement Between Owner and Contractor, as modified.

(Paragraphs deleted)

.2 AIA Document A232-2019, General Conditions of the Contract for Construction, as modified.

(Paragraph deleted)

.3 Drawings – see Drawing Index in the Project Manual.

.4 Specifications – see Index in the Project Manual.

(Paragraph deleted)

.5 Addenda, if any.

(Table deleted)

.6

(Paragraphs deleted)

Other Exhibits:

Bid Form

(Paragraphs deleted)

NYS Prevailing Wage Schedule

SITE CONSTRUCTION BID FORM

FOR

PROJECT

**Tioga Central School District
2021 Capital Improvement Project – Phase I
Maintenance Building & New Bus Garage**

SEE INVITATION TO BID FOR DATE, TIME AND PLACE FOR RECEIPT OF BIDS

The undersigned

(Name of Bidder)

(Address)

Contact: _____

Phone: _____

Email: _____

The Bidder hereby certifies that he has visited the site and has examined and fully comprehends the requirements and intent of the Plans and Project Manual of the proposed work, and being familiar with all the conditions surrounding the construction of the project, including the availability of materials and labor, hereby proposes to furnish all labor, materials, supplies, plant and equipment, and other facilities necessary or proper for or incidental to the performance of the proposed work and does hereby agree to perform all

SITE CONSTRUCTION WORK (SC)

of the project in accordance with the Contract Documents at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

The Bidder agrees to furnish all Materials, Labor, and all other costs for the Total Lump Sum Base Bid of

_____ DOLLARS (\$_____)

These amounts, and the amounts indicated for Alternates, if any, shall be shown in words and figures. In the event of discrepancy, words will govern.

ALLOWANCES (See Project Manual Section 012100)

The Bidder acknowledges the amount shown above **includes** the following allowances:

ALLOWANCE NO. SC-01 Contingency Cash Allowance \$ 10,000.00

ALTERNATES – None.

UNIT PRICES (See Project Manual Section 012200)

The Bidder shall set forth the cost of all unit prices listed below. Should the work listed below be increased or decreased from the amounts shown on the Contract Drawings and/or Project Manual, upon written notice from the Architect, the undersigned Bidder agrees that the prices quoted below (including all insurance, applicable taxes, equipment, overhead and profit), shall be the basis of his compensation or deduction, as the case may be, for such increase or decrease in his work. All work added shall be at the quoted unit prices, and all work deleted shall be at the quoted unit prices less ten percent (10%). Changes shall be processed in accordance with Contract Documents.

<u>ITEM</u>	<u>UNIT OF QUANTITY</u>	<u>TOTAL</u>
SC-01: Undercutting	per cubic yard, installed	\$ _____
SC-02: Soil Stabilization Fabric	per square yard, installed	\$ _____
SC-03: Heavy Duty Asphalt	per square yard, installed	\$ _____
SC-04: Self-Adhering Waterproof Membrane	per linear foot, installed	\$ _____
SC-05: Milling, Tack Coat and Top Coarse Asphalt	per square yard, installed	\$ _____
SC-06: Rock Excavation(s)	per cubic yard open rock in the ground prior to excavation	\$ _____

RIGHT TO WAIVE OR REJECT

The Bidder understands that the right is reserved by the Owner to accept or reject any or all bids.

QUALIFICATION OF BIDDER

Upon request after the bid opening, the Bidder shall submit a fully executed AIA A305 Contractor's Qualification Statement, to be qualified as the lowest responsible bidder.

All contractors and subcontractors submitting bids or performing construction work on public work projects or private projects covered by Article 8 of the Labor Law are required to register with the New York State Department of Labor (NYSDOL) under Labor Law Section 220-i. The Bidder encloses with this Bid a copy of its valid NYSDOL Certificate of Registration. Application for registration is not accepted as a proof of registration and a Bid not accompanied by a valid NYSDOL Certificate of Registration is subject to rejection.

WITHDRAWAL OF BIDS

The Bidder agrees that this bid may not be withdrawn for a period of forty-five (45) calendar days after closing time of same.

PERFORMANCE-PAYMENT BOND

The Bidder agrees, if awarded the Contract, to execute and deliver performance and matching payment bonds in the form bound in the Specifications, both in the amount of the Contract; and to deliver insurance certificates and endorsements for insurance required by the Specifications, upon execution of the Contract. Award of the Contract shall be contingent upon review and acceptance of bonds and insurance by the Owner.

TIME

The Bidder agrees to commence work when directed by the Owner in a Notice-To-Proceed, and to complete the work as specified in Section 011100 "Summary".

BID SECURITY

The Bidder encloses with this Bid this Bid Security required by the Contract Documents in the form of a Certified Check (), or Bid Bond () (check one) in the amount of _____
_____DOLLARS (\$_____) which represents not less than 5% of the Base Bid.

ADDENDUM RECEIPT

The Bidder Acknowledges Addendum No. _____ Dated _____
_____ Dated _____
_____ Dated _____
_____ Dated _____
_____ Dated _____

SIGNED: _____

TITLE: _____

FOR: _____
(Firm - Indicate if Corporation, Partnership, Individual, Other)

FIRM ADDRESS: _____

STATE INCORPORATED, IF INCORPORATED: _____

CORPORATE SEAL, IF INCORPORATED, SHALL BE STAMPED BELOW

DATE: _____

NON-COLLUSIVE BIDDING CERTIFICATION:

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 his knowledge and belief: (1) the prices in this bid have been arrived at independently without collusion, consultation, communications, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor; (2) unless otherwise required by law, the prices which 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 (3) no attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

SIGNED: _____

TITLE: _____

FOR: _____
(Firm - Indicate if Corporation, Partnership, Individual, Other)

FIRM ADDRESS: _____

STATE INCORPORATED, IF INCORPORATED: _____

CORPORATE SEAL, IF INCORPORATED, SHALL BE STAMPED BELOW

DATE: _____

**Certification Of Compliance with the
NEW YORK STATE IRAN DIVESTMENT ACT OF 2012**
(Must be signed and returned with Bid)

By submitting a bid in response to this solicitation or by assuming the responsibility of a Contract awarded hereunder, Bidder/Contractor (or any assignee) certifies 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" list ("Prohibited Entities List") posted on the OGS website at: <http://www.ogs.ny.gov/about/regs/docs/ListofEntities.pdf> and further certifies that it will not utilize on such Contract any subcontractor that is identified on the Prohibited Entities List. Additionally, Bidder/Contractor is advised that should it seek to renew or extend a Contract awarded in response to the solicitation, it must provide the same certification at the time the Contract is renewed or extended.

During the term of the Contract, should the Owner receive information that a person (as defined in State Finance Law §165-a) is in violation of the above-referenced certifications, The Owner 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 Owner shall take such action as may be appropriate and provided for by law, rule, or contract, including, but not limited to, seeking compliance, recovering damages, or declaring the Contractor in default.

The Owner 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.

Any bid hereafter made to any political subdivision of the state or any public department, agency or official thereof by a corporate bidder for work or services performed or to be performed or goods sold or to be sold, where competitive bidding is required by statute, rule, regulation, or local law, deemed to have been authorized by the board of directors of the bidder, and such authorization shall be deemed to include the signing and submission of the bid and the inclusion therein of this certificate as to compliance with the New York State Iran Divestment Act of 2012.

SIGNED: _____

TITLE: _____

FOR: _____
(Name of Bidder)

DATE: _____

**Certification Of Compliance with the
DAVIS-BACON ACT**

(Must be signed and returned with Bid)

_____, a representative of _____, hereby
swears to and certifies that, to the best of his or her knowledge and belief:

1. Neither _____, nor any substantially owned-affiliated entity of the Bidder (collectively the "Bidder"), has been found to be in violation of the Davis-Bacon Act pursuant to 40 U.S.C. 3144, the Copeland Act pursuant to 18 U.S.C. 874 and 40 U.S.C. 3145 or the Contract Work Hours and Safety Standards Act pursuant to 40 U.S.C. 332, or their New York State counterparts.
2. If the Bidder has been found to be in violation of the Davis-Bacon Act, the Copeland Act, the Contract Work Hours and Safety Standards Act, or any of their New York State counterparts, state the name of the agency, the date of the violation, the nature of the violation and any consequence of the violation, including warnings, fines and debarments below.
3. The Bidder is not currently under investigation by any local, state or federal government agency. If Bidder is under investigation, state the name of the agency, the date of the alleged violation and the nature of the alleged violation below.
4. The Bidder's Dun & Bradstreet D-U-N-S number is _____.
5. I have authority to execute this certification, knowing it will be relied upon by the Owner of this Project.

SIGNED: _____

TITLE: _____

FOR: _____
(Name of Bidder)

STATE OF NEW YORK)
COUNTY OF)

On _____, before me, the undersigned, a Notary Public in and for said to me State, personally appeared _____ personally known to me or proved on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she executed the same in his/her capacity(ies), and that by his/her signature(s) on the instrument, the individual(s) or the person on behalf of which the individual(s) acted, executed the instrument.

Notary Public

END OF BID FORM

GENERAL CONSTRUCTION BID FORM

FOR

PROJECT

**Tioga Central School District
2021 Capital Improvement Project – Phase I
Maintenance Building & New Bus Garage**

SEE INVITATION TO BID FOR DATE, TIME AND PLACE FOR RECEIPT OF BIDS

The undersigned

(Name of Bidder)

(Address)

Contact: _____

Phone: _____

Email: _____

The Bidder hereby certifies that he has visited the site and has examined and fully comprehends the requirements and intent of the Plans and Project Manual of the proposed work, and being familiar with all the conditions surrounding the construction of the project, including the availability of materials and labor, hereby proposes to furnish all labor, materials, supplies, plant and equipment, and other facilities necessary or proper for or incidental to the performance of the proposed work and does hereby agree to perform all

GENERAL CONSTRUCTION WORK (GC)

of the project in accordance with the Contract Documents at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

The Bidder agrees to furnish all Materials, Labor, and all other costs for the Total Lump Sum Base Bid of

_____ DOLLARS (\$_____)

These amounts, and the amounts indicated for Alternates, if any, shall be shown in words and figures. In the event of discrepancy, words will govern.

ALLOWANCES (See Project Manual Section 012100)

The Bidder acknowledges the amount shown above **includes** the following allowances:

ALLOWANCE NO. GC-01 Contingency Cash Allowance \$ 10,000.00

ALTERNATES – None.

UNIT PRICES – None.

RIGHT TO WAIVE OR REJECT

The Bidder understands that the right is reserved by the Owner to accept or reject any or all bids.

QUALIFICATION OF BIDDER

Upon request after the bid opening, the Bidder shall submit a fully executed AIA A305 Contractor's Qualification Statement, to be qualified as the lowest responsible bidder.

All contractors and subcontractors submitting bids or performing construction work on public work projects or private projects covered by Article 8 of the Labor Law are required to register with the New York State Department of Labor (NYSDOL) under Labor Law Section 220-i. The Bidder encloses with this Bid a copy of its valid NYSDOL Certificate of Registration. Application for registration is not accepted as a proof of registration and a Bid not accompanied by a valid NYSDOL Certificate of Registration is subject to rejection.

WITHDRAWAL OF BIDS

The Bidder agrees that this bid may not be withdrawn for a period of forty-five (45) calendar days after closing time of same.

PERFORMANCE-PAYMENT BOND

The Bidder agrees, if awarded the Contract, to execute and deliver performance and matching payment bonds in the form bound in the Specifications, both in the amount of the Contract; and to deliver insurance certificates and endorsements for insurance required by the Specifications, upon execution of the Contract. Award of the Contract shall be contingent upon review and acceptance of bonds and insurance by the Owner.

TIME

The Bidder agrees to commence work when directed by the Owner in a Notice-To-Proceed, and to complete the work as specified in Section 011100 "Summary".

BID SECURITY

The Bidder encloses with this Bid this Bid Security required by the Contract Documents in the form of a Certified Check (), or Bid Bond () (check one) in the amount of _____
_____DOLLARS (\$_____) which represents not less than 5% of the Base Bid.

ADDENDUM RECEIPT

The Bidder Acknowledges Addendum No. _____ Dated _____
_____ Dated _____
_____ Dated _____
_____ Dated _____
_____ Dated _____

SIGNED: _____

TITLE: _____

FOR: _____
(Firm - Indicate if Corporation, Partnership, Individual, Other)

FIRM ADDRESS: _____

STATE INCORPORATED, IF INCORPORATED: _____

CORPORATE SEAL, IF INCORPORATED, SHALL BE STAMPED BELOW

DATE: _____

NON-COLLUSIVE BIDDING CERTIFICATION:

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 his knowledge and belief: (1) the prices in this bid have been arrived at independently without collusion, consultation, communications, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor; (2) unless otherwise required by law, the prices which 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 (3) no attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

SIGNED: _____

TITLE: _____

FOR: _____
(Firm - Indicate if Corporation, Partnership, Individual, Other)

FIRM ADDRESS: _____

STATE INCORPORATED, IF INCORPORATED: _____

CORPORATE SEAL, IF INCORPORATED, SHALL BE STAMPED BELOW

DATE: _____

**Certification Of Compliance with the
NEW YORK STATE IRAN DIVESTMENT ACT OF 2012**
(Must be signed and returned with Bid)

By submitting a bid in response to this solicitation or by assuming the responsibility of a Contract awarded hereunder, Bidder/Contractor (or any assignee) certifies 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" list ("Prohibited Entities List") posted on the OGS website at: <http://www.ogs.ny.gov/about/regs/docs/ListofEntities.pdf> and further certifies that it will not utilize on such Contract any subcontractor that is identified on the Prohibited Entities List. Additionally, Bidder/Contractor is advised that should it seek to renew or extend a Contract awarded in response to the solicitation, it must provide the same certification at the time the Contract is renewed or extended.

During the term of the Contract, should the Owner receive information that a person (as defined in State Finance Law §165-a) is in violation of the above-referenced certifications, The Owner 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 Owner shall take such action as may be appropriate and provided for by law, rule, or contract, including, but not limited to, seeking compliance, recovering damages, or declaring the Contractor in default.

The Owner 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.

Any bid hereafter made to any political subdivision of the state or any public department, agency or official thereof by a corporate bidder for work or services performed or to be performed or goods sold or to be sold, where competitive bidding is required by statute, rule, regulation, or local law, deemed to have been authorized by the board of directors of the bidder, and such authorization shall be deemed to include the signing and submission of the bid and the inclusion therein of this certificate as to compliance with the New York State Iran Divestment Act of 2012.

SIGNED: _____

TITLE: _____

FOR: _____
(Name of Bidder)

DATE: _____

General Construction Bid Form

ROOF CONSTRUCTION BID FORM

FOR

PROJECT

**Tioga Central School District
2021 Capital Improvement Project – Phase I
Maintenance Building & New Bus Garage**

SEE INVITATION TO BID FOR DATE, TIME AND PLACE FOR RECEIPT OF BIDS

The undersigned

(Name of Bidder)

(Address)

Contact: _____

Phone: _____

Email: _____

The Bidder hereby certifies that he has visited the site and has examined and fully comprehends the requirements and intent of the Plans and Project Manual of the proposed work, and being familiar with all the conditions surrounding the construction of the project, including the availability of materials and labor, hereby proposes to furnish all labor, materials, supplies, plant and equipment, and other facilities necessary or proper for or incidental to the performance of the proposed work and does hereby agree to perform all

ROOF CONSTRUCTION WORK (RC)

of the project in accordance with the Contract Documents at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

The Bidder agrees to furnish all Materials, Labor, and all other costs for the Total Lump Sum Base Bid of

_____ DOLLARS (\$_____)

These amounts, and the amounts indicated for Alternates, if any, shall be shown in words and figures. In the event of discrepancy, words will govern.

ALLOWANCES (See Project Manual Section 012100)

The Bidder acknowledges the amount shown above **includes** the following allowances:

ALLOWANCE NO. RC-01 Contingency Cash Allowance \$ 10,000.00

ALTERNATES – None.

UNIT PRICES – None.

RIGHT TO WAIVE OR REJECT

The Bidder understands that the right is reserved by the Owner to accept or reject any or all bids.

QUALIFICATION OF BIDDER

Upon request after the bid opening, the Bidder shall submit a fully executed AIA A305 Contractor's Qualification Statement, to be qualified as the lowest responsible bidder.

All contractors and subcontractors submitting bids or performing construction work on public work projects or private projects covered by Article 8 of the Labor Law are required to register with the New York State Department of Labor (NYSDOL) under Labor Law Section 220-i. The Bidder encloses with this Bid a copy of its valid NYSDOL Certificate of Registration. Application for registration is not accepted as a proof of registration and a Bid not accompanied by a valid NYSDOL Certificate of Registration is subject to rejection.

WITHDRAWAL OF BIDS

The Bidder agrees that this bid may not be withdrawn for a period of forty-five (45) calendar days after closing time of same.

PERFORMANCE-PAYMENT BOND

The Bidder agrees, if awarded the Contract, to execute and deliver performance and matching payment bonds in the form bound in the Specifications, both in the amount of the Contract; and to deliver insurance certificates and endorsements for insurance required by the Specifications, upon execution of the Contract. Award of the Contract shall be contingent upon review and acceptance of bonds and insurance by the Owner.

TIME

The Bidder agrees to commence work when directed by the Owner in a Notice-To-Proceed, and to complete the work as specified in Section 011100 "Summary".

BID SECURITY

The Bidder encloses with this Bid this Bid Security required by the Contract Documents in the form of a Certified Check (), or Bid Bond () (check one) in the amount of _____
_____DOLLARS (\$_____) which represents not less than 5% of the Base Bid.

ADDENDUM RECEIPT

The Bidder Acknowledges Addendum No. _____ Dated _____
_____ Dated _____
_____ Dated _____
_____ Dated _____
_____ Dated _____

SIGNED: _____

TITLE: _____

FOR: _____
(Firm - Indicate if Corporation, Partnership, Individual, Other)

FIRM ADDRESS: _____

STATE INCORPORATED, IF INCORPORATED: _____

CORPORATE SEAL, IF INCORPORATED, SHALL BE STAMPED BELOW

DATE: _____

NON-COLLUSIVE BIDDING CERTIFICATION:

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 his knowledge and belief: (1) the prices in this bid have been arrived at independently without collusion, consultation, communications, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor; (2) unless otherwise required by law, the prices which 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 (3) no attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

SIGNED: _____

TITLE: _____

FOR: _____
(Firm - Indicate if Corporation, Partnership, Individual, Other)

FIRM ADDRESS: _____

STATE INCORPORATED, IF INCORPORATED: _____

CORPORATE SEAL, IF INCORPORATED, SHALL BE STAMPED BELOW

DATE: _____

**Certification Of Compliance with the
NEW YORK STATE IRAN DIVESTMENT ACT OF 2012**
(Must be signed and returned with Bid)

By submitting a bid in response to this solicitation or by assuming the responsibility of a Contract awarded hereunder, Bidder/Contractor (or any assignee) certifies 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" list ("Prohibited Entities List") posted on the OGS website at: <http://www.ogs.ny.gov/about/regs/docs/ListofEntities.pdf> and further certifies that it will not utilize on such Contract any subcontractor that is identified on the Prohibited Entities List. Additionally, Bidder/Contractor is advised that should it seek to renew or extend a Contract awarded in response to the solicitation, it must provide the same certification at the time the Contract is renewed or extended.

During the term of the Contract, should the Owner receive information that a person (as defined in State Finance Law §165-a) is in violation of the above-referenced certifications, The Owner 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 Owner shall take such action as may be appropriate and provided for by law, rule, or contract, including, but not limited to, seeking compliance, recovering damages, or declaring the Contractor in default.

The Owner 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.

Any bid hereafter made to any political subdivision of the state or any public department, agency or official thereof by a corporate bidder for work or services performed or to be performed or goods sold or to be sold, where competitive bidding is required by statute, rule, regulation, or local law, deemed to have been authorized by the board of directors of the bidder, and such authorization shall be deemed to include the signing and submission of the bid and the inclusion therein of this certificate as to compliance with the New York State Iran Divestment Act of 2012.

SIGNED: _____

TITLE: _____

FOR: _____
(Name of Bidder)

DATE: _____

1. Neither _____, nor any substantially owned-affiliated entity of the Bidder (collectively the “Bidder”), has been found to be in violation of the Davis-Bacon Act pursuant to 40 U.S.C. 3144, the Copeland Act pursuant to 18 U.S.C. 874 and 40 U.S.C. 3145 or the Contract Work Hours and Safety Standards Act pursuant to 40 U.S.C. 332, or their New York State counterparts.
2. If the Bidder has been found to be in violation of the Davis-Bacon Act, the Copeland Act, the Contract Work Hours and Safety Standards Act, or any of their New York State counterparts, state the name of the agency, the date of the violation, the nature of the violation and any consequence of the violation, including warnings, fines and debarments below.
3. The Bidder is not currently under investigation by any local, state or federal government agency. If Bidder is under investigation, state the name of the agency, the date of the alleged violation and the nature of the alleged violation below.
4. The Bidder’s Dun & Bradstreet D-U-N-S number is _____.
5. I have authority to execute this certification, knowing it will be relied upon by the Owner of this Project.

FOR: _____
(Name of Bidder)

On _____, before me, the undersigned, a Notary Public in and for said to me State, personally appeared _____ personally known to me or proved on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she executed the same in his/her capacity(ies), and that by his/her signature(s) on the instrument, the individual(s) or the person on behalf of which the individual(s) acted, executed the instrument.

Roof Construction Bid Form

MECHANICAL CONSTRUCTION BID FORM

FOR

PROJECT

**Tioga Central School District
2021 Capital Improvement Project – Phase I
Maintenance Building & New Bus Garage**

SEE INVITATION TO BID FOR DATE, TIME AND PLACE FOR RECEIPT OF BIDS

The undersigned

(Name of Bidder)

(Address)

Contact: _____

Phone: _____

Email: _____

The Bidder hereby certifies that he has visited the site and has examined and fully comprehends the requirements and intent of the Plans and Project Manual of the proposed work, and being familiar with all the conditions surrounding the construction of the project, including the availability of materials and labor, hereby proposes to furnish all labor, materials, supplies, plant and equipment, and other facilities necessary or proper for or incidental to the performance of the proposed work and does hereby agree to perform all

MECHANICAL CONSTRUCTION WORK (MC)

of the project in accordance with the Contract Documents at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

The Bidder agrees to furnish all Materials, Labor, and all other costs for the Total Lump Sum Base Bid of

_____ DOLLARS (\$_____)

These amounts, and the amounts indicated for Alternates, if any, shall be shown in words and figures. In the event of discrepancy, words will govern.

ALLOWANCES (See Project Manual Section 012100)

The Bidder acknowledges the amount shown above **includes** the following allowances:

ALLOWANCE NO. MC-01 Contingency Cash Allowance \$ 20,000.00

ALTERNATES – None.

UNIT PRICES – None.

RIGHT TO WAIVE OR REJECT

The Bidder understands that the right is reserved by the Owner to accept or reject any or all bids.

QUALIFICATION OF BIDDER

Upon request after the bid opening, the Bidder shall submit a fully executed AIA A305 Contractor's Qualification Statement, to be qualified as the lowest responsible bidder.

All contractors and subcontractors submitting bids or performing construction work on public work projects or private projects covered by Article 8 of the Labor Law are required to register with the New York State Department of Labor (NYSDOL) under Labor Law Section 220-i. The Bidder encloses with this Bid a copy of its valid NYSDOL Certificate of Registration. Application for registration is not accepted as a proof of registration and a Bid not accompanied by a valid NYSDOL Certificate of Registration is subject to rejection.

WITHDRAWAL OF BIDS

The Bidder agrees that this bid may not be withdrawn for a period of forty-five (45) calendar days after closing time of same.

PERFORMANCE-PAYMENT BOND

The Bidder agrees, if awarded the Contract, to execute and deliver performance and matching payment bonds in the form bound in the Specifications, both in the amount of the Contract; and to deliver insurance certificates and endorsements for insurance required by the Specifications, upon execution of the Contract. Award of the Contract shall be contingent upon review and acceptance of bonds and insurance by the Owner.

TIME

The Bidder agrees to commence work when directed by the Owner in a Notice-To-Proceed, and to complete the work as specified in Section 011100 "Summary".

BID SECURITY

The Bidder encloses with this Bid this Bid Security required by the Contract Documents in the form of a Certified Check (), or Bid Bond () (check one) in the amount of _____
_____DOLLARS (\$_____) which represents not less than 5% of the Base Bid.

ADDENDUM RECEIPT

The Bidder Acknowledges Addendum No. _____ Dated _____
_____ Dated _____
_____ Dated _____
_____ Dated _____
_____ Dated _____

SIGNED: _____

TITLE: _____

FOR: _____
(Firm - Indicate if Corporation, Partnership, Individual, Other)

FIRM ADDRESS: _____

STATE INCORPORATED, IF INCORPORATED: _____

CORPORATE SEAL, IF INCORPORATED, SHALL BE STAMPED BELOW

DATE: _____

NON-COLLUSIVE BIDDING CERTIFICATION:

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 his knowledge and belief: (1) the prices in this bid have been arrived at independently without collusion, consultation, communications, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor; (2) unless otherwise required by law, the prices which 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 (3) no attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

SIGNED: _____

TITLE: _____

FOR: _____
(Firm - Indicate if Corporation, Partnership, Individual, Other)

FIRM ADDRESS: _____

STATE INCORPORATED, IF INCORPORATED: _____

CORPORATE SEAL, IF INCORPORATED, SHALL BE STAMPED BELOW

DATE: _____

**Certification Of Compliance with the
NEW YORK STATE IRAN DIVESTMENT ACT OF 2012**
(Must be signed and returned with Bid)

By submitting a bid in response to this solicitation or by assuming the responsibility of a Contract awarded hereunder, Bidder/Contractor (or any assignee) certifies 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" list ("Prohibited Entities List") posted on the OGS website at: <http://www.ogs.ny.gov/about/regs/docs/ListofEntities.pdf> and further certifies that it will not utilize on such Contract any subcontractor that is identified on the Prohibited Entities List. Additionally, Bidder/Contractor is advised that should it seek to renew or extend a Contract awarded in response to the solicitation, it must provide the same certification at the time the Contract is renewed or extended.

During the term of the Contract, should the Owner receive information that a person (as defined in State Finance Law §165-a) is in violation of the above-referenced certifications, The Owner 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 Owner shall take such action as may be appropriate and provided for by law, rule, or contract, including, but not limited to, seeking compliance, recovering damages, or declaring the Contractor in default.

The Owner 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.

Any bid hereafter made to any political subdivision of the state or any public department, agency or official thereof by a corporate bidder for work or services performed or to be performed or goods sold or to be sold, where competitive bidding is required by statute, rule, regulation, or local law, deemed to have been authorized by the board of directors of the bidder, and such authorization shall be deemed to include the signing and submission of the bid and the inclusion therein of this certificate as to compliance with the New York State Iran Divestment Act of 2012.

SIGNED: _____

TITLE: _____

FOR: _____
(Name of Bidder)

DATE: _____

**Certification Of Compliance with the
DAVIS-BACON ACT**

(Must be signed and returned with Bid)

_____, a representative of _____, hereby
swears to and certifies that, to the best of his or her knowledge and belief:

1. Neither _____, nor any substantially owned-affiliated entity of the Bidder (collectively the "Bidder"), has been found to be in violation of the Davis-Bacon Act pursuant to 40 U.S.C. 3144, the Copeland Act pursuant to 18 U.S.C. 874 and 40 U.S.C. 3145 or the Contract Work Hours and Safety Standards Act pursuant to 40 U.S.C. 332, or their New York State counterparts.
2. If the Bidder has been found to be in violation of the Davis-Bacon Act, the Copeland Act, the Contract Work Hours and Safety Standards Act, or any of their New York State counterparts, state the name of the agency, the date of the violation, the nature of the violation and any consequence of the violation, including warnings, fines and debarments below.
3. The Bidder is not currently under investigation by any local, state or federal government agency. If Bidder is under investigation, state the name of the agency, the date of the alleged violation and the nature of the alleged violation below.
4. The Bidder's Dun & Bradstreet D-U-N-S number is _____.
5. I have authority to execute this certification, knowing it will be relied upon by the Owner of this Project.

SIGNED: _____

TITLE: _____

FOR: _____
(Name of Bidder)

STATE OF NEW YORK)
COUNTY OF)

On _____, before me, the undersigned, a Notary Public in and for said to me State, personally appeared _____ personally known to me or proved on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she executed the same in his/her capacity(ies), and that by his/her signature(s) on the instrument, the individual(s) or the person on behalf of which the individual(s) acted, executed the instrument.

Notary Public

END OF BID FORM

PLUMBING CONSTRUCTION BID FORM

FOR

PROJECT

**Tioga Central School District
2021 Capital Improvement Project – Phase I
Maintenance Building & New Bus Garage**

SEE INVITATION TO BID FOR DATE, TIME AND PLACE FOR RECEIPT OF BIDS

The undersigned

(Name of Bidder)

(Address)

Contact: _____

Phone: _____

Email: _____

The Bidder hereby certifies that he has visited the site and has examined and fully comprehends the requirements and intent of the Plans and Project Manual of the proposed work, and being familiar with all the conditions surrounding the construction of the project, including the availability of materials and labor, hereby proposes to furnish all labor, materials, supplies, plant and equipment, and other facilities necessary or proper for or incidental to the performance of the proposed work and does hereby agree to perform all

PLUMBING CONSTRUCTION WORK (PC)

of the project in accordance with the Contract Documents at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

The Bidder agrees to furnish all Materials, Labor, and all other costs for the Total Lump Sum Base Bid of

_____ DOLLARS (\$_____)

These amounts, and the amounts indicated for Alternates, if any, shall be shown in words and figures. In the event of discrepancy, words will govern.

ALLOWANCES (See Project Manual Section 012100)

The Bidder acknowledges the amount shown above **includes** the following allowances:

ALLOWANCE NO. PC-01 Contingency Cash Allowance \$ 10,000.00

ALTERNATES – None.

UNIT PRICES – None.

RIGHT TO WAIVE OR REJECT

The Bidder understands that the right is reserved by the Owner to accept or reject any or all bids.

QUALIFICATION OF BIDDER

Upon request after the bid opening, the Bidder shall submit a fully executed AIA A305 Contractor's Qualification Statement, to be qualified as the lowest responsible bidder.

All contractors and subcontractors submitting bids or performing construction work on public work projects or private projects covered by Article 8 of the Labor Law are required to register with the New York State Department of Labor (NYSDOL) under Labor Law Section 220-i. The Bidder encloses with this Bid a copy of its valid NYSDOL Certificate of Registration. Application for registration is not accepted as a proof of registration and a Bid not accompanied by a valid NYSDOL Certificate of Registration is subject to rejection.

WITHDRAWAL OF BIDS

The Bidder agrees that this bid may not be withdrawn for a period of forty-five (45) calendar days after closing time of same.

PERFORMANCE-PAYMENT BOND

The Bidder agrees, if awarded the Contract, to execute and deliver performance and matching payment bonds in the form bound in the Specifications, both in the amount of the Contract; and to deliver insurance certificates and endorsements for insurance required by the Specifications, upon execution of the Contract. Award of the Contract shall be contingent upon review and acceptance of bonds and insurance by the Owner.

TIME

The Bidder agrees to commence work when directed by the Owner in a Notice-To-Proceed, and to complete the work as specified in Section 011100 "Summary".

BID SECURITY

The Bidder encloses with this Bid this Bid Security required by the Contract Documents in the form of a Certified Check (), or Bid Bond () (check one) in the amount of _____
_____DOLLARS (\$_____) which represents not less than 5% of the Base Bid.

ADDENDUM RECEIPT

The Bidder Acknowledges Addendum No. _____ Dated _____
_____ Dated _____
_____ Dated _____
_____ Dated _____
_____ Dated _____

SIGNED: _____

TITLE: _____

FOR: _____
(Firm - Indicate if Corporation, Partnership, Individual, Other)

FIRM ADDRESS: _____

STATE INCORPORATED, IF INCORPORATED: _____

CORPORATE SEAL, IF INCORPORATED, SHALL BE STAMPED BELOW

DATE: _____

NON-COLLUSIVE BIDDING CERTIFICATION:

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 his knowledge and belief: (1) the prices in this bid have been arrived at independently without collusion, consultation, communications, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor; (2) unless otherwise required by law, the prices which 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 (3) no attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

SIGNED: _____

TITLE: _____

FOR: _____
(Firm - Indicate if Corporation, Partnership, Individual, Other)

FIRM ADDRESS: _____

STATE INCORPORATED, IF INCORPORATED: _____

CORPORATE SEAL, IF INCORPORATED, SHALL BE STAMPED BELOW

DATE: _____

**Certification Of Compliance with the
NEW YORK STATE IRAN DIVESTMENT ACT OF 2012**
(Must be signed and returned with Bid)

By submitting a bid in response to this solicitation or by assuming the responsibility of a Contract awarded hereunder, Bidder/Contractor (or any assignee) certifies 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" list ("Prohibited Entities List") posted on the OGS website at: <http://www.ogs.ny.gov/about/regs/docs/ListofEntities.pdf> and further certifies that it will not utilize on such Contract any subcontractor that is identified on the Prohibited Entities List. Additionally, Bidder/Contractor is advised that should it seek to renew or extend a Contract awarded in response to the solicitation, it must provide the same certification at the time the Contract is renewed or extended.

During the term of the Contract, should the Owner receive information that a person (as defined in State Finance Law §165-a) is in violation of the above-referenced certifications, The Owner 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 Owner shall take such action as may be appropriate and provided for by law, rule, or contract, including, but not limited to, seeking compliance, recovering damages, or declaring the Contractor in default.

The Owner 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.

Any bid hereafter made to any political subdivision of the state or any public department, agency or official thereof by a corporate bidder for work or services performed or to be performed or goods sold or to be sold, where competitive bidding is required by statute, rule, regulation, or local law, deemed to have been authorized by the board of directors of the bidder, and such authorization shall be deemed to include the signing and submission of the bid and the inclusion therein of this certificate as to compliance with the New York State Iran Divestment Act of 2012.

SIGNED: _____

TITLE: _____

FOR: _____
(Name of Bidder)

DATE: _____

**Certification Of Compliance with the
DAVIS-BACON ACT**

(Must be signed and returned with Bid)

_____, a representative of _____, hereby
swears to and certifies that, to the best of his or her knowledge and belief:

1. Neither _____, nor any substantially owned-affiliated entity of the Bidder (collectively the "Bidder"), has been found to be in violation of the Davis-Bacon Act pursuant to 40 U.S.C. 3144, the Copeland Act pursuant to 18 U.S.C. 874 and 40 U.S.C. 3145 or the Contract Work Hours and Safety Standards Act pursuant to 40 U.S.C. 332, or their New York State counterparts.
2. If the Bidder has been found to be in violation of the Davis-Bacon Act, the Copeland Act, the Contract Work Hours and Safety Standards Act, or any of their New York State counterparts, state the name of the agency, the date of the violation, the nature of the violation and any consequence of the violation, including warnings, fines and debarments below.
3. The Bidder is not currently under investigation by any local, state or federal government agency. If Bidder is under investigation, state the name of the agency, the date of the alleged violation and the nature of the alleged violation below.
4. The Bidder's Dun & Bradstreet D-U-N-S number is _____.
5. I have authority to execute this certification, knowing it will be relied upon by the Owner of this Project.

SIGNED: _____

TITLE: _____

FOR: _____
(Name of Bidder)

STATE OF NEW YORK)
COUNTY OF)

On _____, before me, the undersigned, a Notary Public in and for said to me State, personally appeared _____ personally known to me or proved on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she executed the same in his/her capacity(ies), and that by his/her signature(s) on the instrument, the individual(s) or the person on behalf of which the individual(s) acted, executed the instrument.

Notary Public

END OF BID FORM

ELECTRICAL CONSTRUCTION BID FORM

FOR

PROJECT

**Tioga Central School District
2021 Capital Improvement Project – Phase I
Maintenance Building & New Bus Garage**

SEE INVITATION TO BID FOR DATE, TIME AND PLACE FOR RECEIPT OF BIDS

The undersigned

(Name of Bidder)

(Address)

Contact: _____

Phone: _____

Email: _____

The Bidder hereby certifies that he has visited the site and has examined and fully comprehends the requirements and intent of the Plans and Project Manual of the proposed work, and being familiar with all the conditions surrounding the construction of the project, including the availability of materials and labor, hereby proposes to furnish all labor, materials, supplies, plant and equipment, and other facilities necessary or proper for or incidental to the performance of the proposed work and does hereby agree to perform all

ELECTRICAL CONSTRUCTION WORK (EC)

of the project in accordance with the Contract Documents at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

The Bidder agrees to furnish all Materials, Labor, and all other costs for the Total Lump Sum Base Bid of

_____ DOLLARS (\$_____)

These amounts, and the amounts indicated for Alternates, if any, shall be shown in words and figures. In the event of discrepancy, words will govern.

ALLOWANCES (See Project Manual Section 012100)

The Bidder acknowledges the amount shown above **includes** the following allowances:

ALLOWANCE NO. EC-01 Contingency Cash Allowance \$ 10,000.00

ALTERNATES – None.

UNIT PRICES – None.

RIGHT TO WAIVE OR REJECT

The Bidder understands that the right is reserved by the Owner to accept or reject any or all bids.

QUALIFICATION OF BIDDER

Upon request after the bid opening, the Bidder shall submit a fully executed AIA A305 Contractor's Qualification Statement, to be qualified as the lowest responsible bidder.

All contractors and subcontractors submitting bids or performing construction work on public work projects or private projects covered by Article 8 of the Labor Law are required to register with the New York State Department of Labor (NYSDOL) under Labor Law Section 220-i. The Bidder encloses with this Bid a copy of its valid NYSDOL Certificate of Registration. Application for registration is not accepted as a proof of registration and a Bid not accompanied by a valid NYSDOL Certificate of Registration is subject to rejection.

WITHDRAWAL OF BIDS

The Bidder agrees that this bid may not be withdrawn for a period of forty-five (45) calendar days after closing time of same.

PERFORMANCE-PAYMENT BOND

The Bidder agrees, if awarded the Contract, to execute and deliver performance and matching payment bonds in the form bound in the Specifications, both in the amount of the Contract; and to deliver insurance certificates and endorsements for insurance required by the Specifications, upon execution of the Contract. Award of the Contract shall be contingent upon review and acceptance of bonds and insurance by the Owner.

TIME

The Bidder agrees to commence work when directed by the Owner in a Notice-To-Proceed, and to complete the work as specified in Section 011100 "Summary".

BID SECURITY

The Bidder encloses with this Bid this Bid Security required by the Contract Documents in the form of a Certified Check (), or Bid Bond () (check one) in the amount of _____
_____DOLLARS (\$_____) which represents not less than 5% of the Base Bid.

ADDENDUM RECEIPT

The Bidder Acknowledges Addendum No. _____ Dated _____
_____ Dated _____
_____ Dated _____
_____ Dated _____
_____ Dated _____

SIGNED: _____

TITLE: _____

FOR: _____
(Firm - Indicate if Corporation, Partnership, Individual, Other)

FIRM ADDRESS: _____

STATE INCORPORATED, IF INCORPORATED: _____

CORPORATE SEAL, IF INCORPORATED, SHALL BE STAMPED BELOW

DATE: _____

NON-COLLUSIVE BIDDING CERTIFICATION:

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 his knowledge and belief: (1) the prices in this bid have been arrived at independently without collusion, consultation, communications, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor; (2) unless otherwise required by law, the prices which 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 (3) no attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

SIGNED: _____

TITLE: _____

FOR: _____
(Firm - Indicate if Corporation, Partnership, Individual, Other)

FIRM ADDRESS: _____

STATE INCORPORATED, IF INCORPORATED: _____

CORPORATE SEAL, IF INCORPORATED, SHALL BE STAMPED BELOW

DATE: _____

**Certification Of Compliance with the
NEW YORK STATE IRAN DIVESTMENT ACT OF 2012**
(Must be signed and returned with Bid)

By submitting a bid in response to this solicitation or by assuming the responsibility of a Contract awarded hereunder, Bidder/Contractor (or any assignee) certifies 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" list ("Prohibited Entities List") posted on the OGS website at: <http://www.ogs.ny.gov/about/regs/docs/ListofEntities.pdf> and further certifies that it will not utilize on such Contract any subcontractor that is identified on the Prohibited Entities List. Additionally, Bidder/Contractor is advised that should it seek to renew or extend a Contract awarded in response to the solicitation, it must provide the same certification at the time the Contract is renewed or extended.

During the term of the Contract, should the Owner receive information that a person (as defined in State Finance Law §165-a) is in violation of the above-referenced certifications, The Owner 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 Owner shall take such action as may be appropriate and provided for by law, rule, or contract, including, but not limited to, seeking compliance, recovering damages, or declaring the Contractor in default.

The Owner 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.

Any bid hereafter made to any political subdivision of the state or any public department, agency or official thereof by a corporate bidder for work or services performed or to be performed or goods sold or to be sold, where competitive bidding is required by statute, rule, regulation, or local law, deemed to have been authorized by the board of directors of the bidder, and such authorization shall be deemed to include the signing and submission of the bid and the inclusion therein of this certificate as to compliance with the New York State Iran Divestment Act of 2012.

SIGNED: _____

TITLE: _____

FOR: _____
(Name of Bidder)

DATE: _____

**Certification Of Compliance with the
DAVIS-BACON ACT**

(Must be signed and returned with Bid)

_____, a representative of _____, hereby
swears to and certifies that, to the best of his or her knowledge and belief:

1. Neither _____, nor any substantially owned-affiliated entity of the Bidder (collectively the "Bidder"), has been found to be in violation of the Davis-Bacon Act pursuant to 40 U.S.C. 3144, the Copeland Act pursuant to 18 U.S.C. 874 and 40 U.S.C. 3145 or the Contract Work Hours and Safety Standards Act pursuant to 40 U.S.C. 332, or their New York State counterparts.
2. If the Bidder has been found to be in violation of the Davis-Bacon Act, the Copeland Act, the Contract Work Hours and Safety Standards Act, or any of their New York State counterparts, state the name of the agency, the date of the violation, the nature of the violation and any consequence of the violation, including warnings, fines and debarments below.
3. The Bidder is not currently under investigation by any local, state or federal government agency. If Bidder is under investigation, state the name of the agency, the date of the alleged violation and the nature of the alleged violation below.
4. The Bidder's Dun & Bradstreet D-U-N-S number is _____.
5. I have authority to execute this certification, knowing it will be relied upon by the Owner of this Project.

SIGNED: _____

TITLE: _____

FOR: _____
(Name of Bidder)

STATE OF NEW YORK)
COUNTY OF)

On _____, before me, the undersigned, a Notary Public in and for said to me State, personally appeared _____ personally known to me or proved on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she executed the same in his/her capacity(ies), and that by his/her signature(s) on the instrument, the individual(s) or the person on behalf of which the individual(s) acted, executed the instrument.

Notary Public

END OF BID FORM

 AIA® Document A232® – 2019**General Conditions of the Contract for Construction, Construction Manager as Adviser
Edition**

for the following PROJECT:
(Paragraph deleted)

THE CONSTRUCTION MANAGER:

THE OWNER:
(Paragraphs deleted)

THE ARCHITECT:

King + King Architects, LLP
358 West Jefferson Street
Syracuse, New York 13202
Telephone Number: 315-671-2400

ADDITIONS AND DELETIONS:

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

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

This document is intended to be used in conjunction with AIA Documents A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition; B132™–2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™–2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser.

TABLE OF ARTICLES

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

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents. The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, the Project Manual addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract and Performance and Payment Bonds. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. The Contract Documents do include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, and the Contractor's bid or proposal. The Contract Documents form the Contract for Construction. The Contract Documents represent the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract Documents may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind between any persons or entities other than the Owner and Contractor. The Construction Manager and Architect shall, however, be entitled to performance and enforcement of obligations under the Contract Documents intended to facilitate performance of their duties.

(Paragraph deleted)

§ 1.1.2 The Contract. Where the term "Agreement" or "Contract" is used in the General Conditions, and other Contract Documents, it shall mean the separate Owner-Contractor Agreement between the Owner and each Contractor identified in Conditions of the Contract (General, Supplementary and other conditions).

§ 1.1.3 The Work. The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project. The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by other Contractors, and by the Owner's own forces and Separate Contractors.

§ 1.1.5 Contractors. Contractors are persons or entities, other than Separate Contractors, who perform Work under contracts with the Owner that are administered by the Architect and Construction Manager.

§ 1.1.6 Separate Contractors. Separate Contractors are persons or entities who perform construction under separate contracts with the Owner not administered by the Architect and Construction Manager.

§ 1.1.7 The Drawings. The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

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

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

§ 1.1.10 Initial Decision Maker. The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.1.11 Milestone Schedule. The Milestone Schedule prepared by the Architect and Construction Manager contained in the Bid Documents which is intended to coordinate the completion of the Work on the Project.

§ 1.1.12 Construction Milestone. A due date or benchmark for critical path work items identified by the Architect and Construction Manager which Contractors must satisfy in order to complete the Project by the substantial completion date.

§ 1.1.13 Construction Schedule. A comprehensive schedule of all of the Work which each individual Contractor must complete in order to complete their Work in accordance with the Milestone Schedule. This Construction Schedule must be in sufficient detail breaking down items of Work and in an electronic format with predecessor logic in a format reasonably requested by the Construction Manager.

§ 1.1.14 Coordinated Construction Schedule. The Coordinated Schedule created by the Construction Manager based upon each Contractor's approved Construction Schedule which coordinates all of the Work activities to be completed by the substantial completion date.

§ 1.1.15 Project Schedule. The Project Schedule which incorporates and includes the Architect's design work through the substantial completion of the Project.

§ 1.1.16 MISCELLANEOUS DEFINITIONS

§1.1.16.1 The term "Herein" shall mean the contents of the Contract Documents and / or the contents of the particular section where this term appears.

§1.1.16.2 The term "Indicated" as used Herein shall mean shown on the Drawings or described in the Contract Documents.

§1.1.16.3 The term "Concealed" as used Herein shall mean items hidden from sight in such locations as trenches, chases, shafts, furred spaces, walls, slabs, above ceilings and where in sight in crawl spaces or service tunnels.

§1.1.16.4 The term "Exposed" as used Herein shall mean not "concealed" as defined Herein and the spaces behind normally closed doors such as interiors of cabinets.

§1.1.16.5 The term "Product" as used Herein shall include materials, systems and / or equipment."

§1.1.16.6 The term "Furnish" as used Herein shall mean furnish and deliver to the jobsite all products necessary that are connected with the Work including unloading, handling, transporting unwrapping and inspecting those products to be installed.

§1.1.16.7 The term "Install" as used Herein shall mean furnish all labor and perform all operations connected with assembly, erection, anchoring, installation of products or work, finishing, curing, finishing, cleaning and similar operations including supplying all necessary tools, rigging and equipment to do the work, and connect up, test, place in operation and service such products.

§1.1.16.8 The term "Provide" as used Herein shall mean furnish, without limitation, all labor, products, materials, equipment, transportation, services, etc. required to install, complete the work, and /or to test and place in operation/service.

§1.1.16.9 The term "Piping" as used Herein shall mean pipe, rigid conduit, fittings, valves, hangers and other accessories, which comprise a system.

§1.1.16.10 The terms "equal", "proper", "satisfactory", "workmanlike" and words of similarly implied interpretation, judgment or opinion, shall be understood to mean "in the opinion of the Architect.

§1.1.16.11 As used Herein, the terms "General Contractor" and "General Construction Contractor" have the same meaning.

§1.1.16.12 Persistently fails. The phrase "persistently fails" and other similar expressions, as used in reference to the Contractor, shall be interpreted to mean any combination of acts and omissions, that cause the Owner and/or the Owner's Authorized Representative to reasonably conclude that the Contractor will not complete the Work within the Contract Time, for the Contract Sum or in what they reasonably deem not to be in substantial compliance with the requirements of the Contract Documents.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

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

§1.2.4 Where items are specified by the use of a reference standard not bound in the specifications, the date of the reference standard shall be the latest edition at the time of signing the Contract except as specifically indicated otherwise.

§1.2.5 The reference in the Specifications regarding the division or separation of the Work among types of trades or occupations is only for the suggested purpose of coordinating the Work of the different trades, etc. but it shall be the Contractor's entire responsibility for the proper coordination and completion of all the Work described in the "Specifications" whether performed by the Contractor or Subcontractors, if any.

§1.2.6 In the event of inconsistencies within or between parts of the Contract Documents or between the Contract Documents and applicable standards, codes and ordinances, the Contractor shall (1) provide the better quality or greater quantity of work or (2) comply with the more stringent requirements; either or both in accordance with the Architect's interpretation. The terms and provisions of this Section, however, shall not relieve the Contractor of any of the obligations set forth elsewhere Herein.

.1 On the Drawings, given dimensions shall take precedence over scaled measurements and large scale drawings over small scale Drawings.

.2 Before ordering any materials or doing any work, the Contractor and each Subcontractor shall verify measurements at the Project Site and shall be responsible for the correctness of such measurements. No extra charge or compensation will be allowed on account of differences between actual dimensions and the dimensions indicated on the Drawings. Any difference which may be found shall be submitted to the Architect for resolution before proceeding with the Work.

.3 If a minor change in the Work is found necessary due to actual field conditions, the Contractor shall submit detailed drawings of such departure for the approval by the Architect before making the change.

§1.2.7 Execution of the Contract by the Contractor is a representation that the Contractor has carefully examined the Contract Documents and the site, and represents that the Contractor is thoroughly familiar with the nature and location of the Work, the site, the specific conditions under which the Work is to be performed, and all matters which may in any way affect the Work or its performance. The Contractor further represents that as a result of such examinations and investigations, the Contractor thoroughly understands the Contract Documents and their intent and purpose, and is

familiar with all applicable codes, ordinances, laws, regulations, and rules as they apply to the Work, and that the Contractor will abide by same. Claims for additional time or additional compensation as a result of the Contractor's failure to follow the foregoing procedure and to familiarize itself with all conditions and the Contract Documents will not be permitted.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects. Capitalized terms in other Contract Documents shall be defined as found Herein.

§ 1.4 Interpretation

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

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

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party listed in Article 8 of the Agreement to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.2.1 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

§ 1.9 Disclaimer

In no event shall the Owner or the Architect have any responsibility for the Contractor's construction means, methods, techniques, sequences, procedures or for safety or for safety precautions and programs in connection with the Work notwithstanding any of the rights and authority granted the Owner in the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 General

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

(Paragraphs deleted)

§ 2.2 Intentionally Omitted

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities. Unless otherwise provided under the Contract Documents, the Owner, assisted by the Construction Manager and Architect, shall secure and pay for the building permit.

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

§ 2.3.3 The Owner shall retain a construction manager adviser lawfully practicing construction management in the jurisdiction where the Project is located. That person or entity is identified as the Construction Manager in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.4 If the employment of the Construction Manager or Architect terminates, the Owner shall employ a successor construction manager or architect whose status under the Contract Documents shall be that of the Construction Manager or Architect, respectively.

§ 2.3.5 Upon the request of the Architect, the Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner except to the extent that the Contractor knows or reasonably should know such information to be inaccurate or incomplete, but shall exercise proper precautions relating to the safe performance of the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of the Owner. Contractor shall report to the Architect whenever any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points by professionally qualified personnel.

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

§ 2.3.7 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3.8 The Owner shall forward all communications to the Contractor through the Construction Manager. Other communication shall be made as set forth in Section 4.2.6.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or fails to carry out Work in accordance with the Contract Documents, as determined by the Architect, the Owner, or the Construction Manager, the Owner may issue a written order to the Contractor to stop the

Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

(Paragraphs deleted)

§ 2.5 The Owner's Right to Carry Out the Work

§ 2.5.1 If the Contractor defaults, fails or neglects to carry out the Work in accordance with the Contract Documents and fails within a three (3) calendar day period after receipt of written notice from the Owner to commence and continue correction of such default, failure or neglect with diligence and promptness, including the submission of an acceptable recovery schedule if required by the Construction Manager, the Owner may, without further notice (except to inform the Contractor its attempt to cure is inadequate) and without prejudice to other remedies the Owner may have, correct such deficiencies. Such action by the Owner and amounts charged to the Contractor are both subject to review by the Construction Manager and prior approval of the Architect. In such case an appropriate Change Order shall be issued (without the requirement for a signature by the Contractor) deducting from Payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Architect, the Construction Manager, Attorneys, and others, and expenses made necessary by such default, neglect or failure. The expenses incurred by the Owner in connection with retaining a replacement contractor (on a contingency basis or otherwise) are in addition to any other expenses incurred by Owner to remedy the deficiencies and shall be deducted from Payments then or thereafter due the Contractor. The Construction Manager and/or the Architect, pursuant to Section 9.5.1, may withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the cost of correcting such deficiencies, the cost of retaining a replacement contractor, and Owner's expenses and compensation for the Construction Manager and Architect and their respective consultants' additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs due to the Owner, the Contractor may file a Claim pursuant to Article 15. Such action by the Owner and amounts charged to the Contractor shall be equally binding upon the Contractor's Performance and Payment Bonds Surety.

§ 2.5.2 In the event Contractor fails, refuses or neglects to perform closeout obligations, including without limitation performance of punch-list items, within thirty (30) calendar days following the date of Substantial Completion, the Owner, after notice to Contractor and without prejudice to other remedies the Owner may have, may correct such deficiencies. In such case, the Contractor shall be liable to the Owner for the costs of correcting such deficiencies, including compensation for the Architect, the Construction Manager, Attorneys, and others, and expenses made necessary by such default, neglect or failure. If Payments due the Contractor then or thereafter due are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. Such action by the Owner and amounts charged to the Contractor shall be equally binding upon the Contractor's Performance and Payment Bonds Surety.

§ 2.5.3 Should there be, in the opinion of the Architect or Initial Decision Maker, unwarranted delay on the part of any Contractor in completion of incomplete Work or other Contractor requirements, the Owner may have full or partial use and occupancy of any or all portions of buildings as required for moving in or installing furniture, fixtures, supplies or equipment and for general cleaning and maintenance work. In such event Contractor whose unfinished work is performed subsequently shall be responsible for the prevention of any damage to such Owner's installation. Such use or occupancy by the Owner shall in no instance constitute acceptance of any of the Work.

ARTICLE 3 CONTRACTOR

§ 3.1 General

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

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

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

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

(Paragraph deleted)

§ 3.2.1 By executing the Contract, Contractor represents and warrants to the Owner that:

- .1 Contractor is and will be financially responsible and has and will have sufficient liquidity to meet its financial responsibilities under the Contract and for all other Projects in which Contractor is or may become involved;
- .2 Contractor has carefully examined the Contract Documents and has visited and examined the site;
- .3 from Contractor's investigation, Contractor has satisfied itself as to the nature and location of the proposed Work, general and local conditions, and all matters which may in any way affect the Work or its performance;
- .4 Contractor fully understands the intent and purpose of the Contract Documents; and
- .5 The Contractor acknowledges that the Owner is a school district which is subject to various laws and regulations of the State of New York. The Contractor will, in each phase of the Contract, in accordance with applicable standards, comply with applicable laws and regulations as they pertain to the bidding and construction of the Project, including, without limitation, the requirements of Article 5-A of the General Municipal Law; Article 9 of the Education Law; and Sub-Chapter J, Part 155 of Title 8, Chapter II of the Codes, Rules and Regulations of the State of New York.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.5, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. The Contractor shall promptly report to the Construction Manager and Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information submitted to the Construction Manager in such form as the Construction Manager and Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.2.1 The Contractor shall promptly notify the Architect, in writing, of any inconsistencies or errors to provide the Architect ample time for observation, investigation, detail drawings, etc.

§ 3.2.2.2 All Contractors submitting bid proposals shall be presumed to have examined the site to consider fully all conditions, which may have a bearing on the work, and to have accounted for these conditions in their bid proposals.

§ 3.2.2.3 When required, off-site storage is the responsibility of the Contractor.

§ 3.2.2.4 The exactness of grades, elevations, dimensions or locations indicated on the Drawings or of Work installed by others is not guaranteed by the Architect or the Owner.

§ 3.2.2.5 Except as to any reported errors, inconsistencies, nonconformities or omissions, and to concealed or unknown conditions referred to in Section 3.7.4, by executing the Agreement, the Contractor represents the following:

- .1 The Contract Documents are sufficiently complete and detailed for the Contractor to (1) perform the Work required to produce the results intended by the Contract Documents and (2) comply with all the requirements of the Contract Documents.
- .2 The Work required by the Contract Documents, including, without limitation, all construction details, construction means, methods, procedure and techniques necessary to perform the Work, use of materials, selection of equipment and requirements of product manufacturers are consistent with: (1) good and sound practices within the construction industry; (2) generally prevailing and accepted industry standards applicable to Work; (3) requirements of any warranties applicable to the Work; and (4) all laws, ordinances, regulations, rules, and orders, and Owner's policies and procedures which bear upon the Contractor's performance of the Work.

§ 3.2.2.6 The Contractor shall satisfy itself as to the accuracy of all grades, elevations, dimensions and locations

AIA Document A232 – 2019. Copyright © 1992, 2009, and 2019. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 10:42:35 ET on 02/26/2026 under Order No.4104247949 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.

User Notes:

(1380797761)

indicated on the Drawings. Where the Work of this Contract connects or interfaces with existing or other work Contractor shall verify at the site all conditions of such existing or other work. Any errors due to the Contractor's failure to verify such information shall be promptly remedied by the Contractor at no additional cost to the Owner.

§ 3.2.2.7 Before ordering any materials or doing any Work, the Contractor and each Subcontractor shall verify all existing conditions and measurements. Any differences, which may be found, between actual measurements and dimensions indicated on the Drawings shall be submitted to the Architect for resolution before proceeding with the Work. No extra compensation will be allowed for such discrepancies.

§ 3.2.2.8 If the Contractor performs any construction activity which involves a recognized error, inconsistency or omission in the Contract Documents without first providing notice to the Owner, Architect and Construction Manager of such condition and receiving authorization to proceed, the Contractor shall assume responsibility for such performance and shall bear an appropriate amount of the attributable costs for correction.

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

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

§ 3.2.5 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Construction Manager and Architect for evaluating and responding to the Contractor's requests for information that are not prepared in accordance with the Contract Documents or where the requested information is available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation.

§ 3.2.6 Where existing conditions are obscured or concealed from the Owner or Architect's view prior to the start of this Project's construction activities, portrayal of such conditions in the documents is based on reasonable implications and assumptions. The Owner and Architect do not imply or guarantee to the Contractor in any way that such portrayals in the Documents are accurate or true.

§ 3.2.6.1 If the Contractor, during the progress of the work, discovers any discrepancies between the Drawings and the Specifications, errors and/or omissions on the Drawings, or any discrepancies between physical condition of the work and the Drawings, he shall immediately notify the Architect in writing who shall promptly adjust same. Whether or not an error is believed to exist, deviations from the Drawings and dimensions given thereon shall be made only after approval in writing is obtained from the Architect. Any work performed after such discovery without the approval of the Architect shall be at the Contractor's risk and expense.

§ 3.2.6.2 The Contractor may submit requests for information to the Architect to help facilitate the Contractor's performance of the contract. Prior to submitting each request for information, the Contractor shall first carefully study and compare the Contract Documents, field conditions, other Owner provided information, Contractor prepared Coordination Drawings, and prior Project correspondence and documentation to determine that the information to be requested is not reasonably obtainable from such sources.

§ 3.2.6.3 Each request for information shall be submitted to the Architect, in writing, with a copy to the Construction Manager. Each request for information shall identify the specific sources which were reviewed by the Contractor in an effort to determine the information requested, and a statement to the effect that the information being requested could not be determined from such sources.

§ 3.2.6.4 The Contractor shall submit each request for information sufficiently in advance of the date by which such information is requested in order to allow the Architect sufficient time, in the Architect's professional judgment, to permit adequate review and response and to permit Contractor compliance with the latest Construction Schedule.

§ 3.2.6.5 The Contractor shall reimburse the Owner amounts charged to the Owner by the Architect or Construction Manager for responding to Contractor requests for information where such information is available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner provided information.

§ 3.2.7 Whenever the Drawings show existing or other construction not required as part of the Contract Work, it is understood that it is so shown as a matter of information and that the Owner, while believing such information to be substantially correct, assumes no responsibility thereof. The Contractor shall become familiar with all conditions affecting the nature and manner of conducting the Work.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract, subject to overall coordination of the Project by the Construction Manager. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences, or procedures may not be safe, the Contractor shall give timely written notice to the Owner, the Construction Manager, and the Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. The Construction Manager shall review the proposed alternative for sequencing, constructability, and coordination impacts on the other Contractors. Architect and Construction Manager shall advise Contractor in writing if Contractor's proposed alternative is acceptable as referenced above, in which case the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.1.1 The Contractor shall be responsible for and coordinate any and all inspections required by any governmental body having jurisdiction over the project. Failure to obtain any permits, licenses or other approvals because of the failure of the Contractor to conform to this requirement shall not extend the Contract time, and the Contractor shall not be entitled to any increase in the Contract Sum therefor. In addition, any additional costs and/or expenses of any nature incurred by the Owner as a result of the Contractor's failure to conform to this requirement shall constitute a charge against the Contractor's Contract.

§ 3.3.1.2 Coordination: Each Contractor shall be fully responsible for the coordination of the relationship of the Work of its Subcontractors and other Contractors and shall cross check all of its Instructions, Specifications, Drawings, Shop Drawings, Instruments of Service and installations with those of other Contractors and with existing conditions.

- .1** The General Construction Contractor shall Furnish and erect all necessary batter boards, establish all lines and levels and connection therewith, and run all subsequent lines and levels as the work progresses in order to assure careful and accurate work true to the proper lines in accordance with the Contract Documents. Any batter boards, monuments, or marks of reference, which may for any reason become disturbed or destroyed, whether such displacement or destruction is caused by carelessness, accident, or by the elements, shall at all times, be promptly and accurately re-established by the General Construction Contractor.
- .2** The General Construction Contractor shall establish finished floor elevations and finished grade lines for the building for all trades when requested to do so; and shall establish center lines of all interior partitions on floor forms before concrete is placed in order that Mechanical/Electrical Contractors will be able to place sleeves, etc., in proper locations.
- .3** Each Contractor shall be required to establish centerlines, elevations and location of its Work when it is required for other Contractors to coordinate location of their work.

§ 3.3.1.3 The Contractor shall:

- .1 Review all specified construction or installation procedures, including those recommended by manufacturers,
- .2 Advise the Architect:
 - If the specified procedure deviates from good construction practice,
 - If following the procedure will affect any warranties, including the Contractor's general warranty,
 - Or of any objections the Contractor may have to the procedure; and
 - Propose any alternative procedure, which the Contractor will warrant.

§ 3.3.1.4 Preconstruction Meetings: Prior to commencing the Work and before commencing certain portions of the Work, Contractors and their Subcontractors shall be required to participate in preconstruction meetings when deemed necessary by the Architect to coordinate Work between trades or to address concerns of the Owner.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors. Contractor shall provide all on-site workers and the workers shall wear and prominently display a photo-identification badge at all times for identification and security purposes along with proof of their OSHA 10-hour training certification with their badge.

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

§ 3.3.4 Shut Downs: Such Work as connections to existing sewers, plumbing, heating and electric systems, shall be done at a time agreeable to the Owner and the Architect, and shall be determined and agreed to well in advance of the actual doing of such Work so as to interfere as little as possible with the operation and use of existing facilities. Shut downs must be coordinated through the designated representative of the Owner. The continued uninterrupted operation of all facilities of the building is essential.

- .1 If any existing facilities must be interrupted, the Contractor for the Work shall provide all necessary temporary facilities and connections necessary for maintaining these existing facilities at no increase in Contract price except as otherwise specified.
- .2 No mechanical, heating, plumbing, sprinkler or electric services shall be interrupted at any time, except as approved in advance by the Owner. All communication systems must be maintained without interruption. As much related Work as possible shall be performed prior to shut-downs, so as to minimize the period of shut-down.
- .3 All material and manpower to do the Work involved shall be at the job prior to interruption of services.

§ 3.3.5 The Contractor, its employees and subcontractors shall be subject to such rules and regulations for the conduct of the Work as the Owner may establish. The Contractor shall be responsible for the enforcement of same among his or her employees and those of its Subcontractors.

§ 3.3.6 Where equipment, lines of piping and/or conduit are shown diagrammatically, the Contractor shall be responsible for the coordination and orderly arrangement of the various lines of exposed piping and conduit included in the Work of the Contract. Contractor shall coordinate the Work of several Subcontractors and prevent all interferences between equipment, lines of piping, architectural features, and avoid any unsightly arrangements in the exposed Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

(Paragraph deleted)

§ 3.4.2 After the Contract has been executed, the Architect in conjunction with the Construction Manager, will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in the Specifications. Substitutions shall satisfy the following conditions:

1. The materials, products and equipment described in the Contract Documents establish the standard of required quality, function, dimension and appearance expected.
2. Requests for substitutions must be submitted prior to, and acceptance provided by Architect prior to, time that bids are received (see below for post-bid substitution requests).
3. Substitution requests will be considered only if standards are met or exceeded as described above and are subsequently approved by the Architect and Owner.
4. Each such request shall include the name of the material, product or equipment item for which substitution is requested and a complete description of the proposed substitute, including drawings, cuts, performance and test data and any other information necessary for a complete evaluation.
5. Each such request shall include a statement setting forth any changes in other materials, product or equipment or other work that incorporation of the substitution would require.
6. The burden of proof of the merit of the proposed substitution is upon the proposer.
7. The Architect's decision of approval or disapproval of a proposed substitution shall be final and will be set forth in writing.
8. Additional substitution requests, during construction, will be considered only if substitution is caused by specific material, product or equipment's subsequent removal from, or unavailability in the marketplace, and only if the substitution(s) complies with the requirements Herein and each is at "no change" or "credit" to Contract amount.
9. Contractor's Responsibilities: If any of the following conditions occur due to substitutions, the contractor making the substitution shall bear the cost of such conditions, including payment for services rendered by the Architect and/or Construction Manager:
 - (a) Redesign required for any of the Work.
 - (b) Material or quantity changes for any of the Work.
 - (c) Delays in any of the Work.
 - (d) Request for information generated due to substitutions.

§ 3.4.2.1 In the event that Contractor wants to make a substitution and Architect requires additional compensation to evaluate same, Contractor agrees to have the cost of a reasonable Architect's fee (for this additional service) deducted from its Contract Sum. By proposing a substitution, the Contractor is deemed to represent and warrant to the Owner that the proposed substitution is appropriate for the purposes for which the Contractor proposes its use. Substitutions may be rejected by the Owner for any reason or for no reason, without explanation.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them. There shall be no harassment of any kind by Contractor's employees or other persons carrying out the Work, including but not limited to sexual, ethnic, or religious harassment. If the Owner determines and notifies the Contractor that an employee or other person carrying out the Work is not acceptable within the meaning of this Article, Contractor shall remove the employee or other person from each project site within 24 hours.

§ 3.4.4 The Contractor shall comply with the most current Contract Requirements and Prevailing Wage Rate Schedules as published by the Bureau of Public Works, State of New York, Department of Labor established for this Project.

§ 3.4.4.1 The Contractor shall provide the labor necessary to install its work within the terms of this Contract. The Owner assumes no responsibility for any expense due to so-called "overtime."

§ 3.4.5 On receipt of signed Contract, the Prime Contractor will be expected to place firm orders with vendors for needed materials, including Subcontractors and major material suppliers. If deemed necessary to assure delivery of materials at times needed, Contractor may accept delivery of such materials at any time, and may include the cost of such materials in its next monthly application for payment, provided such materials have actually been delivered to Contractor and properly stored by him with approval or under direction of the Architect and Construction Manager either at the job site or in an approved storage shed or warehouse, as provided elsewhere in these General Conditions. No materials or supplies for the Work shall be purchased by the Contractor or by any subcontractor subject to any

chattel mortgage or under a conditional sale or other agreement by which an interest is retained by the seller. The Contractor warrants that he has full title to all materials and supplies used by him in the Work, or resold to the Owner, Pursuant to this Contract Document, free from all liens, claims or encumbrances.

§ 3.4.6 All materials used permanently in the Work shall be new unless otherwise specified. The apparent silence of the Specifications as to any detail described concerning any Work to be done and materials to be Furnished shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the first quality are to be used, and all interpretations of the Specifications shall be made on this basis. All material incorporated in the Work shall be clean and exhibit no appearance of aging, exposure to weather, prior use, handling or damage of any kind.

§ 3.4.6.1 All Work shall be executed in a thorough, substantial, workmanlike manner, in complete accordance with the manufacturer's most recent written recommendations unless otherwise specified or permitted by the Architect. A sufficient force of competent workmen, foremen, and superintendents shall be employed at all times to permit the Work to be pursued with diligence until completion.

§ 3.4.7 Manufacturer's identifications shall be inconspicuous, but where nameplates contain information relative to characteristics or maintenance, they shall be clearly visible and located for easy access.

§ 3.4.8 Equipment intended for permanent installation shall not be operated for temporary purposes without the written permission of the Architect.

§ 3.4.9 Materials shall be delivered in manufacturer's original sealed containers, with complete identification of contents and manufacturer, and kept sealed in original containers until used. Labels shall not be removed until materials have been installed and inspected.

§ 3.4.10 Whenever the Contract Documents require delivery by the Contractor of any materials, equipment or other items, the term delivery shall be deemed to include unloading and storing with proper protection where directed.

§ 3.4.11 Materials shall be applied or installed under proper climactic conditions, not when they may be affected by temperature, moisture, humidity or dust.

§ 3.4.12 As defined by Federal and State Laws, no materials incorporated into the Project Work shall contain asbestos. Material shall be "asbestos-free" containing zero percent (0%) asbestos. The Architect reserves the right to request certification from the material manufacturer through the Contractor for certification that materials installed contain zero percent (0%) asbestos.

§ 3.4.13 Equivalent Products: Except as otherwise specified, whenever a material, article or piece of equipment is identified on the Drawings or in the Specifications by reference to manufacturer's or vendors' names, trade names, catalog numbers, or the like, it is so identified for the purpose of establishing a standard, and any material, article, or piece of equipment of other manufacturers' or vendors which will perform adequately the duties imposed by the general design may be considered equally acceptable provided the material, article, or piece of equipment so proposed is, in the opinion of the Architect, of equal substance, appearance, size, function and performance. Such proposed product shall not be purchased or installed until approved by the Architect.

- .1 The Architect will be allowed a reasonable time within which to evaluate each proposed substitution. The Architect will be the sole judge of equivalence, and no substitution shall be ordered, installed or utilized without the Architect's review process having been completed and the product accepted by written notification.
- .2 Owner may require Contractor to furnish at the Contractor's expense a special performance guarantee or other surety with respect to any substitution.
- .3 The Architect will record time required by the Architect and the Architect's Consultants in evaluating substitutions proposed by the Contractor and in making changes in the Contract Documents occasioned thereby. Whether or not the Architect accepts a proposed substitution, Contractor shall reimburse the Owner for the charges of the Architect, and the Architect's Consultants for evaluating each proposed substitution.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner, Construction Manager, and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements, including substitutions not properly approved and authorized, shall be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Construction Manager or Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. Contractor shall perform the Work in strict accordance with the Contract Documents and best industry practices. All materials are to be new, unless specified otherwise. Contractor, at its expense, shall remove and replace materials not meeting specifications or materials failing to perform as represented or warranted by the manufacturer, regardless of whether incorporated into the Work. Contractor shall promptly replace or correct any work or materials which Owner, Construction Manager or Architect shall reject as failing to conform to the requirements of the Contract Documents. The foregoing warranty obligations are not limited by the provisions of Article 12, and are in addition to and not in limitation of any other warranty set forth in the Contract Documents or otherwise prescribed by law.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.5.3 Neither final payment, nor provision in Contract Documents, nor partial or entire occupancy of premises by Owner shall constitute an acceptance of Work not done in accordance with Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship.

§ 3.5.4 The Contractor shall warrant all materials and operating systems to be free from any defects and faulty equipment for a period of one (1) year from the date the Architect recommends final payment, or where the performance of materials, system or equipment is documented, from the date that such materials, systems, or equipment perform satisfactorily, whichever date is later. The Performance and Payment bonds shall remain in full force and effect through the guarantee period.

§ 3.5.5 In emergencies occurring during the guarantee period, the Owner may correct any defect immediately and charge the cost to the Contractor. The Owner shall at once notify the Contractor, who may take over the Work and make any corrections remaining after his or her forces arrive at the Work. Any repair work not started within seven days following notice to the Contractor of any defect shall be considered an emergency.

§ 3.5.6 The Contractor shall obtain and furnish to the Architect written Manufacturer's Warranties in the name of the Owner for all major materials and for all equipment. The terms of the warranty shall be as individually specified for the item. If no term is specified, the term shall be for a minimum of one year.

§ 3.6 Exempt From Sales Tax

§ 3.6.1 Owner represents that it is an organization operated for purposes that make it exempt from New York Sales and Compensating Use Tax pursuant to Section 1115(a) (15) of the tax law, as amended by laws of New York 1974, CH. 513 and 514. The Contractor is advised that the Owner is exempt from payment of all State and Local sales and compensating use taxes of the State of New York, cities and counties on the purchase of all materials and supplies incorporated in and becoming an integral component part of the structures, buildings or real property, pursuant to the provisions of this Contract. Such taxes are not to be included in the Contract price, bid or costs to be reimbursed, as the case may be. This exemption does not, however, apply to tools, machinery, equipment or other property leased by or to the Contractor or a subcontractor or to supplies and materials which, even though they are consumed in the performance of the Contract, are not incorporated into the completed permanent work, and the Contractor and his or her subcontractors shall be responsible for and pay any and all applicable taxes, including sales and compensating use taxes, on such leased tools, machinery, equipment or other property upon all such unincorporated supplies and materials. Owner shall deliver to Contractor the appropriate exemption certificate required to be supplied by the Owner and Contractor and his or her subcontractors and material men shall be solely responsible for obtaining or delivering any and all exemption or other certificates and for furnishing a Contractor Exempt Purchase Certificate or other appropriate certificates to all persons, firms, or corporations from whom they purchase supplies, materials, and equipment for the

performance of the Work.

§ 3.6.2 Except as otherwise specified, all Federal, State and Local taxes are to be included in the Contract price.

§ 3.6.3 Assessments and Taxes on Wages: Each Contractor shall pay and include in his or her proposal all costs and liabilities for the amounts assessed, or which may be assessed by the Federal, State and local governments under any and all Acts or Laws upon the wages and salaries paid or to be paid all employees of the Contractor and his or her subcontractors under this Contract.

§ 3.7 Permits, Fees, Notices, and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Owner, assisted by the Architect and Construction Manager, shall secure and pay for the State Education Department building permit. The Contractor shall secure and pay for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work , including but not limited to all infectious disease exposure precautions. If the Contractor fails to give such notices as applicable to the performance of the Work, the Contractor shall be liable for and shall indemnify and hold harmless the Owner against any and all resulting fines, penalties, judgments or damages, including reasonable attorney fees, imposed on or incurred by the parties indemnified, as a result of such failure by the Contractor.

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

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide written notice to the Owner, Construction Manager, and the Architect before conditions are disturbed or affected work is performed, and in no event later than 7 days after first observance of the conditions. The Architect and Construction Manager will promptly investigate such conditions and, if the Architect, in consultation with the Construction Manager, determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect, in consultation with the Construction Manager, determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner, Construction Manager, and Contractor in writing, stating the reasons. If the Owner or Contractor disputes the Architect's determination or recommendation, either party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner, Construction Manager, and Architect. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15. No adjustment in the Contract Time or Contract Sum will be permitted, however, in connection with a concealed or unknown condition that does not differ materially from those conditions disclosed or that reasonably should have been disclosed by the Contractor's (1) prior inspections, test, and reviews, or (2) inspections, tests, and reviews the Contractor had the opportunity to make or should have performed in connection with the Project.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct.

§ 3.8.2 Contract Sum Permitted Allowance costs shall include the direct cost to the Contractor and Subcontractor for labor, materials and equipment, including delivery, unloading, storage, handling and installation. Allowance costs do not include the Contractor's *(Paragraph deleted)* overhead and profit, including the costs of bonds, insurance, administration and supervision, which costs should be carried as part of the Contract Sum.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent Superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work, and shall attend all Project meetings, whether held prior to or after Substantial Completion of the Work. The Superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor. The Contractor shall delegate to the Superintendent decision making authority to facilitate coordination of multiple contractors and coordination of the Work.

§ 3.9.2 Prior to starting the Work, the Contractor shall designate a Project Manager, a non-working on-site Superintendent, and other key individuals who shall be assigned to the Project through and including final completion. Such designations shall be in writing and provided to the Architect and Owner. The Superintendent shall be in attendance at the Project site throughout the Work, remain on the Project site not less than eight hours per day, five days per week, until termination of the Contract, unless the job is suspended, Work is stopped by the Owner, or no Work is scheduled. The Superintendent shall be approved by the Owner in its sole discretion. Said representatives shall be qualified in the type of work to be undertaken and shall not be changed during the course of construction without the prior written consent of the Owner. Should a representative leave the Contractor's employ, the Contractor shall promptly designate a new representative. The Owner shall have the right, at any time, to direct a change in the Contractor's representatives if their performance is unsatisfactory. In the event of such a demand, the Contractor shall within three days after notification thereof, replace said individual(s) with an individual(s) satisfactory to Owner, in Owner's sole discretion. If said replacement is disapproved, the Contractor may, at Owner's option, be terminated for cause. The Owner shall have no obligation to direct or monitor the Contractor's employees. All references Herein to the Superintendent shall be taken to mean the Contractor's superintending staff. Each Subcontractor shall designate a Project Manager, Superintendent, and other key individuals who shall be assigned to the Project.

§ 3.9.3 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect, through the Construction Manager, of the name and qualifications of a proposed Superintendent. Within 14 days of receipt of the information, the Construction Manager may notify the Contractor, stating whether the Owner, the Construction Manager, or the Architect (1) has reasonable objection to the proposed Superintendent or (2) require additional time for review. Failure of the Construction Manager to provide notice within the 14-day period shall constitute notice of no reasonable objection. The Contractor shall not change the Superintendent without prior written notice to the Architect and Owner at least thirty (30) days prior to the proposed date of the change.

§ 3.9.4 The Contractor shall not employ a proposed Superintendent to whom the Owner, Construction Manager, or Architect has made reasonable and timely objection. The Contractor shall not change the Superintendent without the Owner's written consent.

§ 3.9.5 The Contractor shall not reduce or terminate supervision of the Work, nor change the Superintendent without the prior written approval of the Owner and Architect.

§ 3.9.6 If, for any reason, the Contractor takes an action resulting in any of the changes noted in Section 3.9.5, the Owner or their Agent may take remedial action to ensure continued progress of the Work, including the hiring of suitable supervisory personnel, and charge the Contractor all costs associated with these remedial actions including the costs of legal, and Architectural services.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information, and the Construction Manager's use in developing the Project schedule, a Contractor's construction schedule for the Work in electronic format with predecessor logic. The schedule shall contain detail appropriate for the

Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project. The Contractor shall cooperate with the Construction Manager in scheduling and performing the Contractor's Work to avoid conflict with, and as to cause no delay in, the work or activities of other Contractors, or the construction or operations of the Owner's own forces or Separate Contractors. Failure by a Contractor to furnish any required schedule or schedule revision in a timely manner shall entitle the Construction Manager to prepare a schedule for that Contractor's Work, to which said Contractor shall be bound.

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

§ 3.10.3 The Contractor shall participate with other Contractors, the Construction Manager, and the Owner in reviewing and coordinating all schedules for incorporation into the Project schedule that is prepared by the Construction Manager. The Contractor shall make revisions to the construction schedule and submittal schedule as deemed necessary by the Construction Manager to conform to the Project schedule.

§ 3.10.4 The Contractor shall perform the Work in accordance with the most recent schedules submitted to the Owner, Construction Manager, and Architect, and incorporated into the approved Project schedule.

§ 3.10.5 Procedure and Schedule of Work:

- .1 Unless otherwise stated the Work on the entire project shall be performed continuously without interruption, so that all Work can be completed in the time set forth in the Contract Documents.
- .2 The Contractor shall cooperate with the Owner, and the sequence of operation shall be scheduled with the Owner so as to interfere as little as possible with the Owner's use of existing site and existing structures and the Owner's approval shall be obtained prior to the starting of such operations.
- .3 Time of Completion: All Work shall be completed on or before the date set forth in the Agreement, except as otherwise specified or modified by Change Order.
- .4 Job Meetings: During the course of construction, job meetings will be held with representatives of the Owner, the Architect and Engineers, the Construction Manager and the Contractors to discuss the progress of the Work, any problems of construction, timing or procedure, so as to expedite all phases of the Work to completion. Contractors and Subcontractors are to be represented at such meetings.
- .5 Overtime Work: Each Contractor shall take into account the possible need for overtime work in order to meet the Contract Completion Date and shall include the costs associated with said overtime work in their Contract Sum.

§ 3.10.6 Project Scheduling

- .1 After the Contractor has received from the Owner a notice to proceed or a letter of intent, a preconstruction conference will be held. The procedures and scheduling of the Work will be discussed.
- .2 At the preconstruction conference, using the Project Schedule in Contract Documents, each Contractor shall submit a Construction Schedule to the Construction Manager of its own Work indicating starting dates and estimated completion dates of each phase of the Work and indicating information described in Contract (General, Supplementary and other conditions) "Submittals", using the time of completion set forth in the Contract Documents. The Project Schedule submitted by each Contractor shall be in electronic format with predecessor logic and durations specified for each of the Work activities set forth on the

Schedule of Values.

.3 Procedures and requirements described in Section 3.10 of this General Conditions on "Submittals" shall be followed by all Contractors and the Architect to develop a Project Schedule.

.4 Once a Project Schedule is published by the Architect and approved by the Owner, it shall be strictly enforced until the Project is completed, unless it becomes necessary to revise it by an appropriate modification.

Upon issuance of the approved Project Schedule, each Contractor shall be responsible for interfacing and/or integrating its Work with that of other Contractors and the Owner and for completing its Work in the allotted time.

In the event that the Contractors do not create and/or agree on an integrated Project Schedule, the Contractors will abide by the Project schedule previously developed by the Architect and contained in the bid documents.

.5 NO PAYMENTS will be made on any of the Contracts until the scheduling procedures in this Section 3.10.6 have been completed.

§ 3.10.7 Continuing Performance and Schedule Adjustments

.1 In the event the Owner and Architect determine that performance of the Work has not progressed to the level of completion required by the Project Schedule the Owner shall have the right to order the Contractor to take corrective action necessary to expedite the progress of construction including without limitation overtime work, additional work shifts, supplying additional manpower or equipment as well as other extraordinary measures. Such extraordinary measures shall continue until the progress of the Work conforms to milestone dates set forth in the Project Schedule.

.2 The Contractor shall not be entitled to additional compensation in connection with such extraordinary measures required by the Owner except when Work progress has been delayed by events such as labor strikes or natural catastrophes. The Owner reserves the right to withhold payments due under the Contract Documents until the Contractor submits a Project Schedule Recovery Plan including a daily work schedule to complete all Work in compliance with the Project Schedule. The Contractor shall be responsible for all costs of preparing and performing the Work identified in the Project Schedule Recovery Plan.

.3 The Owner shall have the right to direct the Contractor to delay, postpone or reschedule any portion of the Work that may interfere with or disrupt the operations of the Owner.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Construction Manager, Architect, and Owner, and delivered to the Construction Manager for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data, and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work. Each submittal shall bear written confirmation that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of the submittal. Reproducing Architect's construction drawing is not acceptable for shop drawing submittals.

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

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect and Construction Manager is subject to the limitations of Sections 4.2.10 through 4.2.12.

Informational submittals upon which the Construction Manager and Architect are not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Construction Manager or Architect without action.

§3.12.4.1 The Contractor represents and warrants that all Shop drawings shall be prepared by a person or entity possessing expertise and experience in the trade for which the shop drawing has been prepared and, if required by the Contract Documents or law, by a licensed professional engineer.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, indicate review and approval in writing, and submit to the Construction Manager, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the Project submittal schedule approved by the Construction Manager and Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of other Contractors, Separate Contractors, or the Owner's own forces. The Contractor shall cooperate with the Construction Manager in the coordination of the Contractor's Shop Drawings, Product Data, Samples, and similar submittals with related documents submitted by other Contractors. No extension of time will be granted to the Contractor because of failure to have Shop Drawings, product data, and samples submitted in ample time to allow for review by the Architect or their Consultants.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner, Construction Manager, and Architect, that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 Work performed without approved Shop Drawings, product data, samples or similar submittals as required by the Specifications is subject to all comments and conditions of approval regardless of Work progress. Completed work must be in accordance with all comments and conditions of approval regardless of Work progress. Any portion of the Work performed prior to review and approval by the Architect of required Shop Drawings, Product Data, Samples, or other Submittals, is performed at Contractor's risk. No Contract adjustments will be made to correct or modify Work installed without approval.

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

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

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon

the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed, or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner, the Architect, and the Construction Manager shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Construction Manager shall review submittals for sequencing, constructability, and coordination impacts on other Contractors.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Construction Manager and Architect at the time and in the form specified by the Architect.

§ 3.12.10.3 If it is the position of the Contractor, or his or her licensed design professional, that the Owner and Architect have not provided all performance and design criteria, the Contractor shall request additional criteria in writing before proceeding with the professional services described in 3.12.10. Proceeding with the professional services shall be evidence that the Owner and Architect have provided all necessary performance and design criteria.

§ 3.13 Use of Site

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

§ 3.13.1.1 Use of Buildings and Site:

- .1 Each Contractor shall cooperate with the Owner in making available for the Owner's use, areas of the completed or partially completed building(s) or site as provided for in Article 9, Section 9.9. The Owner shall have the right to take possession of and to use any completed or partially completed portions of the building or site even though the time of completing the entire Work or such portion of the Work may not have expired. Such use shall not constitute acceptance thereof. Such occupancy shall in no way abrogate any specified warranties or guaranties for materials, workmanship or operation of equipment pertaining to the occupied portions.
- .2 Each Contractor shall cooperate with the Owner in making available for the Owner's use such building services as heating, ventilating, cooling, water, lighting and telephone for the space or spaces to be occupied, and if the equipment required to furnish such services is not entirely completed at the time the Owner desires to occupy the aforesaid space or spaces, the Contractor shall make every reasonable effort to complete such part of its Work as soon as possible to the extent that the necessary equipment can be put into operation and use.
- .3 Mutually acceptable arrangements shall be made as to the warranties or guaranties affecting all Work associated therewith.
- .4 Such occupancy or use shall not commence prior to a time mutually agreed to by the Owner and Contractor and to which the insurance company or companies providing the property insurance have consented by endorsement to the policy or policies. Such occupancy shall be documented with an appropriately executed Certificate of Substantial Completion.

§ 3.13.2 The Contractor shall coordinate the Contractor's operations with, and secure the approval of, the Construction Manager before using any portion of the site.

§ 3.14 Cutting and Patching

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

§ 3.14.1.1 The word "new" used Herein shall mean Work which has been or is to be installed under the terms of Contract for this project. The word "existing" used Herein shall mean existing conditions previous to the award of a Contract for this project.

§ 3.14.1.2 In order to eliminate cutting and patching as much as possible, each Contractor shall, during the progress of the Work Furnish to the General Construction Contractor who shall then install them, proper sleeves, inserts, etc. as required for his or her new Work and shall give proper and detailed instructions to others where Work may be affected by their Work, with adequate notice prior to the erection of new Work. Cutting and patching Work as required to install new work or remove existing Work shall be done carefully and neatly with as little damage as possible

§ 3.14.1.3 Unless otherwise specified in the Contract (General, Supplementary and other conditions, or the plans and specifications) each Contractor is responsible for their own cutting, removals and patching required for the proper installation or execution of their Work, as defined in the Specifications. Core drilling remains the responsibility of each Contractor.

§ 3.14.1.4 Any costs caused by defective or ill-timed Work shall be borne by the Contractor responsible, therefore. Any Contractor who is required to cut and patch his or her new Work to provide conditions for other Contractors to complete their new Work and who was not given adequate prior notice of the conditions required for completion of such Work before doing his or her work, shall charge the Contractor in default the documented cost of the cutting and patching Work plus 15% for overhead and profit unless otherwise specified.

§ 3.14.1.5 Cutting and patching of any Work shall be made in such a manner as to not breach any provisions of any guarantee or warranty on existing work left in place or guaranty or warranty required for his or her new Work. Patching of Work shall match existing adjacent surfaces and patchwork shall be disguised completely to hide any trace of patching.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner, Separate Contractors, or of other Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner, Separate Contractors, or by other Contractors except with written consent of the Construction Manager, Owner, and such other Contractors or Separate Contractors. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Separate Contractors, other Contractors, or the Owner, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project. If the Contractor fails to clean up as provided in the Contract Documents, the Owner, or Construction Manager with the Owner's approval, may do so and the Owner shall be entitled to reimbursement from the Contractor.

(Paragraph deleted)

§ 3.15.2 All debris required to be removed from the Project shall be removed in accordance with all applicable rules, regulations and statutes, which may pertain thereto & in accordance with the authority having jurisdiction. The Contractor shall warrant that all debris shall be disposed of in accordance with all rules, regulations and statutes applicable thereto and at a facility permitted and authorized to receive materials of the type and nature so removed from the premises. The Contractor shall hold the Owner free and harmless of, from or concerning any claimed liability resulting from the improper or unlawful removal and/or disposal of such debris. Contractors are encouraged to recycle as much material as is practical.

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner, Construction Manager, and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner, Architect, or Construction Manager. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect through the Construction Manager.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Construction Manager, Architect, and their respective directors, trustees, officers, employees, agents, consultants, interim administrators, authorized volunteers and committee members, students, teachers, auxiliary instructors, and members of the Board of Education (collectively "Indemnitees") from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, when such claim, damage, loss or expense is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself, and including loss of use), but only to the extent caused, in whole or part, by the acts or omissions, or other culpable conduct, of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by an Indemnitee. The Contractor agrees to include the following indemnity provision in each and every contract it enters into with a subcontractor, and to require that subcontractor to include such provision in each contract it enters into with any lower tier subcontractor: To the fullest extent permitted by law, Subcontractor shall indemnify and hold harmless the Contractor, Owner, Construction Manager, Architect, and each of their respective representatives, employees, directors, officers, consultants and agents, from and against any and all claims, suits, actions, debts, damages, fines, penalties, costs, charges and expenses, including attorneys' fees and court costs, arising out of, relating to or resulting from the performance of this Subcontract, including, but not limited to, bodily injury and/or property damage, to the extent caused, in whole or in part, by acts, actions, omissions, fault or breach of the Subcontractor, its employees, agents, subcontractors, suppliers and/or materialmen, regardless of whether or not such claim is caused in part by a party indemnified hereunder.

§ 3.18.1.1 To the maximum extent permitted by law, the Contractor hereby assumes the entire responsibility and liability for any and all damage (liquidated, direct or consequential) and injury (including death), disease or sickness of any kind or nature whatsoever, to all persons, whether or not employees of the Contractor, and to all property and business or businesses, caused by, resulting from, arising out of, or occurring in connection with:

- a. the Work;
- b. the performance or intended performance of the Work;
- c. the performance or failure to perform the Contract;
- d. the failure to complete the Work by the date set for Substantial Completion;
- e. any occurrence which happens in or about the area where the Work is being performed by the Contractor, either directly or through a Subcontractor, or while any of Contractor's property, equipment or personnel is in or about such area; or
- f. New York State Labor Law, Article 10, including without limitation sections 240, 241, 241-a and 241-b, thereof, as amended, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder.

§ 3.18.1.2 Except to the extent, if any, expressly prohibited by law, should any such damage or injury referred to in Section 3.18.1.1 be sustained, suffered, or incurred by Owner, Architect, or Construction Manager, or should any claim for such damage or injury be made or asserted against any of them, whether or not such claim is based upon Owner's, Architect's, or Construction Manager's alleged active or passive negligence or participation in the wrong or upon any alleged breach of any statutory duty or obligation on the part of the Owner, Architect, or Construction Manager, Contractor shall indemnify and hold harmless Owner, Architect, and Construction Manager along with their Board of Education, Administration officers, agents, partners, and employees (hereinafter collectively referred to as

"Indemnitees"), of, from and against any and all other loss, cost, expense, and liability, including without limitation, legal fees and disbursements, that Indemnitees may directly or indirectly sustain, suffer or incur as a result of such damages, injuries and claims; and Contractor agrees to assume, on behalf of any and all Indemnitees the defense (with counsel satisfactory to the party indemnified) of any action at law or in equity, or other legal proceeding, which may be brought against any Indemnitee upon or by reason of such damage, injury or claim and to pay on behalf of every Indemnitee, the amount of any judgment, decree, award, or order that may be entered against each said Indemnitee in any such action or proceeding. In the event that any such claim, loss, cost, expense, liability, damage or injury is sustained, suffered, or incurred by, or is made, asserted or threatened against any Indemnitee, Owner shall, in addition to all other rights and remedies, have the right to withhold from any payments due and to become due to Contractor an amount sufficient in Owner's judgment to protect and indemnify the Indemnitee(s) from and against any and all such claim, loss, cost, expense, liability, damage or injury, including legal fees and disbursements; or Owner, in its discretion, may require Contractor to furnish a surety bond satisfactory to Owner guaranteeing such protection which bond shall be furnished by Contractor within 5 days after written demand has been made therefore. In the event more than one Contractor is connected with an event or occurrence (or series of events or occurrences) covered by this indemnification, then all such Contractors shall be jointly and severally responsible to the Indemnitee, and the ultimate responsibility among such indemnifying Contractors shall be settled or otherwise determined by separate proceedings and without loss, expense or damage to any Indemnitee.

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

§ 3.18.3 In any and all claims against the Owner, the Architect, the Construction Manager, or their agents or employees by third parties, the indemnification obligation under this § 3.18 shall apply and shall not be limited by limitation or amount of or type of damages, compensation, insurance proceeds, or benefits payable by or for the Contractor or Subcontractors.

§ 3.18.4 Contractor shall comply with, and cooperate with, Architect, Construction Manager, and Owner in complying with legal requirements. Among other things, Contractor shall be responsible for performing corrective work within any abatement periods prescribed by governmental entities including but not limited to OSHA, appealing from decisions or orders, requesting extensions on abatement periods, and furnishing such information or evidentiary material as may be necessary or as may be requested by Architect, Construction Manager, or Owner to fully protect the rights and interests of Owner, Architect, and Construction Manager with respect to possible, threatened or pending proceedings or orders.

§ 3.18.5 Natale Patent Rights. With respect to any Contractor performing asbestos abatement as part of its Scope of Work.

- .1 Contractor shall hold a valid current license to perform Work using the negative pressure system covered by the Natale Patent or provide and Indemnity Agreement as follows:
- .2 Indemnity Agreement: Contractor and Contractor's surety agree to protect, indemnify and hold harmless the Owner, the Architect, and the Board of Education, Administration directors, officers, agents, employees, and assigns of the Architect from any and all claims, judgments, liabilities, expenses, attorney fees, court costs, or losses of any nature, resulting from claims of patent right infringement including but not limited to U.S. Patent Number 4,604,111, commonly known as the Natale Patent, arising out of the performance of Work on the Project.
 - (a) The provisions of this Indemnity Agreement shall protect the Indemnitees against all claims arising out of the subject matter or performance of this Contract and Contract Documents, including, without limitation, allegations or findings that the Indemnitees, or any of them, were guilty of negligence in the issuance of such Contract.
 - (b) The provisions of this Indemnity Agreement shall be in addition to and shall in no way delete any provisions, including warranty and indemnity provisions of the Agreement.

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

ARTICLE 4 ARCHITECT AND CONSTRUCTION MANAGER

§ 4.1 General

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number. All changes in the work must be processed through the Architect.

§ 4.1.2 The Construction Manager is the firm set forth on page 1 hereof.

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

§ 4.2 Administration of the Contract

§ 4.2.1 The Construction Manager and Architect will provide administration of the Contract as described in the Contract Documents and will be the Owner's representatives during construction until the date the Architect issues the final Certificate for Payment and during the Correction Period described in Article 12. The Construction Manager and Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed or in progress, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. On the basis of the site visits, the Architect will keep the Owner and the Construction Manager reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner and Construction Manager

(1) known deviations from the Contract Documents and from the most recent Project schedule prepared by the Construction Manager, and (2) defects and deficiencies observed in the Work.

§ 4.2.2.1 The Contractor shall reimburse the Owner for compensation paid to the Architect for additional site visits made necessary by the fault, neglect, or request of the Contractor.

§ 4.2.2.2 On the basis of onsite observations and otherwise, the Architect shall keep the Owner informed of the progress of the Work, and will endeavor to guard the Owner against defects and deficiencies in the Work.

§ 4.2.2.3 The Architect will promptly report to the Owner any observed defects or deficiencies of the Work.

§ 4.2.3 The Construction Manager shall provide one or more representatives who shall be in attendance at the Project site whenever the Work is being performed or as otherwise directed by the Owner. The Construction Manager will determine in general if the Work observed is being performed in accordance with the Contract Documents, will keep the Owner and Architect reasonably informed of the progress of the Work, and will promptly report to the Owner and Architect known deviations from the Contract Documents and the most recent Project schedule, and defects and deficiencies observed in the Work.

§ 4.2.4 The Construction Manager will schedule and coordinate the activities of the Contractor and other Contractors in accordance with the latest approved Project schedule.

§ 4.2.5 The Construction Manager, except to the extent required by Section 4.2.4, and Architect will not have control over, or charge of, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1, and neither will be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents except to the extent that any such failure shall be directly attributable to the negligent or wrongful act or omission of the Construction Manager or the Architect. Neither the Construction Manager nor the Architect will have control over or charge of, or be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or of any other persons or entities performing portions of the Work. Nothing contained in this Section 4.2.5 shall limit the duties of the Architect or the Construction Manager to the Owner under any other provision of the Contract Documents. If the Architect or the Construction Manager believes that the Contractor is failing to perform the Work in accordance with the requirements of the Construction Documents, it shall promptly disclose such failure to the Owner in writing.

§ 4.2.6 Communications. The Owner shall communicate with the Contractor and the Construction Manager's consultants through the Construction Manager about matters arising out of or relating to the Contract Documents. The Owner and Construction Manager shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Construction Manager otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with other Contractors shall be through the Construction Manager. Communications by and with the Owner's own forces and Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.7 The Construction Manager and Architect will review and certify all Applications for Payment by the Contractor, in accordance with the provisions of Article 9.

§ 4.2.8 The Architect and Construction Manager have authority and responsibility to reject Work that does not conform to the Contract Documents, and will notify each other about the rejection. The Construction Manager shall determine whether the Work of the Contractor is being performed in accordance with the requirements of the Contract Documents and notify the Owner, Contractor and Architect of defects and deficiencies in the Work. Whenever the Construction Manager considers it necessary or advisable, the Construction Manager will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, upon written authorization of the Owner, whether or not the Work is fabricated, installed or completed. The foregoing authority of the Construction Manager will be subject to the provisions of Sections 4.2.18 through 4.2.20 inclusive, with respect to interpretations and decisions of the Architect. However, neither the Architect's nor the Construction Manager's authority to act under this Section 4.2.8 nor a decision made by either of them in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect or the Construction Manager to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons performing any of the Work.

§ 4.2.9 Utilizing the submittal schedule provided by the Contractor, the Construction Manager shall prepare, and revise as necessary, a Project submittal schedule incorporating information from other Contractors, the Owner, Owner's consultants, Owner's Separate Contractors and vendors, governmental agencies, and participants in the Project under the management of the Construction Manager. The Project submittal schedule and any revisions shall be submitted to the Architect for approval.

§ 4.2.10 The Construction Manager will receive and promptly, in such a manner as to cause no delay in the progress of the Work, review for conformance with the submittal requirements of the Contract Documents, all submittals from the Contractor such as Shop Drawings, Product Data, and Samples. Where there are Multiple Contractors, the Construction Manager will also check and coordinate the information contained within each submittal received from the Contractor and other Multiple Contractors, and transmit to the Architect those recommended for approval. By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Construction Manager represents to the Owner and Architect that the Construction Manager has reviewed and recommended them for approval. The Construction Manager's actions will be taken in accordance with the Project submittal schedule approved by the Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness while allowing sufficient time to permit adequate review by the Architect.

§ 4.2.11 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Upon the Architect's completed review, the Architect shall transmit its submittal review to the Construction Manager.

§ 4.2.11.1 If the Architect is required to review more than two (2) submittals by a Contractor for the reason that the submittal and one (1) re-submittal failed to conform to the information given or the design concept expressed in the Contract Documents, the Contractor shall reimburse the Owner for the amount of compensation paid by the Owner to the Architect for such additional reviews. The Owner shall be entitled to withhold from any payment due the Contractor any such amount due from the Contractor.

§ 4.2.12 Review of the Contractor's submittals by the Construction Manager and Architect is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Construction Manager and Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Construction Manager and Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Construction Manager and Architect, of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.13 The Construction Manager and the Architect will prepare Change Orders and Construction Change Directives as set forth in the agreements between the Owner-Architect and Owner-Construction Manager.

§ 4.2.14 The Construction Manager and the Architect will take appropriate action on Change Orders or Construction Change Directives in accordance with Article 7, and the Architect will have authority to order minor changes in the Work as provided in Section 7.4. The Architect, in consultation with the Construction Manager, will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.15 Utilizing the documents provided by the Contractor, the Construction Manager will maintain at the site for the Owner one copy of all Contract Documents, approved Shop Drawings, Product Data, Samples, and similar required submittals, in good order and marked currently to record all changes and selections made during construction. These will be available to the Architect and the Contractor, and will be delivered to the Owner upon completion of the Project.

§ 4.2.16 The Construction Manager will assist the Architect in conducting inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion in conjunction with the Architect pursuant to Section 9.8; and receive and forward to the Owner written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10. The Construction Manager will forward to the Architect a final Application and Certificate for Payment or final Project Application and Project Certificate for Payment upon the Contractor's compliance with the requirements of the Contract Documents.

§ 4.2.17 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Construction Manager of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.18 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of the Construction Manager, Owner, or Contractor through the Construction Manager. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.19 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations

and decisions, the Architect will endeavor to secure faithful performance by Contractor, and will not be liable for results of interpretations or decisions so rendered in good faith.

§ 4.2.19.1 If Work is described or indicated in a manner which makes it impossible to carry out the requirements of the Contract Documents, or should discrepancies appear among the Contract Documents, the Contractor shall request interpretation before proceeding with the Work. If Contractor fails to make such a request, no excuse will be entertained for failure to carry out the Work of the Contract Documents. Should a conflict occur in or between Contract Documents, the Contractor is deemed to have estimated on the more expensive way of doing the Work.

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

§ 4.2.21 The Construction Manager will receive and review requests for information from the Contractor, and forward each request for information to the Architect, with the Construction Manager's recommendation. The Architect will review and respond in writing, through the Construction Manager, to requests for information about the Contract Documents. The Construction Manager's recommendation and the Architect's response to each request will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

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

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 The Contractor shall not award work to any one Subcontractor in excess of 50 percent of the Contract Sum, without prior written approval of the Owner. Unless otherwise stated in the Contract Documents, the Contractor, within ten (10) calendar days after award of the Contract, shall furnish in writing the Construction Manager, for review by the Owner, Construction Manager and Architect, of the persons or entities proposed for each principal portion of the Work, including those who are to Furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Construction Manager may notify the Contractor whether the Owner, the Construction Manager or the Architect (1) has reasonable objection to any such proposed person or entity or, (2) requires additional time or information for review. Failure of the Construction Manager to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.1.1 Unless otherwise expressly set forth in the Contract Documents, a Subcontractor proposed by a Contractor shall not be acceptable unless the Contractor submits evidence to the Construction Manager with its proposal of the Subcontractor that the proposed Subcontractor has satisfactorily completed similar contracts or subcontracts and has the necessary experience, personnel, equipment, licensing, and financial ability to complete the subcontract in accordance with the Project Schedule. The substitution of a different proposed Subcontractor shall not entitle the Contractor to any upward adjustment in the Contract Sum or the Contract Time.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner, Construction Manager or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection. Contractor shall provide proposed substitute within five (5) days of notice of such reasonable objection.

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

(Paragraph deleted)

§ 5.2.4 Maintenance of the Project Schedule is critical. Contractors shall award subcontracts to entities capable of performing in a manner that will maintain the Project Schedule and require its subcontractors to complete their work in accordance with the Project Schedule.

§ 5.3 Subcontractual Relations

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

§ 5.4 Contingent Assignment of Subcontracts

- § 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that
- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
 - .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor Contractor or other entity.

(Paragraph deleted)

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction with Own Forces and to Award Other Contracts

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When the Owner performs construction or operations with the Owner's own forces or Separate Contractors, the Owner shall provide for coordination of such forces and Separate Contractors with the Work of the Contractor, who shall cooperate with them.

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

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner's own forces, Separate Contractors, Construction Manager and other Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner's own forces, Separate Contractors or other Contractors, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Construction Manager and Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor or other Contractors that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Construction Manager and the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's or other Contractors' completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractors or other Contractors that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs, including costs that are payable to a Separate Contractors or to other Contractors, because of the Contractor's delays, improperly timed activities or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor causes to completed or partially completed construction, or to property of the Owner, Separate Contractors, or other Contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner, Separate Contractors, and other Contractors shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.2.6 Claims and other disputes and matters in question between the Contractor and a Separate Contractor shall be subject to the provisions of Article 15 as amended provided the separate contractor has reciprocal obligations.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, other Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Construction Manager, with notice to the Architect, will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

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

§ 7.1.2.1 See other subsections for Allowance Use provisions and permitted costs for the Allowance Uses.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.1.4 Unit Prices

§ 7.1.4.1 Unit prices shall be submitted in the Bid Form for various items set forth therein.

§ 7.1.4.2 Unit prices set forth shall be used to determine equitable adjustment of the Contract price in connection with additional Work or Work omitted or reduced by the Architect. The Unit Prices quoted shall include all labor, materials, equipment, applicable taxes and shall apply to all Work added or Work deducted.

§ 7.1.4.3 If any one of the unit prices quoted by a Contractor is excessively high in the opinion of the Architect, the

Owner and Architect will have the right to adjust such unit prices to a fair and reasonable amount.

§ 7.1.5 Changes in the Work involving additional Work or deletion of Work whether or not resulting in an addition to or subtraction from the Contract Sum shall not be made until the Contractor submits to the Architect the cost of the added or deleted Work with a complete and detailed listing of all Subcontractors involved, all materials, labor and equipment.

§ 7.1.5.1 Overhead and profit as described in 7.1.7.1 and 7.1.7.2 may be added to the cost of a claim for additional Work *only* when the source of monies for such additional work is not a Contingency Allowance included in the Contract Sum or any other monies for Work included in the Contract Sum.

§ 7.1.5.2 Changes in the Work whether or not involving additions or deductions from the Contract Sum shall not be made until an appropriate Change Order or Change Directive has been issued.

§ 7.1.5.3 Where quoted unit prices are not applicable as set forth in Section 7.1.4 and the extra cost is to be determined under clause 7.3.3.3, the mark-ups (above actual cost) for overhead and profit shall be as specified in Section 7.1.7 and as qualified in 7.1.5.1 above.

§ 7.1.6 Labor costs shall include items incidental to labor such as workmen's compensation insurance, social security, fringe benefits (exclusive of transportation) and all mandatory costs paid in connection with labor.

§ 7.1.7 Overhead shall include insurance other than those incidental to labor mentioned above, premiums on bonds required by the Contract, Contractor's Supervisory employees, home and field office expenses, transportation costs and both manual and power small tools and manual and power small equipment. Material and equipment costs shall be as described in 7.3.4.

§ 7.1.7.1 For Work done by the Contractor's own forces, mark-up for combined overhead and profit on materials and on cost of labor shall be as set forth in Section 7.5 hereof.

§ 7.1.7.2 For Work done by the subcontractors, mark-up of costs as defined Herein by subcontractors for combined overhead and profit on materials and on cost of labor shall be as set forth in Section 7.5 hereof.

§ 7.1.8 Material costs shall be as described in 7.3.4.

§ 7.1.9 To facilitate reviewing quotations for either extra charges or deductions, all proposals shall be accompanied by a complete itemization of costs including labor, materials, subcontracts, and if allowed, mark-ups for overhead and profit. Subcontracts shall be similarly itemized.

§ 7.1.10.1 If requested, the Contractor shall submit detailed quotations from material suppliers.

§ 7.2 Change Orders

A Change Order is a written instrument prepared by the Construction Manager and signed by the Owner, Construction Manager, Architect, and Contractor, stating their agreement upon all of the following:

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

§ 7.2.1 All Change Orders must have the approval of the Owner, Architect, and Construction Manager in writing.

§ 7.2.2 Agreement on any Change Order shall constitute a final settlement of all matters relating to the change in the Work which is the subject of the Change Order, including, but not limited to, all direct and indirect costs associated with such change and any all adjustments to the Contract Sum and the contract time.

§ 7.2.3 Methods used in determining adjustments to the Contract Sum may include these, those listed in Section 7.3 with its subsections and Section 7.5 with its subsections.

§ 7.2.4 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are Subcontracts, they shall be itemized also.

§ 7.3 Construction Change Directives

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

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

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

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Construction Manager shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in Section 7.5. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Construction Manager may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, social security, unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance directly related to the work of the change, and other employee costs approved by the Construction Manager and Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation directly related to the work of the change, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others directly related to the work of the change;
- .4 Actual costs of premiums for all bonds, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change as approved in advance by the Architect and Construction Manager.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

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

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

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Construction Manager and Architect.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Construction Manager and Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Construction Manager and Architect determine to be reasonably justified. The interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Construction Manager and Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Construction Manager shall prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.3.11 Lump sum adjustment described in clause 7.3.3.1 shall be substantiated by submitting evidence of actual costs to the Architect for evaluation for the following:

- .1 Costs described in Section 7.3.4, including labor and other costs of subcontractors, itemized by trades.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Construction Manager and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Construction Manager that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

§ 7.5 OVERHEAD AND PROFIT

§ 7.5.1 The combined overhead and profit included in the total cost of a Change Order or Change Directive to the Owner shall be based on the following schedule:

§ 7.5.1.a Contractor: For Work performed by the Contractor's own forces, markup shall not exceed a total of fifteen percent (15%), of the value of labor and materials (L+M).

- .1 Example: Total Contractor Amount= (L+M) + 15% O&P

§ 7.5.1.b Contractor's Subcontractor(s): For Work performed by the Subcontractor's own forces, markup shall not exceed a total of ten percent (10%) of their value of labor and material (L+M). For the Contractor, for work performed by that Contractor's Subcontractor, markup shall not exceed five percent (5%) for the value of the total Subcontractor value of labor and material (L+M) amount.

- .1 Example: Total Subcontractor Amount= (L+M) + 10% O&P
- .2 Example: Total Contractor Amount= Total Subcontract Amount+ 5% O&P

§ 7.5.1.c Contractor's Subcontractor's Sub-subcontractor(s): For Work performed by the Sub-subcontractor's own forces, markup shall not exceed a total of five percent (5%) of their value of labor and materials (L+M). For the Subcontractor, for work performed by the Sub-subcontractor, markup shall not exceed a total of five percent (5%) of their value of labor and materials (L+M) for work performed by the Sub-subcontractor. For the Subcontractor, markup shall not exceed a total of five percent (5%) of the Sub-subcontractor amount. For the Contractor, markup shall not exceed 5% of the Subcontractor Amount.

- .1 Example: Total Sub-subcontractor Amount= (L+M) + 5% O&P
- .2 Example: Total Subcontractor Amount= Sub-subcontractor Amount+ 5% O&P
- .3 Example: Total Contractor Amount= Subcontractor Amount+ 5% O&P

Prime Contractor's 5% markup on sublet work shall be on the total of labor and material only and shall exclude the Subcontractor's markup.

For each change, for Contractor, Subcontractor or Sub-subcontractor involved, the total aggregate sum mark-up for all contractors shall not exceed 15% of the value of the work.

§ 7.5.2 Performance and Payment Bond premiums Contractor is not entitled to reimbursement of bond premiums for change orders. Following substantial completion Contractor can present documentation of bond premium increase (based on Contractor's final contract value) for consideration and compensation via a change order. Overhead and profit available to Contractor is limited to the amount authorized by Section 7.5.1 of this General Conditions.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

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

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

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 TIME IS OF THE ESSENCE IN THE COMMENCEMENT, PROSECUTION AND COMPLETION OF THE WORK. Contractor shall be responsible for all direct and consequential damages to Owner and Architect arising from the delay of Contractor, and its Subcontractors, in performing or completing the Work in accordance with the time requirements of paragraph 8.2. The indemnity provisions of Articles 3 and 11 are applicable to such damages and to claims arising in respect thereto. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.1.1 Contractor shall cooperate with Owner, Construction Manager, Architect and other Contractors on the Project, making every reasonable effort to reduce the contract time.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

(Paragraph deleted)

§ 8.2.2.1 Contractor shall not commence Work on the site until evidence of insurance and original performance and payment bonds as required in Article 11, have been accepted by the Owner.

§ 8.2.3 Contractor shall do all things necessary to ensure the prosecution of the Work in accordance with any one or more of the following as determined by the Architect and the Owner, in their discretion:

- .1 Project schedules and revisions thereof, given from time to time to Contractor;
- .2 The time requirements for various portions of Work;
- .3 The requirements of the Project including, but not limited to, coordination requirements as may from time to time be known to Contractor; and
- .4 Schedules of the Work provided by Contractor to Architect upon the Owner's request.

§ 8.2.4 Should the progress of the Work and/or other Work be delayed by any fault, neglect, act or failure to act of Contractor or any of its Subcontractors or suppliers so as to cause any additional cost, expense, liability or damage to

Owner, Architect, or Construction Manager, or for which Owner, Architect, or Construction Manager may become liable, Contractor shall hold them harmless from and indemnify them against all such additional cost, expense, liability or damage.

§ 8.2.5 If the Contractor does not achieve Substantial Completion within the Contract Time established in the Agreement between the Owner and the Contractor, or in a subsequent Change Order, the Contractor shall be liable to the Owner for any liquidated, direct and/or consequential damages; for the costs of fees and reimbursements to the Owner's Agents including, but not limited to, the Architect, the Construction Manager, and legal counsel for their services attributable to the Contractor's delay or abandonment. Except as may be prohibited by applicable law, all of Owner's rights and remedies in connection with the Contractor's failure to achieve Substantial Completion within the Contract Time established in the Agreement between the Owner and the Contractor, shall be cumulative and may be exercised singularly or concurrently. Election by Owner to pursue any remedy shall not exclude pursuit of any other remedy.

§ 8.2.6 The Work shall be performed during designated working hours, except that in the event of emergency or when necessary to perform the Work in accordance with the requirements of Section 8.2, Work shall be performed at Contractor's cost and expense on other shifts, overtime, Saturdays, Sundays, Holidays and at other times, if permission to do so has been obtained in writing from Owner. Without limiting the requirements of the preceding sentence, if the progress of the Work or of the Project has been delayed by any fault, neglect, act or failure to act of Contractor or any of its Subcontractors or suppliers, Contractor shall work such overtime, at Contractor's cost and expense as aforesaid, as Architect shall deem necessary or desirable to make up for all time lost and to avoid delay in the completion of the Work and of the Project. The failure by Architect to direct Contractor to engage in such overtime shall not relieve Contractor of the consequences of its delay.

§ 8.2.7 Unless otherwise noted, the date of commencement of the Work is the date established in a notice to proceed. The notice to proceed will be issued immediately upon return of signed documents by the Contractor and the presentation of acceptable insurance certificates. Contractor shall organize construction schedules as specified in Section 3.10, Contractor's Construction Schedules. The commencement date shall not be postponed by the failure to act of the Contractor or of persons or entities for which the Contractor is responsible.

§ 8.2.8 The Architect may direct acceleration of the Work so that it may be performed in advance of the schedules, time requirements and Project requirements described in Section 8.2. If so directed, Contractor shall increase its staff and/or work overtime. Contractor will not be entitled to additional compensation for work performed outside of designated working hours, except as approved by Owner in writing in advance. Provided that Contractor is not in default under the Contract, is meeting the Project Schedule, and Owner has issued the aforesaid authorization, there shall be added to the Contract Sum as actual out-of-pocket amount equal to:

- .1 Additional premiums on wages actually paid, at rates that have been accepted by Architect;
- .2 Taxes imposed by law on such additional wages; and
- .3 Premiums for worker's compensation and liability insurance if required to be paid on such additional wages.

Written authorization for overtime work that exceeds \$500.00 for which Contractor intends to charge the Owner in any one week shall be invalid unless confirmed in writing by the Owner, it being understood that Owner's Site Representative shall not have authority to authorize such overtime which exceeds \$500.00 in any one week.

§ 8.2.9 In no case shall the Contractor delay the progress of the Work or any part thereof on account of changes in the Work or disputes caused by proposed or ordered changes in the Work or any disputes or disagreements as to the equitable value of such changes.

§ 8.2.10 Contractor and Contractor's Surety shall be strictly accountable for completion of the Work in accordance with the Project Schedule as a condition to satisfactory contractual performance.

§ 8.2.11 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the time set in the Project Schedule.

§ 8.3 Delays and Extensions of Time

(Paragraphs deleted)

§ 8.3.1 Should Contractor be obstructed or delayed in the commencement, prosecution or completion of the Work, without fault on its part, by reason of failure to act, direction, order, neglect, delay or default of the Owner or the Architect; by changes in the Work; fire, lightning, earthquake, enemy action, act of God or similar catastrophe; by Government restrictions with respect to materials or labor, or by an industry-wide strike beyond Contractor's reasonable control, then Contractor shall be entitled to an extension of time lost by reason of any and all causes aforesaid, but no claim for extension of time on account of delay shall be allowed unless a claim in writing therefore is presented to Architect with reasonable diligence but in any event not later than fifteen (15) days after the commencement of such claimed delay. Except for the causes specifically listed above in this Section, no other cause or causes of delays shall give rise to an extension of time to perform the Work. The granting of an extension of time is conditioned upon Contractor's timely submission of the aforesaid written notice. Except to the extent, if any, expressly prohibited by law, Contractor expressly agrees not to make, and hereby waives, any claim for damages, including those resulting from increased labor or material cost, on account of any delay, obstruction or hindrance for any cause whatsoever, whether or not foreseeable and whether or not anticipated including but not limited to the causes set forth in this Section, and agrees that the sole right and remedy therefore shall be an extension of time not to exceed the duration of the time lost, provided the Contractor has met the pre-condition of a notice of claim to the Architect as set forth in this Section.

§ 8.3.2 If Contractor claims an increase in the Contract Sum or an extension in the completion time required by reason of a change in the Work, Contractor shall give Architect written notice within fifteen (15) days after Contractor's knowledge of the occurrence of the matter giving rise to such claim. This notice shall be given by Contractor before proceeding to execute the changed Work, except in an emergency endangering life or property in which case Contractor shall proceed in accordance with Article 10. No such claim will be valid unless notice is given as required in this Section. Contractor shall proceed to execute the Work, even though the increase or time extension has not been agreed upon.

§ 8.3.2.1 Extension of time, if requested by the Contractor, shall only be considered after the Contractor has made reasonable effort to recover the lost time.

§ 8.3.2.2 An extension, or extensions, of time may be granted subject to the provisions of this article, but only after written application therefore by the Contractor.

§ 8.3.2.3 An extension of time shall be only for the number of days of delay that the Architect may determine to be due solely to the causes set forth in the application for extension of time. 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 the actual period of delay as determined by the Architect.

§ 8.3.3 Contractor shall not be allowed an extension of time unless Contractor has established to the satisfaction of the Owner and Architect that the delay claimed by Contractor is to a portion of the Work on the critical path of the Work schedule.

§ 8.3.4 No monetary recovery may be obtained by Contractor for delay. Time extensions for delay are limited to the specific causes set forth in Section 8.3.1 and then, only upon compliance with the notice and proof requirements of Section 8.3.1 and 8.3.2.

§ 8.3.5 Contractor waives any claim against Owner, Architect, or Construction Manager for the consequences of any delay resulting from directions given or not given by Architect or Construction Manager including scheduling and coordination of the Work or resulting from Architect's preparation of Drawings and Specifications or review of Shop Drawings.

§ 8.3.6 When the Contract Time has been extended, as provided under this Section 8.3, such extension of time shall not be considered as justification for extra compensation to the Contractor for administrative costs or other similar reasons.

§ 8.3.7 The intent of the Contracts is for the Work to follow a logical sequence; however, the Contractor may be

required by Architect to temporarily omit or leave out any section of Work, or perform Work out of sequence. All such out-of-sequence Work and come back time to these areas shall be performed at no additional cost to the Owner.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

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

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner, the applicable unit prices shall be equitably adjusted as set forth in Section 7.1.4.3.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Construction Manager, at least sixty (60) days before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Construction Manager and the Architect. This schedule, unless objected to by the Construction Manager or Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. The Construction Manager shall forward to the Architect the Contractor's schedule of values. Any changes to the schedule of values shall be submitted to the Construction Manager and supported by such data to substantiate its accuracy as the Construction Manager and the Architect may require, and upon written approval by the Construction Manager or the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least fifteen days before the date established for each progress payment, the Contractor shall submit to the Construction Manager an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner, Construction Manager or Architect require, such as copies of requisitions, releases of waivers of lien from Subcontractors and suppliers, certified payroll information in accordance with NYS law, and shall reflect retainage if provided for in the Contract Documents.

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

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

§ 9.3.1.3 Until Substantial Completion, the Owner shall pay ninety-five percent (95%) of the amount due to the Contractor on account of progress payments and withhold an amount necessary to satisfy any claims, liens, or judgements against the Contractor which have not been resolved, settled, or discharged.

§ 9.3.1.4 The Contractor shall supply with each of its applications for payment any information reasonably requested by the Architect, Owner, or Construction Manager, including but not limited to such as lien waivers for work performed to date by subcontractors and suppliers, and certified payroll information.

§ 9.3.1.5 When the work or major portions thereof as contemplated by the terms of the Contract are substantially complete, the Contractor shall submit to the Construction Manager and Architect a requisition for payment of the remaining amount of the Contract balance for that major portion of the Work. Upon receipt of such requisition, the Owner shall approve and promptly pay the remaining amount of the Contract less two times the value of any remaining items to be completed, including close-out documentation/items and work, and an amount necessary to satisfy any claims, liens or judgments against the Contractor, which have not been suitably discharged, as determined by the Architect in conjunction with the Construction Manager. Any claims, liens or judgments referred to in this clause shall pertain to the Project and shall be filed in accordance with the terms of the Contract, and applicable laws.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

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

§ 9.3.4 The Contractor further expressly undertakes to defend the Owner, at the Contractor's sole expense, against any actions, lawsuits or proceedings brought against Owner as a result of liens filed against the Work, the site of any of the Work, the project site and any improvements thereon, payments due the Contractor or any portion of the property of the Owner, including but not limited to the public fund in connection with the Work (referred to collectively as liens in Section 9.3.3). The Contractor hereby agrees to indemnify and hold Owner harmless against any such liens or claims of lien and agrees to pay any judgment or lien resulting from any such actions, lawsuits or proceedings and reimburse Owner for all legal fees and costs incurred by Owner in connection with any such actual or threatened action, lawsuit or proceeding.

§ 9.3.5 The Owner shall release any payments withheld due to a lien or a claim of lien if the Contractor obtains security acceptable to the Owner or a lien bond which is: (1) issued by a surety acceptable to the Owner, (2) in form and substance satisfactory to the Owner, and (3) in an amount not less than One Hundred Ten percent (110%) of such lien claim. By posting a lien bond or other acceptable security, however, the Contractor shall not be relieved of any responsibilities or obligations under this Section 9.3, including, without limitation, the duty to defend and indemnify the Owner. The cost of any premiums incurred in connection with such bonds and security shall be the responsibility of the Contractor and shall not be part of, or cause any adjustment to, the Contract Sum.

§ 9.3.6 The Contractor agrees to waive any right which it may have to assert a mechanic's or other lien against the Project site and any improvements thereon or the public fund created in connection with the Project, including, without limit, the Work itself. Furthermore, the Contractor will cause a similar provision, waiving any right to a mechanic's or other lien against the property, to be included in all of its subcontracts, any subcontracts and all contracts with material suppliers. Upon execution of the Agreement, the Contractor shall also execute the waiver of lien attached to the Agreement and made a part thereof as an Exhibit.

§ 9.4 Certificates for Payment

§ 9.4.1 Where there is only one Contractor, the Construction Manager will, within seven days after the Construction Manager's receipt of the Contractor's Application for Payment, review the Application, certify the amount the Construction Manager determines is due the Contractor, and forward the Contractor's Application and Certificate for Payment to the Architect. Within seven days after the Architect receives the Contractor's Application for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a Certificate for Payment, in the full amount of the Application for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Construction Manager and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1. The Construction Manager will promptly forward to the Contractor the Architect's notice of withholding certification.

§ 9.4.2 Where there is more than one Contractor performing portions of the Project, the Construction Manager will, within seven days after the Construction Manager receives all of the Contractors' Applications for Payment: (1)

review the Applications and certify the amount the Construction Manager determines is due each of the Contractors; (2) prepare a Summary of Contractors' Applications for Payment by combining information from each Contractor's application with information from similar applications for progress payments from the other Contractors; (3) prepare a Project Application and Certificate for Payment; (4) certify the amount the Construction Manager determines is due all Contractors; and (5) forward the Summary of Contractors' Applications for Payment and Project Application and Certificate for Payment to the Architect.

§ 9.4.2.1 Within seven days after the Architect receives the Project Application and Project Certificate for Payment and the Summary of Contractors' Applications for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a Project Certificate for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a Project Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Project Application for Payment, and notify the Construction Manager and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1. The Construction Manager will promptly forward the Architect's notice of withholding certification to the Contractors.

§ 9.4.3 The Construction Manager's certification of an Application for Payment or, in the case of more than one Contractor, a Project Application and Certificate for Payment, shall be based upon the Construction Manager's evaluation of the Work and the data in the Application or Applications for Payment. The Construction Manager's certification will constitute a representation that, to the best of the Construction Manager's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is, or Contractors are, entitled to payment in the amount certified.

§ 9.4.4 The Architect's issuance of a Certificate for Payment or, in the case of more than one Contractor, Project Application and Certificate for Payment, shall be based upon the Architect's evaluation of the Work, the recommendation of the Construction Manager, and data in the Application for Payment or Project Application for Payment. The Architect's certification will constitute a representation that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is, or Contractors are, entitled to payment in the amount certified.

§ 9.4.5 The representations made pursuant to Sections 9.4.3 and 9.4.4 are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Construction Manager or Architect.

§ 9.4.6 The issuance of a Certificate for Payment or a Project Certificate for Payment will not be a representation that the Construction Manager or Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Construction Manager or Architect may withhold a Certificate for Payment or Project Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Construction Manager's or Architect's opinion the representations to the Owner required by Section 9.4.3 and 9.4.4 cannot be made. If the Construction Manager or Architect is unable to certify payment in the amount of the Application, the Construction Manager will notify the Contractor and Owner as provided in Section 9.4.1 and 9.4.2. If the Contractor, Construction Manager and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment or a Project Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Construction Manager or Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment or Project Certificate for Payment previously issued, to such extent as may be necessary in the Construction Manager's or Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from the acts and omissions described in Section 3.3.2 because of

- .1 defective Work not remedied;

- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor or other Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
- .7 repeated failure to carry out the Work in accordance with the Contract Documents; or
- .8 failure to comply with applicable federal, state or local law or regulations, including but not limited to laws requiring the delivery of certified payrolls to the Owner.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

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

§ 9.5.4 If the Architect or Construction Manager withholds certification for payment under Section 9.5.1, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Construction Manager, and both will reflect such payment on the next Certificate for Payment. Payments made by the Owner to any Subcontractor of the Contractor under this Article 9 shall be deemed to be payments made to the Contractor for the purposes of this Contract.

§ 9.5.5 Notwithstanding anything above to the contrary, the Owner has the right to withhold payment to protect itself against damages incurred or which may be incurred as the result of the Contractor's breach of Contract or negligence, including, but not limited to, the items set forth in Section 9.5.1.

§ 9.6 Progress Payments

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

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

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

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid and charge any costs or expenses, including but not limited to attorneys' fees and disbursements, incurred by the Owner as a result of the Contractor's failure to furnish such evidence. Neither the Owner, Construction Manager nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as required by law.

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

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

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or Furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained Herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Construction Manager and Architect do not issue a Certificate for Payment or a Project Certificate for Payment, through no fault of the Contractor, within fourteen days after the Construction Manager's receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Construction Manager and Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner, Construction Manager and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately, and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents. This Section 9.7 shall not apply to the extent that the Contractor owes the Owner any amount pursuant to the indemnification or other provisions of the Contract Documents, or the Owner is required to incur any cost or expense to purchase additional insurance or pay premiums for the Contractor's insurance as a result of a failure of the Contractor to obtain or maintain insurance meeting the requirements set forth in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 The Date of Substantial Completion of the Project or a designated portion thereof is the date when construction is sufficiently complete in accordance with the Drawings and Specifications so the Owner can occupy or utilize the entire Project (or such portion thereof as Owner earlier elects to occupy or utilize) for the uses for which it is intended. Substantial Completion shall not be deemed to exist until the Owner receives a Certificate of Occupancy for the Project (or such portion as elected by Owner) if such Certificate of Occupancy is required, and any other permits, approvals, licenses and any other documents from governmental authorities having jurisdiction therefore necessary for the beneficial occupancy of the project and the Contractor, Architect and Owner have agreed upon a schedule to provide the Owner with all as built drawings, operating manuals and warranties. Warranties called for by the Agreement or by the Drawings and Specifications shall commence on the date of Substantial Completion of the Project or designated portion thereof, or any later date that the parties agree. This date shall be established by a Certificate of Substantial Completion signed by the Owner, Architect and Contractor and shall state their respective responsibilities for security, maintenance, heat utilities, damage to the Work and insurance. This Certificate shall also list the items to be completed or corrected together with a price for each item and a time for their completion and correction.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall notify the Construction Manager, and the Contractor and Construction Manager shall jointly prepare and submit to the Architect a comprehensive written list of items to be completed or corrected which shall identify all non-conforming, defective and incomplete Work and establish the date of commencement of warranties in connection with any such Work prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the list, the Architect, assisted by the Construction Manager, will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended

use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect, assisted by the Construction Manager, to determine Substantial Completion.

§ 9.8.3.1 Except with the consent of the Owner, the Architect in conjunction with the Construction Manager will perform no more than two (2) inspections to determine whether the Work or a designated portion thereof has attained Substantial Completion in accordance with the Contract Documents. The two (2) inspections will include not only determining if the area is substantially complete, but will also include any follow-up inspection to confirm all open punch list items have been completed for that specific item. The Owner may deduct from the Contract Sum amounts paid to the Architect for any additional inspections necessitated by the Contractor's misrepresentation of conditions.

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

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance, and upon the Owner's receipt of the consent of surety with respect to any bond furnished by the Contractor pursuant to the Agreement, the Owner shall promptly pay that portion of the Contract Sum not yet paid less an amount equal to two (2) times the value of any items of Work remaining to be completed and the amount necessary to satisfy any claims, liens, or judgments against the Contractor that have not been discharged.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor and Construction Manager shall jointly prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect after consultation with the Construction Manager.

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

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

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon completion of the Work, the Contractor shall forward to the Construction Manager a notice that the Work is ready for final inspection and acceptance, and shall also forward to the Construction Manager a final Contractor's Application for Payment. Upon receipt, the Construction Manager shall perform an inspection to confirm the completion of Work of the Contractor. The Construction Manager shall make recommendations to the Architect when the Work of all of the Contractors is ready for final inspection, and shall then forward the Contractors' notices and Application for Payment or Project Application for Payment, to the Architect, who will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully

performed, the Construction Manager and Architect will promptly issue a final Certificate for Payment or Project Certificate for Payment stating that to the best of their knowledge, information and belief, and on the basis of their on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Construction Manager's and Architect's final Certificate for Payment or Project Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect through the Construction Manager (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, (6) evidence of compliance with all applicable code requirements, and (7),, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, including but not limited to: AIA G706-1994, Contractor's Affidavit of Payment of Debts and Claims; AIA G706A-1994, Contractor's Affidavit of Release of Liens; AIA G707-1994, Consent of Surety to Final Payment; AIA Document G904-2022, Unconditional Waiver and Release on Final Payment; AIA Document G907-2022, Sworn Construction Statement; and additional lien waivers and releases from the Contractor and all subcontractors and materials suppliers as requested by Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

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

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

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner after final payment.

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

§ 9.10.6 In the event the Contractor does not achieve final completion within thirty (30) days after the date of substantial completion, allowing for any approved extensions of the contract time, Contractor shall not be entitled to any further payment and Contractor hereby agrees that such failure to complete the work within the time set forth above shall constitute a waiver of all claims by the Contractor to any money that may be due. This provision shall not operate as a waiver by the Owner of any claims or remedies of any nature against the Contractor arising out of the Contract.

§ 9.11 Retainage

§ 9.11.1 Applications for Payment shall include a retainage amount of not less than five percent (5%) of the value of the completed work. Reduction of retainage shall only be approved upon completion of the Work, consent of the Contractor's surety to release of retainage, and when authorized by the Owner in writing.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall submit the Contractor's safety program to the Construction Manager for review and coordination with the safety programs of other Contractors. The Construction Manager's responsibilities for review and coordination of safety programs shall not extend to direct control over or charge of the acts or omissions of the Contractors, Subcontractors, agents or employees of the Contractors or Subcontractors, or any other persons performing portions of the Work and not directly employed by the Construction Manager.

§ 10.2 Safety of Persons and Property

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

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, the Contractor's Subcontractors or Sub-subcontractors, when appropriate using coverings and other protective measures sufficient to insure the integrity and security of the Work and such materials and equipment;
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction; and
- .4 construction or operations by the Owner, Separate Contractors, or other Contractors.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss, including but not limited to all infectious disease exposure precautions. The Contractor represents and warrants to the Owner that its services and compensation contemplate compliance with all of the Owner's applicable policies and procedures and all current federal, state, and local orders, regulations, and guidance including but not limited to regulations and guidance from the NYS Education Department and the NYS Department of Health. Accordingly, the Contractor hereby waives any claim for an increase in compensation or a change to the Substantial Completion date due to said compliance.

§ 10.2.2.1 The Contractor acknowledges that certain applicable laws, including, but not limited to, Sections 240 and 241 of New York State Labor Law, may impose liability on the Owner for injuries to persons employed by the Contractor or by its Subcontractors or Sub-subcontractors. As between the Owner and the Contractor (or any of the Contractor's Subcontractors or Sub-subcontractors or any persons for which any of them shall be responsible), the Contractor shall be solely responsible for compliance with all such laws to the extent they pertain to the safety or protection of persons on the Project site or performing the Work. Any claim, charge, penalty or cause of action arising out of or on account of any such law shall be subject to Section 3.18.

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

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly

employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner, Construction Manager or Architect or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18. The Contractor shall also be responsible, at the Contractor's sole cost and expense, for all measures necessary to protect any property adjacent to the Project and improvements therein. Any damage to such property or improvements shall be promptly replaced by the Contractor.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner, Construction Manager and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If the Contractor suffers injury or damage to person or property because of an act or omission of the Owner, written notice of the injury or damage, whether or not insured, shall be given to the Owner within a reasonable time not exceeding seven (7) calendar days after discovery. The notice shall provide sufficient detail to enable the Owner to investigate the matter.

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

§ 10.2.10 The Contractor shall be solely responsible for the conditions which develop during construction and in the event any structure is dislocated, over strained, or damaged so as to affect its usefulness, the Contractor shall be solely responsible. The Contractor shall take whatever steps necessary to strengthen, relocate or rebuild the structure to meet requirements.

§ 10.2.11 The Contractor is responsible for restoration and/or repair of utilities, private property, buildings, pavement, walkways, roads, etc. damaged by its activities, or by its Subcontractors or Sub-subcontractors under this Agreement.

§ 10.3 Hazardous Materials

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

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor, Construction Manager and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor, the Construction Manager and the Architect will promptly reply to the Owner in writing stating whether or not any of them has reasonable objection to the persons or entities proposed by the Owner. If the Contractor, Construction Manager or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor, the Construction Manager and the Architect have no reasonable objection. When the material or substance

has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately, and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Construction Manager, Architect, their consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity. Exception is made for the Contractor expressly retained for the removal of lead, asbestos or polychlorinated (PCB) from the site. In this condition, all Contract Specifications and Drawings shall govern the handling of this material.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

(Paragraph deleted)

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Liability Insurance

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located and one to which the Owner has no reasonable objection, such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts which are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations;
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18;
- .9 Where the Contract or Subcontract involves asbestos, the insurance required by Section 11.1 shall specifically include the words asbestos abatement work and shall specify any limitations on completed

operation time period and if there is a limitation, it will be at the Owner's discretion to accept or reject the limitation; and

.10 Insurance must remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work.

.11 Contractor agrees to indemnify the Owner for all applicable deductibles and self-insurance retentions.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. All liability insurance shall be written on an occurrence basis with the Contractor's insurance as primary and the Owner's policies as excess and noncontributory. Coverages shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.2.1 If there is a lapse in the Contractor's required insurance through cancellation, expiration, failure to renew, or any other cause, the Contractor shall stop performing Work until it is once again in compliance with this Article. The Contractor shall have no claim against the Owner and shall not be entitled to any adjustment in the Contract Time or the Contract Sum as a result of any resulting delays. At its sole option, the Owner shall be permitted to pay the amount of any premium due for a policy of insurance required to be maintained by the Contractor under the Contract Documents or take such other action as may be necessary to prevent a lapse of coverage under any such policy and deduct the amount paid by the Owner from any amounts to be paid or to become payable to Contractor under the Contract Documents.

§ 11.1.2.2 The Contractor shall include coverage for its Subcontractors in its liability insurance policies or submit evidence that each of its Subcontractors has obtained and is maintaining insurance coverage in the amount and of the types required of the Contractor by this Article before such Subcontractor commences any portion of the Work or enters onto the Project site. The Contractor shall not permit any Subcontractor to enter upon or continue the performance of the Work unless such Subcontractor maintains insurance coverage of the types and in the amounts described in this Article. In the event the Contractor fails to obtain the required certificates from a Subcontractor, and a claim is made or suffered, the Contractor shall indemnify, defend, and hold harmless the District from any and all claims for which the required insurance would have provided coverage.

§ 11.1.3 Each certificate of insurance must describe the services to be provided by Contractor, be acceptable to the Owner, and shall be submitted to the Construction Manager for transmittal to the Owner with a copy to the Architect prior to commencement of the Work; and thereafter upon renewal or replacement of each required policy of insurance. The certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage shall be furnished by the Contractor with reasonable promptness. The Contractor shall provide written notification to the Owner of the cancellation or expiration of any insurance required by Section 11.1. The Contractor shall provide such written notice within five (5) business days of the date the Contractor is first aware of the cancellation or expiration or is first aware that the cancellation or expiration is threatened or otherwise may occur, whichever comes first.

§ 11.1.3.1 Along with the submission of certificates of insurance, the Contractor shall include written disclosure of any prior and/or pending claims against the submitted policies. In addition, the Contractor shall immediately disclose to Owner in writing, any subsequent claims against the policies.

§ 11.1.3.2 A fully completed New York Construction Certificate of Liability Insurance Addendum (ACORD 855 NY 2014/05) must be included with the certificates of insurance. For any "Yes" answers on Items G through L on this Form – additional details must be provided in writing.

§ 11.1.4 Each Contractor shall maintain the following insurance for the duration of this Agreement and shall maintain Products and Completed Operations insurance coverage in effect for a period of two (2) years after Final Completion of the Work to be performed under the Contract Documents.

§ 11.1.4.1 Comprehensive General Liability Insurance naming the Owner, Architect and Construction Manager as an Additional Insured, containing an Additional Insured Endorsement, and a Waiver of Subrogation Endorsement. The additional insured coverage shall be primary and a non-contributory on a follow form basis to any of the Owner's, Architect's and Construction Manager's insurance policies and shall apply to both ongoing and completed operations on a per project and per location basis:

General Aggregate	\$2,000,000
Products Completed Operations Aggregate	\$2,000,000
Personal and Advertising Injury	\$1,000,000
Each Occurrence	\$1,000,000
Fire Damage	\$100,000
Medical Expense	\$10,000

Including Bodily Injury and Property Damage, Damage for Premises/Operations, Products and Completed Operations and coverage provided by the General Liability coverage form CG00010 1/96 in connection with work to be completed by the Contractor and all subcontractors and consultants, with the Owner, Architect and Construction Manager named as an Additional Insured. Coverage must be provided on a per project, per location basis.

All property damage insurance shall include coverage for explosion, collapse, and underground operations.

§ 11.1.4.2 Commercial Automobile Liability Insurance covering owned and rented vehicles operated by the Contractor with policy limits of not less than one million (\$1,000,000) combined single limit and aggregate for bodily injury and property damage. Including Bodily Injury and Property Damage for the operation of Any Auto (Symbol 1) used in connection with Work to be completed by the Contractor and all subcontractors and consultants, with the Owner, Architect, and Construction Manager named as Additional Insureds and a Waiver of Subrogation Endorsement.

§ 11.1.4.3 The Umbrella Liability Insurance coverage shall provide additional limits of liability coverage over and above the General Liability and Automobile Liability coverages required by this Agreement on a follow-form basis with the Owner, Architect, and Construction Manager named as Additional Insureds and a Waiver of Subrogation Endorsement. Umbrella Liability Insurance:

Each Occurrence Limit	\$5,000,000
Aggregate	\$5,000,000

§ 11.1.4.4 Worker's Compensation Insurance covering the obligations of the Contractor in accordance with applicable law at statutory limits and Employer's Liability Insurance with a policy limit of not less than required by applicable law, covering all operations under this Agreement, whether performed by the Contractor, its subcontractors or consultants, containing a Blanket Waiver of Subrogation Endorsement.

§ 11.1.4.5 Owner's and Contractor's Protective Liability Insurance **with the Owner listed as the Named Insured:**

Each Occurrence	\$1,000,000
Aggregate	\$2,000,000

§ 11.1.4.6 Builder's Risk Insurance, the General Contractor shall provide property damage insurance on a builder's risk "all risk" or equivalent policy form in the amount of the initial contract sum plus the value of subsequent contract modifications and the cost of materials supplied or installed by others, comprising the total value for the entire project at the site on a replacement cost basis without optional deductibles. The form of the policy shall be Completed Value. The policy deductible must be no greater than \$5,000 per occurrence.

§ 11.1.4.7 If required by the Contract Documents, Contractor shall provide Contractor's Pollution Liability Coverage and Asbestos Abatement Liability Coverage naming the Owner as an Additional Insured, in the amount of \$2,000,000 for Each Occurrence, for a period of three (3) years following the acceptance by Owner of a Certificate of Substantial Completion. The Asbestos Abatement Liability Insurance shall specify any limitations on the completed operations time period, subject to the Owner's approval which may be withheld at the Owner's option. The Asbestos Abatement Liability Insurance shall indemnify the Owner and provide the Owner with a defense should there be an occurrence

creating potential liability for the Owner. If the Asbestos Abatement Liability Coverage required herein is not available from an insurance carrier licensed to do business in the state of New York, Contractor must notify Owner in writing as soon as practical.

§ 11.1.4.8 The Contractor shall provide to the Owner for each of the insurance coverages required herein one original or one certified copy of the original policy of insurance, including all endorsements, plus one certificate of insurance on ACCORD Form 25S accompanied by AIA Form G715, with a brief description of the project or service. The policies and certificates shall show the Owner, the Architect, and the Construction Manager as an additional insured on the Comprehensive General Liability, Automobile Liability, umbrella or excess policies, and the Owner as the Named Insured on the Owner's Protective Liability Insurance policy. All such insurance shall be written without expense to the Owner by an insurance company authorized to provide insurance in the State of New York with an AM Best rating of A- or better, shall be drawn on standard forms approved by the New York State Insurance Department and shall protect the Contractor, its subcontractors and consultants, and the Owner, the Architect and the Construction Manager from liability for claims for personal injury, death and property damage which may arise from performance under the Contract Documents.

§ 11.1.4.8.1 At the request of the Owner, the issuing insurance company, agents and/or authorized representatives shall set forth in writing that there are no pending claims against the insured and/or that there is ample coverage remaining to cover the insured in the event of a claim.

§ 11.1.4.8.2 At the request of the Owner, the issuing insurance company, agents and/or authorized representatives shall set forth in writing that the insurance: (1) applies to all operations of the Contractor in connection with the Work to be performed under this Agreement; (2) applies on the effective dates stated, whether or not the Agreement between the Contractor and the Owner has been executed; and (3) is written in accordance with the company's regular policies and endorsements.

§ 11.1.4.8.3 Each policy must provide the Owner thirty (30) days advance written notice prior to cancellation, a reduction in coverage, and/or non-renewal of the policy.

§ 11.1.4.8.4 Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice directly to the Owner and its bonding company, and separately to the Construction Manager, of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Waiver of Subrogation

§ 11.2.1 The Contractor waives all rights against (1) Owner and any of its agents, and employees; (2) the Construction Manager and Construction Manager's consultants; (3) the Architect and Architect's consultants for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this Section 11.2.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

(Paragraphs deleted)

§ 11.3 Owner's Insurance

§ 11.3.1 The Owner may purchase and maintain insurance in its discretion.

(Paragraph deleted)

§ 11.4

(Paragraphs deleted)

Performance Bond and Payment Bond

(Paragraphs deleted)

§ 11.4.1 The Contractor must furnish two (2) executed Surety bonds, each in the amount equal to one hundred (100%) percent of the Contract Sum.

§ 11.4.1.1 The Performance Bond shall be furnished as security for the faithful performance by the Contractor of all terms and conditions of the Contract Documents.

§ 11.4.1.2 The Payment Bond shall be furnished as security for the claims of laborers and materials suppliers.

§ 11.4.1.3 Both bonds shall be made out to the Owner, prepared on a modified AIA Form A312-2010 and submitted by the Contractor to the Owner within ten (10) days of notification of contract award with all signatures properly acknowledged by a notary and in strict compliance with applicable New York State law.

§ 11.4.1.3.1 The Performance Bond shall contain the following modification in §16:

Surety hereby waives notice of and consents to any addition, alteration, omission, change, extension of time, or other modification of the Construction Contract. Such addition, alteration, omission, change, extension of time, or other modification of the Construction Contract, or forbearance on the part of either the Owner or the Contractor to the other, shall not release the Surety from its obligations hereunder. Surety further agrees that it is obligated under this bond to any successor, grantee, or assignee of the Owner.

Surety agrees that in the event of a default by the Owner in the performance of the Owner's obligations to the Contractor under the Construction Contract, the Contractor or Surety shall provide written notice of default to the Owner and the Owner shall have thirty (30) days from receipt of such notice within which to cure such default, or such additional reasonable period of time as may be required if the nature of the default is such that it can't be cured within thirty (30) days.

Notwithstanding anything to the contrary contained in the Construction Contract between the Contractor and the Owner or herein, no meeting among Owner, Contractor, and Surety, or any combination thereof, is required as a pre-condition to Owner declaring Contractor in default or prior to Owner terminating the Construction Contract with Contractor. Any such requirements contained herein are waived by the Contractor and the Surety and are unenforceable against the Owner.

This Bond includes performance by the Contractor of any correction and/or warranty obligations contained in the Construction Contract, including such performance after the date of Substantial or Final Completion.

This Bond is given as a statutory bond or as required by the Construction Contract and section 13 applies without exception.

§ 11.4.1.3.2 The Payment Bond shall contain the following modification in §18:

Surety hereby waives notice of and consents to any addition, alteration, omission, change, extension of time, or other modification of the Construction Contract. Such addition, alteration, omission, change, extension of time, or other modification of the Construction Contract, or forbearance on the part of either the Owner or the Contractor to the other, shall not release the Surety from its obligations hereunder. Surety further agrees that it is obligated under this bond to any successor, grantee, or assignee of the Owner.

Surety agrees that in the event of a default by the Owner in the performance of the Owner's obligations to the Contractor under the Construction Contract, the Contractor or Surety shall provide written notice of default to the Owner and the Owner shall have thirty (30) days from receipt of such notice within which to cure such default, or such additional reasonable period of time as may be required if the nature of the default is such that it can't be cured within thirty (30) days.

This Bond is given as a statutory bond or as required by the Construction Contract and section 14 applies without exception.

§ 11.4.1.4 The Surety thereon must be such Surety company or companies as are authorized and licensed to transact business in the State of New York and included on the Department of the Treasury's Listing of Approved Sureties

with an underwriting limit of at least \$2,000,000 or the amount of the bond, whichever is higher. Each bond must be properly signed with acknowledgment of the signatures. Attorneys-in-fact who sign bonds must file with each bond a certified copy of their power of attorney to sign said bonds. Every bond must display the Surety's Bond Number.

§ 11.4.1.5 All Bonds shall be maintained in full force for a one (1) year after the date of the Contractor's acceptance of final payment as guarantee that the Contractor will make good any faults or defects in the Work arising from improper or defective workmanship or materials which may appear during the period.

§ 11.4.1.6 The Contractor shall keep the surety informed of the progress of the Work, and, where necessary, obtain the surety's consent to, or waiver of: (1) notice of changes in the Work; (2) request for reduction or release of retention; (3) request for final payment; and (4) any other material required by the surety. The Owner shall be notified by the Contractor, in writing, of all communications with the surety. The Owner may, in the owner's sole discretion, inform surety of the progress of the Work and obtain consents as necessary to protect the Owner's rights, interest, privileges and benefits under any bond issued in connection with the Work.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract or performance under the Contract Documents, the Contractor shall promptly furnish a copy of the bonds and hereby authorizes the Owner to furnish a copy of the bonds.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Construction Manager's or Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by either, be uncovered for their examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Construction Manager or Architect has not specifically requested to examine prior to its being covered, the Construction Manager or Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Construction Manager or Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion, and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Construction Manager's and Architect's services and expenses made necessary thereby, shall be at the Contractor's expense and may be deducted pursuant to a change directive.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 The Contractor unconditionally warrants the Work and its performance to the Owner. The Contractor shall perform all warranty obligations and responsibilities with respect to the Work. The Contractor, at its sole expense, shall remedy defects due to improper and/or defective workmanship or materials appearing within one (1) year of Final Completion or for such longer period as may be set forth elsewhere in the Contract Documents (the "Correction Period"). Upon Substantial Completion of the Work, the Contractor shall submit to the Owner all written warranties and guaranties from Subcontractors, suppliers, and manufacturers. If a warrant or guaranty delivered to the Owner by a supplier, vendor, or manufacturer shall be available, the Owner will first diligently pursue remedies under such warranty or guaranty before pursuing any remedy against the Contractor pursuant to any such warranty or guaranty, and the Contractor shall fully cooperate with such efforts. The Contractor acknowledges that its obligations to the Owner under this Section are joint and several during the Correction Period with Subcontractors, suppliers, vendors, and manufacturers for all warranties and guaranties supplied with respect to the Work or any portion thereof. Any notice given to the Contractor by the Owner pertaining to any deficiency in the Work covered by a warranty or guaranty described in this Section shall toll the Correction Period until the deficiency has been corrected, and the Correction Period for all corrected Work shall recommence on the date of correction. The obligations of the Contractor pursuant to this Section shall continue notwithstanding the termination of the Contract or of the Contractor

for any reason. The rights and remedies of the Owner pursuant to this Section are in addition to and not in lieu of any rights and remedies that may be available to the Owner under the Contract Documents, including but not limited to Section 2.4 of this Agreement, or applicable law. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Construction Manager's and Architect's services and expenses made necessary thereby, shall be at the Contractor's expense and may be deducted pursuant to a change directive.

§ 12.2.2.1.1 Any replacement made under any guarantee required by or included in the Contract Documents, or within one (1) year after the date of substantial completion of the Contract, shall likewise be guaranteed as stipulated above from the date such replacement is accepted by the Owner.

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

(Paragraph deleted)

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

§ 12.2.3.1 Upon request by the Owner and prior to expiration of one year from the date of Substantial Completion, the Construction Manager and the Architect will conduct, and the Contractor shall attend a meeting with the Owner to review the facility operations and performance.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction whether completed or partially completed, of the Owner or separate contractors or other Multiple Contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents. The obligations shall cover any repair and replacement to any part of the Work or other property caused by the defective Work.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the Correction Period as described in Section 12.2.2.1 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located excluding that jurisdiction's choice of law rules.

§ 13.1.2 The Contractor shall at all times observe and comply with all Federal and State Laws, and all Laws, Ordinances and Regulations of the Owner, in any manner affecting the work, and all such orders decreed as exist at present and those which may be enacted later, by bodies or tribunals having jurisdiction or authority over the Work, and the Contractor shall indemnify and save harmless the Owner and all its officers, agents or servants against any claim or liability arising from, or based on, a violation of any such law, ordinances, regulation or order, whether by its employee or agents.

§ 13.1.3 During the performance of this Contract, the Contractor agrees as follows:

1. The Contractor will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, sexual orientation, military status, sex, disability, predisposing genetic characteristics, marital status, or domestic violence victim status.

2. If directed to do so by the Owner or the State Commissioner of Human Rights, the Contractor will send to each labor union or representative of workers which with the Contractor has or is bound by a collective bargaining or other agreement or understanding, a notice, to be provided by the State Commissioner of Human Rights, advising such labor union or representative of the Contractor's agreement under clauses (1) through (6) (hereinafter called "non-discrimination clauses"). If the Contractor was directed to do so by the Owner as part of the bid or negotiation of this Contract, the Contractor shall request such labor union or representative to furnish a written statement that such labor union or representative will not discriminate because of age, race, creed, color, national origin, sexual orientation, military status, sex, disability, predisposing genetic characteristics, or marital status, and that such labor union or representative will cooperate, within the limits of its legal contractual authority, in the implementation of the policy and provisions of these non-discrimination clauses and that it consents and agrees that the recruitment, employment and the terms and conditions of employment under this Contract shall be in accordance with the purposes and provision of these non-discrimination clauses. If such labor union or representative fails or refuses to comply with such a request that it furnish such a statement, the Contractor shall promptly notify the Owner and the State Commissioner of Human Rights of such failure or refusal.
3. If directed to do so by the Owner or the Commissioner of Human Rights, the Contractor will post and keep posted in conspicuous places, available to employees and applicants for employment, notices to be provided by the State Commissioner of Human Rights setting forth the substance of provisions of clauses (1) and (2) and such provision of the State's law against discrimination as the State Commissioner of Human Rights shall determine.
4. The Contractor will state in all solicitations or advertisements for employees placed by or on behalf of the Contractor, that all qualified applicants will be afforded equal employment opportunities without discrimination because of age, race, creed, color, national origin, sexual orientation, military status, sex, disability, predisposing genetic characteristics, marital status, or domestic violence victim status.
5. The Contractor will comply with the provisions of Sections 290-299 of the Executive Law, and with the Civil Rights Law, will furnish all information and reports deemed necessary by the State Commissioner of Human Rights under these non-discrimination clauses and such section of the Executive Law, and will permit access to the Contractor's books, records, and accounts by the Owner, the State Commissioner of Human Rights, the Attorney General and the Industrial Commissioner for the purposes of investigation to ascertain compliance with the non-discrimination clauses and such sections of the Executive Law Civil Rights Law.
6. This Contract may be forthwith cancelled, terminated, or suspended, in whole or in part, by the Owner upon the basis of a finding made by the State Commissioner of Human Rights that the Contractor has not complied with the non-discrimination clauses, and that the Contractor may be declared ineligible for future contracts made by or on behalf of the Owner, the State or a public authority or agency of the State, until the Contractor satisfies the State Commissioner of Human Rights that the Contractor has established and is carrying out a program in conformity with the provisions of these non-discrimination clauses. Such findings may be made by the State Commissioner of the Human Rights after conciliation efforts by the Commissioner have failed to achieve compliance with these non-discrimination clauses and after a verified complaint has been filed with the Commissioner, notice thereof has been given to the Contractor to be heard publicly in accordance with the Executive Law. Such sanctions may be imposed and remedies invoked independently of or in addition to sanctions and remedies otherwise provided by law, and
7. The Contractor will include the provisions of clauses .1 through .6 in every subcontract or purchase order in such a manner that such provisions will be binding upon each subcontractor or vendor as to operations to be performed within the State of New York. The Contractor will take action in enforcing such provisions of such subcontract or purchase order as the State Commissioner of Human Rights or the Owner may direct, including sanctions or remedies for non-compliance. If the Contractor becomes involved or is threatened with litigation with a subcontractor or vendor as a result of such directions by the State Commissioner of Human Rights or the Owner, the Contractor shall promptly so notify the Owner and the Attorney General requesting the Attorney General to intervene and protect the interests of the State of New York.

§ 13.1.4 The parties expressly agree that any claim, dispute, or other controversy of any nature arising out of the Contract or performance of the Work shall be commenced and maintained in the New York State Supreme Court in the County where the Project is located.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. The Contractor shall not assign the Contract as a whole without written consent of the Owner. Any assignment or attempted assignment by the Contractor in violation of the provisions of this Section 13.2.1 shall be void and unenforceable and shall be deemed a material breach of this Agreement.

(Paragraph deleted)

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Construction Manager, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Construction Manager and Architect timely notice of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests or inspections where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Construction Manager, Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Construction Manager and Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Construction Manager and Architect of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Construction Manager's and Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Construction Manager for transmittal to the Architect.

§ 13.4.5 If the Construction Manager or Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Construction Manager or Architect will do so promptly and, where practicable, at the normal place of testing.

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

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate applicable to Public School Districts in with the State of New York.

§ 13.6 Any material to be furnished shall be subject to inspections and tests in the shop and field by the Architect. Shop inspection shall not relieve the Contractor of the responsibility to furnish satisfactory materials and the right is reserved to reject any material at any time before final acceptance of the work, when in the opinion of the Architect the materials and workmanship do not conform to the Specification requirements.

§ 13.7 General Provisions

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped; or
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;

(Paragraphs deleted)

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

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner, Construction Manager and Architect, and upon the failure of the Owner to cure the alleged grounds for termination within that seven day period, terminate the Contract and recover from the Owner payment for Work properly and acceptably executed prior to termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees, or any other persons performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner, Construction Manager and Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1

(Paragraphs deleted)

If, in the opinion of the Owner, the Contractor at any time refuses or fails to provide sufficient skilled workers or materials, timely prosecute the Work, is substantially behind schedule, fails to furnish the Owner with satisfactory assurance evidencing the Contractor's ability to complete the Work in compliance with the requirements of the Contract Documents, make payment to Subcontractors as required by the Contract, by the Contractor's contracts with such third parties, or by applicable law, or comply with any provisions of the Contract Documents, or makes any general assignment for the benefit of creditors, becomes insolvent, makes any filing in any proceeding in bankruptcy, has any involuntary proceeding in bankruptcy commenced for it, or disregards applicable laws, rules, and regulations or Project-specific instructions of the Owner, the Owner may, without prejudice to any other rights or remedies it may have: (a) take reasonable steps to remedy the condition, in which case the Contractor shall be liable to the Owner for the direct and indirect costs. The costs incurred by the Owner in connection with retaining a replacement contractor (on a contingency basis or otherwise) are in addition to any other costs incurred by Owner to remedy the condition (including, without limitation, reasonable legal fees and disbursements) incurred by the Owner in taking such steps; or (b) terminate the Contract. In either event, the Owner may enter the Project site, take possession of all Work and all

materials and equipment of the Contractor, require the Contractor to assign to the Owner any or all of its subcontracts and contracts or purchase orders pertaining to the Project or the Work, and complete the Work by itself, through others, or by whatever method or methods the Owner may deem appropriate. In the case of termination for default, the Contractor shall not be entitled to receive any further payment until the Work is fully completed and accepted by the Owner. Any payment then made shall be limited to Work fully performed by the Contractor in accordance with the Contract Documents up to the date of termination, less any charges or other amounts owed by the Contractor to the Owner. If the amount paid by the Owner for completing the Work exceeds the unpaid balance of the Contract Sum, then the Contractor shall pay the Owner the difference within five (5) business days following demand therefor by the Owner. The Contractor shall, in addition, pay all of the Owner's costs of collection, including, without limitation, reasonable legal fees and disbursements. The Contractor's obligations hereunder shall survive the termination of the Contract for any reason.

§ 14.2.2

(Paragraphs deleted)

If the Owner is subsequently determined in any binding dispute resolution proceeding to have improperly or wrongfully exercised its rights under Section 14.2, the Agreement shall be deemed to have been terminated at the Owner's convenience and the Contractor shall be compensated accordingly.

§ 14.2.3 The Contractor hereby constitutes and appoints the Owner its true and lawful attorney in fact to execute and deliver all instruments and documents and take all such other actions on behalf of the Contractor as the Owner may deem necessary or convenient to the effectuation of the purposes and transactions described in this Article 14 from and after the Owner's termination of the Contract as permitted by this Article 14. Nothing in this Section 14.2.3 and no exercise or assertion by the Owner of any of the authority granted hereunder shall be deemed to relieve the Contractor of any liability or obligation to the Owner under the Contract Documents or otherwise.

(Paragraph deleted)

§ 14.3 Suspension by the Owner for Convenience

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

§ 14.3.2 The Contract Sum and the Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. No adjustment shall be made to the extent:

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

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 Notwithstanding any other provision to the contrary in this Agreement, the Owner reserves the right at any time and in its absolute discretion to terminate the services of the Contractor and/or the Work for the Owner's convenience and without cause by giving written notice to the Contractor. This termination for the convenience of the Owner provision allows and authorizes the Owner to terminate this Agreement at any time and for any reason or no reason. This right may be exercised by the Owner in its complete discretion.

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

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

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to, and the Owner shall reimburse the Contractor for, an equitable pro rata portion of the Contractor's fee based on the portion of the Work properly completed before the effective date of termination. Contractor's payment for all such Work shall be contingent on its performance of such Work in accordance with the Contract Documents as certified by the Architect

and Construction Manager and the delivery of all required submittals related to the completed Work. Contractor shall be entitled to no other payment and waives any claim for damages.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition. A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. The Owner may, but is not required to, refer a claim to the Construction Manager and or the Architect for their review and assistance.

§ 15.1.2 Notice of Claims. Claims by the Contractor must be initiated by written notice to the Owner and to the Initial Decision Maker with a copy sent to the Construction Manager and Architect. Claims by the Contractor must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the Contractor should have been aware of the condition giving rise to the Claim, whichever is later. The notice requirements set forth in this Agreement dealing with Claims and Disputes are in addition to and not a substitution or replacement of any and all notice requirements contained in applicable law.

§ 15.1.2.1 Claims by the Contractor must be made by written notice in accordance with the following procedures.

- .1 The Contractor may submit a Claim concerning a matter properly noticed in accordance with the time requirements of this Contract set forth in Section 15.1.2 and elsewhere;
- .2 Failure by the Contractor to furnish the required Claim documentation within the time set forth above shall constitute waiver of the Contractor's right to compensation for such Claim.
- .3 Contractor shall furnish three (3) certified copies of the required Claim documentation, with a copy submitted to the Owner, Architect, and Construction Manager. The Claim documentation shall be complete when furnished. The evaluation of the Contractor's Claim will be based, among other things, upon the Owner's Project Records and the Contractor's furnished Claim documentation.
- .4 Claim documentation shall conform to Generally Accepted Accounting Principles and shall be in the following format:
 - a. general introduction;
 - b. general background discussion
 - c. issues
 - i. index of issues (listed numerically);
 - ii. for each issue:
 - (1) background
 - (2) chronology
 - (3) Contractor's position (reason for Owner's potential liability)
 - (4) supporting documentation of merit or entitlement
 - (5) supporting documentation of damages
 - (6) begin each issue on a new page
 - d. all critical path method schedules (as-planned, monthly updates, schedule revisions and as-built), along with computer disks of all schedules related to the Claim;
 - e. productivity exhibits (if appropriate); and
 - f. summary of issues and damages.
- .5 Supporting documentation of merit for each issue shall be cited by reference, photocopies or explanation. Supporting documentation may include, but shall not be limited to General Conditions, General Requirements, technical specifications, drawings, correspondence, conference notes, Shop Drawings and submittals, shop drawing logs, survey books, inspection reports, delivery schedules, test reports, daily reports, subcontracts, fragmentary CPM schedules or time impact analyses, photographs, technical reports, requests for information, field instructions and all other related records necessary to support the Contractor's claim.
- .6 Supporting documentation of damages for each issue shall be cited, photocopied or explained. Supporting documentation may include, but shall not be limited to, any or all documents related to the preparation and submission of the bid; certified, detailed labor records including labor distribution reports; material and equipment procurement records; construction equipment ownership, cost records or rental records; subcontractor or vendor files and cost records; service cost records;

purchase orders; invoices; Project as-planned and as-built cost records; general ledger records; variance reports; accounting adjustment records, and any other accounting material necessary to support the Contractor's Claims.

- .7 Each copy of the Claim documentation shall be certified by a responsible officer of the Contractor in accordance with the requirements of these Contract Documents.

§ 15.1.3 Continuing Contract Performance. Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Construction Manager will prepare Change Orders and the Architect will issue a Certificate for Payment or Project Certificate for Payment in accordance with the decisions of the Initial Decision Maker.

(Paragraphs deleted)

§ 15.1.4 Claims for Additional Cost. If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided Herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.3. Claims for additional compensation relating to Contractor's non-compliance with its representations and warranties in this Contract will not be allowed.

(Paragraphs deleted)

§ 15.1.5 Claims for Additional Time

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided Herein shall be given. The Contractor's Claim shall include an estimate of probable effect of delay on progress of the Work. In the case of a continuing delay only one Claim is necessary. Claims for an extension of time relating to Contractor's non-compliance with its representations and warranties in this Contract will not be allowed.

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

§ 15.1.6 Claims for Consequential Damages. The Contractor waives all Claims for consequential damages arising out of or relating to this Contract. This waiver includes, but is not limited to:

- .1 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit; and
- .2 all consequential damages incurred by the Contractor as a result of Owner's termination in accordance with Article 14.

(Paragraphs deleted)

§ 15.2 Initial Decision

§ 15.2.1 Claims shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

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

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

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response to the requested supporting data, or (2) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect and Construction Manager, if the Architect or Construction Manager is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 are subject to mediation upon mutual agreement of the parties.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered in accordance with the Construction Industry Mediation Procedures of the American Arbitration Association in effect on the date of this Agreement. However, the American Arbitration Association will not be involved in the mediation unless the parties mutually agree. A request for mediation shall be made in writing, delivered to the other party to the Contract. The parties shall select a mutually acceptable mediator. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order.

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

(Paragraph deleted)

§ 15.4 Litigation

If for any reason the Claim or dispute is not resolved by the mediation or the parties fail to agree on mediation as a dispute resolution process, then the Claim or dispute shall be resolved in New York State Supreme Court in the County where the Project is located. The Owner shall be entitled to recover its reasonable attorney's fees and costs if it prevails in the litigation. The Owner and the Contractor consent to exclusive jurisdiction of the New York State Supreme Court with jurisdiction over the County in which the Project is located and waive any and all objections to the jurisdiction of such court.

(Paragraphs deleted)

§ 15.5 SAVING CLAUSE

If, during the term of this Contract, it is found that a specific clause of the Contract is illegal under Federal or State law, the remainder of the Contract not affected by such a ruling shall remain in full force and effect.

ARTICLE 16 PROVISIONS REQUIRED BY LAW

§ 16.1 PROVISIONS DEEMED INSERTED

Each and every provision or obligation required by law and/or required to be inserted in the Contract 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.

§ 16.2 MINIMUM RATE OF WAGE AND SUPPLEMENT

§16.2.1 The minimum hourly wage rates (including supplements) to be paid shall not be less than that designated by the New York State Department of Labor, Bureau of Public Works and any redetermination of the prevailing rate of wages after the Contract is approved shall be deemed to be incorporated Herein by reference as of the effective date of redetermination and shall form a part of these Contract Documents.

§16.2.2 The minimum hourly supplement to be paid shall be in accordance with the prevailing practices in the locality where the work is located and shall be not less than that designated by the Industrial Commissioner. Supplements as defined in Section 220 of the Labor Law, as amended, means all remuneration for employees paid in any medium other than cash or reimbursements for expenses or any payments which are not wages within the meaning of the law, including, but not limited to, health, welfare, non-occupational disability, retirement, vacation benefits, holiday pay and life insurance.

§16.2.3 Contractor, by entering into the Agreement, certifies that it and each of its subcontractors have completed the required New York State Public Work Contractor and Subcontractor Registry in accordance with the New York State Department of Labor requirements, as amended from time to time. Acceptable proof of registration is required as part of the Contractor's bid submission and the Contractor's failure to provide such proof shall be cause for termination of this Agreement for cause. Contractor hereby indemnifies Owner against any and all claims, damages, penalties, and attorneys fees and costs incurred by Owner as a result of the Contractor's or a subcontractor's failure to register or re-register as required by the New York State Department of Labor.

§16.2.4 The Contract shall be forfeited by a Contractor and he shall not be entitled to receive any sum of money for any work performed hereunder on his or her second conviction for willfully paying less than the stipulated wage scale (including supplements) as provided in the Labor Law, Section 220, as amended, or the stipulated minimum hourly wage scale (including supplements) as provided in the Labor Law, Section 220-d, as amended.

§16.2.5 The Contractor shall comply with all requirements of the Labor Law Section 220-j, as amended, regarding mandatory electronic submission of certified payroll records.

§ 16.3 APPRENTICES

Where required by law apprentices must be registered, individually, under a bona fide program registered with the New York State Department of Labor. The allowable ratio of apprentices to journeymen in any craft classification shall not be greater than the ratio permitted to the contractor as to his or her work force on any job under the registered program. Any employee, who is not registered as above, shall be paid the prevailing wage rate for the classification of work he actually performed. The contractor or subcontractor will be required to furnish written evidence of the registration of his or her program and apprentices as well as of the appropriate ratios and wage rates for the area of construction, prior to using any apprentices on the contract work. (See Section 220.3-e).

§ 16.4 ASSIGNMENT OF PUBLIC CONTRACTS

As provided in Section 109 of the General Municipal Law, the Contractor is prohibited from assigning, transferring, conveying, subletting or otherwise disposing of this Contract, or of his or her right title, or interest therein, or his or her power to execute such contract or any other person or corporation without the previous consent in writing of the officer, board or agency awarding the Contract. If any Contractor, to whom any contract is let, granted and awarded, as required by law, by any officer, board or agency in a political subdivision, or of any district therein, shall without the previous written consent specified in subdivision one of this section, assign, transfer, convey, sublet or otherwise dispose of such contract, or his or her right, title or interest therein, or his or her power to execute such contract, to any other person or corporation, the officer, board or agency which let, made, granted, or awarded such contract shall revoke and annul such contract, and the political subdivision or district therein, as the case may be, and such officer, board or agency shall be relieved and discharged from any and all liability and obligations growing out of such contract to such contractor, and to the person or corporation to which such contract shall have been assigned, transferred, conveyed, sublet or otherwise disposed of, and such contractor, and his or her assignees, transferees or sublessees shall forfeit and lose all moneys, theretofore earned under such contract, except so much as may be required to pay his or her employees. The provisions of this section shall not hinder, prevent, or affect an assignment by any such contractor for the benefit of his or her creditors made pursuant to the laws of this state."

§ 16.5 PHOTO IDENTIFICATION & SCREENING

Prior to entering Owner's property, any individual performing services on behalf of Contractor on this capital project shall display a photo-identification badge at all times for identification and will be screened to evaluate their ability to work on Owner's property in accordance with applicable law and Owner's policies, all at Contractor's sole cost and expense. Pursuant to the Safe Schools Against Violence in Education Act ("SAVE" legislation) and Part 87 of the Regulations of the Commissioner of Education, any individual who, as a result of their work on this capital project, will move (or migrate) in and out of student occupied areas for more than five (5) days a year, must be fingerprinted. All contractors shall be responsible for full compliance with the applicable fingerprinting provisions of New York's SAVE Legislation and Part 87 of the Regulations of the Commissioner of Education at their sole cost and expense.

DRAFT AIA® Document A132™ – 2019

Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition

AGREEMENT made as of the « » day of « » in the year Two Thousand Twenty-six

BETWEEN the Owner:

« »

and the Contractor:

(Name, legal status, address, and other information)

TBD

for the portion of the following Project identified as the Contractor's Work in Article 2 of this Agreement:

(Name, location, and detailed description)

«King + King Project No.: »

The Construction Manager:

(Name, legal status, address, and other information)

« »

The Architect:

«King + King Architects, LLP
358 West Jefferson Street
Syracuse, New York 13202 »

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An Additions and Deletions Report that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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

This document is intended to be used in conjunction with AIA Documents A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition; B132™-2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™-2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser. AIA Document A232™-2019 is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

TABLE OF ARTICLES

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

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents comprised of: (1) this Agreement between the Owner and Contractor ("Agreement"), (2) Invitation to Bid, (3) Instructions to Bidders, (4) the General Conditions (AIA Document A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as modified), (5) Supplementary or other Conditions, if any, (6) Drawings, (7) Specifications, (8) Addenda issued prior to receipt of bids, including any bidding requirements in such Addenda, (9) The Contractor's Bid, (10) Modifications issued after execution of the Agreement, (11) the Contractor's Performance and Payment Bonds, (12) sample forms included with the bid solicitation, (13) other information furnished by the Owner in anticipation of receiving bids, and (14) other documents listed in the Agreement, if any, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. A Modification is: (1) a written amendment to the Contract Documents signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of additional Contract Documents, other than Modifications, appears in Article 9 below. Unless specifically enumerated in the Agreement, the Contract Documents do not include other documents.

ARTICLE 2 THE WORK OF THIS CONTRACT

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

ARTICLE 3 DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work is the date of this Agreement unless a different date is stated below, or provision is made for the date to be fixed in a notice to proceed issued by the Owner.

The date of commencement of the Work shall be:

(Check one of the following boxes.)

☐ [**«XX»**] The date of this Agreement.

☐ [**« »**] A date set forth in a notice to proceed issued by the Owner.

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

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

§ 3.3 Substantial Completion of the Project or Portions Thereof

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the date of Substantial Completion of the Work of all of the Contractors for the Project will be:

(Insert the date of Substantial Completion of the Work of all Contractors for the Project.)

<< >>

§ 3.4 When the Work of this Contract, or any Portion Thereof, is Substantially Complete

§ 3.4.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall substantially complete the entire Work of this Contract:

(Check one of the following boxes and complete the necessary information.)

[☐] By the following date:

§ 3.4.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work of this Contract are to be substantially complete prior to when the entire Work of this Contract shall be substantially complete, the Contractor shall substantially complete such portions by the following dates:

Portion of Work

Date to be substantially complete

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be a Stipulated Sum, in accordance with Section 4.2 below

§ 4.2 Stipulated Sum

§ 4.2.1 The Contract Sum shall be (\$), subject to additions and deductions as provided in the Contract Documents.

§ 4.2.2 Alternates

§ 4.2.2.1 Alternates, if any, included in the Contract Sum:

Item

Price

§ 4.2.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.

(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item

Price

Conditions for Acceptance

§ 4.2.3 Allowances, if any, included in the Contract Sum:

(Identify each allowance.)

Item

Price

§ 4.2.4 Unit prices, if any:

(Identify the item and state the unit price, and quantity limitations, if any, to which the unit price will be applicable.)

Item

Units and Limitations

Price per Unit (\$0.00)

<< >>

<< >>

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

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

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month.

§ 5.1.3 Provided that an Application for Payment is received by the Construction Manager not later than the 25th day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the 30th day of the following month. If an Application for Payment is received by the Construction Manager after the application date fixed above, payment of the amount certified shall be made by the Owner not later than 30 (thirty) days after the Construction Manager receives and approves the Application for Payment. Additional procedures for Applications for Payment are set forth in Article 9 of the General Conditions.

§ 5.1.4 Progress Payments Where the Contract Sum is Based on a Stipulated Sum

§ 5.1.4.1 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Construction Manager and Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.4.2 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment. All progress payments made previous to the last and final payment shall be based on estimates and the right is hereby reserved by the Architect for the Owner to make all due and proper corrections in any payment for any previous error.

§ 5.1.4.3 In accordance with AIA Document A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as modified, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.4.3.1 The amount of each progress payment shall first include:

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.4.3.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as modified;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as modified; and
- .5 Retainage withheld pursuant to Section 5.1.7 herein.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to when the Work of this Contract is substantially complete, the Owner shall withhold the following amount, as retainage, from the payment otherwise due:

« Five percent (5%) of the amount due, plus an amount necessary to satisfy any claims, liens, or judgments against the Contractor which have not been resolved, settled, or discharged.»

§ 5.1.7.2 Except as set forth in this Section 5.1.7.2, when the Work of this Contract is substantially complete, the Contractor may submit an Application for Payment that includes all or a portion of the retainage withheld from prior Applications for Payment pursuant to Section 5.1.7.1, but Owner is not obligated to release retainage until final completion and the receipt of the consent of the Contractor's surety to said release. Owner may withhold two hundred percent (200%) of the amount required to complete the Work plus an amount necessary to satisfy any claims, liens, or judgments against the Contractor which have not been resolved, settled, or discharged.

§ 5.2 Final Payment

§ 5.2.1 Final Payment Where the Contract Sum is Based on a Stipulated Sum

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

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as modified, and to satisfy other requirements, if any, which extend beyond final payment;
- .2 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect; and
- .3 the Contractor has fully performed all obligations under the Contract Documents and complied with the closeout and final payment requirements of the Contract Documents, including but not limited to Section 9.10 of AIA Document A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as modified.

§ 5.2.1.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the final Certificate for Payment or Project Certificate for Payment and Contractor has fully complied with all obligations under this Agreement including but not limited to all closeout and final payment requirements, and as follows:

« »

§ 5.2.1.3 In addition to other required items, including but not limited to those required under Section 9.10 of the General Conditions, the final Application for Payment must follow the submission and approval of the following, all in form and substance satisfactory to the Owner and in compliance with applicable law:

1. permanent certificate(s) of occupancy or use issued by the appropriate governmental authority;
2. all maintenance and operating manuals;
3. marked sets of field drawings and specifications reflecting "as-built" conditions;
4. reproducible drawings reflecting the location of any concealed utilities, mechanical and electrical systems, and their components;
5. Assignments of all guarantees and warranties to the Contractor from Subcontractors, materialmen, vendors, or manufacturers, together with a list of their names, addresses, telephone numbers, and corresponding guarantees and warranties from each; and
6. all other information and materials required to comply with the requirements of the Contract documents or reasonable requested by the Owner, Architect, or Construction Management

§ 5.2.1.4 Compliance with the New York Law

Notwithstanding Sections 5.1 and 5.2 above, all payments by the Owner to the Contractor will be made in accordance with Section 106-b(1)(a) of New York State General Municipal Law, or any successor statute governing payment by public owners to contractors on public work projects. The provisions of that section supersede, override, and replace anything in this Agreement or elsewhere in the Contract Documents that are or appear to be to the contrary, including but not limited to progress payments, retainage, substantial completion, reduction of retainage, reducing payments as a result of claims, liens, or judgments not suitably discharged, reducing payments for the value of incomplete work following substantial completion, and final completion. In addition, Contractor will make payments to its subcontractors and materialmen in accordance with Section 106-b(2) of New York State General Municipal Law, or any successor statute governing payment by contractors on public work projects to subcontractors and materialmen, which likewise supersede, override, and replace anything in this Agreement or elsewhere in the Contract Documents that are or appear to be to the contrary.

§ 5.3 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the New York Statutory Rate applicable to the obligations of Schools Districts.

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as Initial Decision Maker pursuant to Article 15 of AIA Document A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as modified, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.

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

<< >>
<< >>

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as modified, the method of binding dispute resolution shall be litigation with exclusive jurisdiction and venue in the New York State Supreme Court for the County where the project is located. Contractor waives any objection to jurisdiction and venue set forth herein.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 Where the Contract Sum is a Stipulated Sum

§ 7.1.1 The Contract may be terminated by the Owner, or the Contractor as provided in Article 14 of AIA Document A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as modified.

§ 7.1.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as modified.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as modified or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:

(Name, address, email address, and other information)

The Owner's Superintendent of Schools or designee.

§ 8.3 The Contractor's representative:

(Name, address, email address, and other information)

§ 8.4 The Contractor's representative shall not be changed without ten days' prior written notice to the Owner and compliance with the applicable provisions of AIA Document A232-2019 General Conditions of the Contract for Construction, Construction Manager as Advisor Edition, as modified.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance and bonds as set forth in AIA Document A232-2019 General Conditions of the Contract for Construction, Construction Manager as Advisor Edition, as modified, Article 11 – Insurance and Bonds.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as modified, may be given in accordance with a building information modeling exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with a building information modeling exhibit, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

<>

§ 8.8 Other provisions. The Contractor represents and warrants to the Owner (in addition to, and not in lieu of, any other representations and warranties in the Contract Documents or other liability imposed by law with respect to the Contractor's duties, obligations, and performance under this Agreement), which shall survive execution and delivery of this Agreement, any termination of this Agreement, and final completion of the Work, that:

- .1 it and its Subcontractors are financially solvent, able to pay all debts as they mature, and possess sufficient working capital to complete the Work and perform all obligations under this Agreement;
- .2 it is able to furnish the plant, tools, materials, supplies, equipment, and labor required to complete the Work and perform all obligations under this Agreement;
- .3 it is authorized to do business in the State of New York and is properly licensed by all governmental, public, and quasi-public authorities with jurisdiction over it, the Work, and the Project;
- .4 its execution of and performance under this Agreement are within its duly authorized powers;
- .5 its duly authorized representative visited the site of the Project, became familiar with the local and special conditions under which the Work will be performed, and correlated the observations during such visit(s) with the requirements of the Contract Documents; and
- .6 it possesses the level of experience and expertise in administering, constructing, managing, and superintending projects of the size, complexity, and nature of this Project necessary to perform the Work with proper care, skill, and diligence.

§ 8.9 Contractor by entering into the Agreement certifies that it and each of its subcontractors have completed the required New York State Public Work Contractor and Subcontractor Registry in accordance with the New York State Department of Labor requirements, as amended from time to time. Acceptable proof of registration is required as part of the Contractor's bid submission and the Contractor's failure to provide such proof shall be cause for termination of this Agreement for cause. Contractor hereby indemnifies Owner against any and all claims, damages, penalties, and attorneys fees and costs incurred by Owner as a result of the Contractor's or a subcontractor's failure to register or re-register as required by the New York State Department of Labor.

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 The documents listed in Article 1.
- .2 AIA Document A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition, as modified.
- .3 AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as modified.
- .4 Building Information Modeling Exhibit, if completed:

<>

- .5 Drawings: All Contract Document Drawings

- .6 Specifications: Specification Sections assigned to this Contract as Outlined in the Project Manual

- .7 Addenda, if any:

Number	Date	Pages
_____	_____	_____

- .8 Other Exhibits:

.9 Other documents: None.

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

OWNER (Signature)

« »« »

(Printed name and title)

CONTRACTOR (Signature)

« »« »

(Printed name and title)

SELECTED AIA DOCUMENTS

Contractors are required to obtain and use the following AIA documents, which can be ordered directly from the American Institute of Architects, at <https://aiacontracts.com/documents?productRole=general-contractor>

CONTRACTOR'S QUALIFICATION STATEMENT - AIA Document A305 (2020)

An owner preparing to request bids or to award a contract for a construction project often requires a means of verifying the background, references, and financial stability of any contractor being considered. These factors, along with the time frame for construction, are important for an owner to investigate. Using AIA Document A305-2020, the contractor may provide a sworn, notarized statement and appropriate attachments to elaborate on important aspects of the contractor's qualifications.

BID BOND - AIA Document A310 (2010)

AIA Document A310-2010, a simple, one-page form, establishes the maximum penal amount that may be due to the owner if the selected bidder fails to execute the contract or fails to provide any required performance and payment bonds.

PERFORMANCE BOND AND PAYMENT BOND - AIA Document **A312 (2010)**

AIA Document **A312** incorporates two bonds – one covering the contractor's performance, and the other covering the contractor's obligations to pay subcontractors and others for material and labor. In addition, AIA **A312** obligates the surety to act responsively to the owner's requests for discussions aimed at anticipating or preventing a contractor's default.

APPLICATION AND CERTIFICATION FOR PAYMENT, Construction Manager as Adviser Edition - AIA Document G732 (2019)

AIA Document **G732-2019** serves as both the contractor's application and the architect's certification. Its use can expedite payment and reduce the possibility of error. If the application is properly completed and acceptable to the architect, the architect's signature certifies to the owner that a payment in the amount indicated is due to the contractor. The form also allows the architect to certify an amount different than the amount applied for, with explanation provided by the architect. The standard AIA Document G703-1992, Continuation Sheet, is appropriate for use with **G732-2019**.

CONTINUATION SHEET – AIA Document G703 (1992)

AIA Document G703-1992, Continuation Sheet, and G732-2019, provide convenient and complete forms on which the contractor can apply for payment and the architect can certify that payment is due. The forms require the contractor to show the status of the contract sum to date, including the total dollar amount of the work completed and stored to date, the amount of retainage (if any), the total of previous payments, a summary of change orders, and the amount of current payment requested. AIA Document G703-1992 breaks the contract sum into portions of the work in accordance with the schedule of values prepared by the contractor as required by the general conditions. Note: The AIA does not publish a standard schedule of values form.

CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS – AIA Document G706 (1994)

The contractor submits this affidavit with the final request for payment, stating that all payrolls, bills for materials and equipment, and other indebtedness connected with the work for which the owner might be responsible has been paid or otherwise satisfied. AIA Document G706-1994 requires the contractor to list any indebtedness or known claims in connection with the construction contract that have not been paid or otherwise satisfied. The contractor may also be required to furnish a lien bond or indemnity bond to protect the owner with respect to each exception.

CONTRACTOR'S AFFIDAVIT OR RELEASE OF LIENS – AIA Document G706A (1994)

AIA Document G706A-1994 supports AIA Document G706-1994 in the event that the owner requires a sworn statement of the contractor stating that all releases or waivers of liens have been received. In such event, it is normal for the contractor to submit AIA Documents G706-1994 and G706A-1994 along with attached releases or waivers of liens for the contractor, all subcontractors, and others who may have lien rights against the owner's property. The contractor is required to list any exceptions to the sworn statement provided in G706A-1994 and may be required to furnish to the owner a lien bond or indemnity bond to protect the owner with respect to such exceptions.

CONSENT OF SURETY TO FINAL PAYMENT – AIA Document G707 (1994)

AIA Document G707-1994 is intended for use as a companion to AIA G706-1994, Contractor's Affidavit of Payment of Debts and Claims, on construction projects where the contractor is required to furnish a bond. By obtaining the surety's approval of final payment to the contractor and its agreement that final payment will not relieve the surety of any of its obligations, the owner may preserve its rights under the bond.

CONSENT OF SURETY TO FINAL REDUCTION IN OR PARTIAL RELEASE OF RETAINAGE – AIA Document G707A (1994)

This is a standard form for use when a surety company is involved and the owner/contractor agreement contains a clause whereby retainage is reduced during the course of the construction project. When duly executed, AIA Document G707A-1994 assures the owner that such reduction or partial release of retainage does not relieve the surety of its obligations.

SUPPLEMENTAL ATTACHMENT FOR ACORD CERTIFICATE OF INSURANCE 25 – AIA Document G715 (2017)

For use in adopting ACORD Form 25 to certify contractor insurance coverages required under standard form of agreement between Owner and Contractor. Because the ACORD certificate does not have space to show all coverages required in standard form of agreement between Owner and Contractor, the Supplemental Attachment form should be completed, signed by the contractor's insurance representative, and attached to the ACORD certificate.

UNCONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT – AIA Document G904 (2022)

AIA Document G904TM–2022 is intended for use when the Contractor is required to provide a waiver and release that unconditionally waives and releases the Contractor’s rights to assert a lien or payment bond claim for Work performed on the Project, except for those rights listed under “Exceptions” in the document. The Contractor’s waiver of rights is not conditioned upon the Contractor’s receipt of a future payment as described in the form. AIA Document G904 is typically executed as part of the documentation in support of a final payment.

SWORN CONSTRUCTION STATEMENT – AIA Document G907 (2022)

AIA Document G907TM–2022 is intended for use when the Contractor is required to provide a sworn statement describing all persons or entities having performed work or provided materials in furtherance of the Contractor’s Work for a period covered in a progress or final payment.

PRODUCER	THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.	
	INSURERS AFFORDING COVERAGE	NAIC #
INSURED	INSURER A:	
	INSURER B:	
	INSURER C:	
	INSURER D:	
	INSURER E:	

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	ADD'L INSRD	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
		GENERAL LIABILITY ☐ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS MADE ☐ OCCUR ☐ ☐ GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☐ PRO-JECT ☐ LOC				EACH OCCURRENCE	\$
						DAMAGE TO RENTED PREMISES (Ea occurrence)	\$
						MED EXP (Any one person)	\$
						PERSONAL & ADV INJURY	\$
						GENERAL AGGREGATE	\$
						PRODUCTS - COMP/OP AGG	\$
		AUTOMOBILE LIABILITY ☐ ANY AUTO ☐ ALL OWNED AUTOS ☐ SCHEDULED AUTOS ☐ HIRED AUTOS ☐ NON-OWNED AUTOS ☐				COMBINED SINGLE LIMIT (Ea accident)	\$
						BODILY INJURY (Per person)	\$
						BODILY INJURY (Per accident)	\$
						PROPERTY DAMAGE (Per accident)	\$
		GARAGE LIABILITY ☐ ANY AUTO ☐				AUTO ONLY - EA ACCIDENT	\$
						OTHER THAN AUTO ONLY: EA ACC	\$
						AGG	\$
		EXCESS/UMBRELLA LIABILITY ☐ OCCUR ☐ CLAIMS MADE ☐ DEDUCTIBLE ☐ RETENTION \$				EACH OCCURRENCE	\$
						AGGREGATE	\$
							\$
							\$
							\$
		WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? If yes, describe under SPECIAL PROVISIONS below				☐ WC STATU-TORY LIMITS ☐ OTH-ER	
						E.L. EACH ACCIDENT	\$
						E.L. DISEASE - EA EMPLOYEE	\$
						E.L. DISEASE - POLICY LIMIT	\$
		OTHER					

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES / EXCLUSIONS ADDED BY ENDORSEMENT / SPECIAL PROVISIONS

CERTIFICATE HOLDER

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL _____ DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE

IMPORTANT

If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

DISCLAIMER

The Certificate of Insurance on the reverse side of this form does not constitute a contract between the issuing insurer(s), authorized representative or producer, and the certificate holder, nor does it affirmatively or negatively amend, extend or alter the coverage afforded by the policies listed thereon.

SAMPLE
Refer to the General
Conditions for specific
insurance requirements.

INFORMATION AVAILABLE TO BIDDERS

PRE-RENOVATION SURVEY FOR ASBESTOS CONTAINING MATERIAL
TIOGA CENTRAL SCHOOL DISTRICT – MAINTENANCE BUILDING
2025 CAPITAL IMPROVEMENT PROJECT – PHASE 1
(Number of Pages - 20)
Prepared by:
Energy & Environment, LLC
April 2026

The materials and conditions indicated in these reports are offered as supplementary only. The reports are not inserted as part of the Contract Documents for this project, nor shall they be considered as instructions or specifications for execution of Work.

There is no guarantee, either expressed or implied, that the conditions indicated are representative of those actually existing throughout the area or in any part of it, or that unforeseen developments may not occur. Interpretation or extrapolation of the reports presented is the responsibility of the Contractor.



Energy & Environment, LLC
6443 Ridings Road, Suite 134
Syracuse, New York 13206

315 569 2139 tel
sean.hart@energyandenvironment.net

April 30, 2026

Mr. Joshua Roe
Superintendent
Tioga Central School District
27 5th Ave
Tioga Center, NY 13845

**Re: Tioga Central School District – Maintenance Building Roof
Pre-Renovation Survey for Asbestos Containing Materials**

Dear Mr. Roe:

This report and attachments represent Energy & Environment, LLC (E&E)'s report for the above-referenced project.

I Introduction

Project Team

E&E was retained by Tioga Central School District (TCSD) to conduct pre-renovation testing services to identify asbestos-containing materials (ACM) within the roof system of the Maintenance Building at Tioga Central School located at 27 5th Avenue, Tioga Center, New York (Facility) as directed by the Project Architect, King & King Architects as agent for TCSD.

The field work was conducted by E&E representative Sean Hart on April 9, 2026. Services consisted of the collection of suspect bulk material samples for asbestos and quantification of any identified ACM. Mr. Hart is New York State Department of Labor (NYSDOL) and United States Environmental Protection Agency (USEPA) certified asbestos building inspector. Copies of applicable certifications and E&E's license are provided in Attachment A.

II Discussion

Asbestos Survey Methodology

This survey was conducted in order to provide a document for the Facility and design team that would be sufficient to communicate the presence, location and quantity of identified ACM and/or presumed asbestos containing materials (PACM) in preparation of potential renovations to certain areas of the structure. The survey was conducted in accordance with the requirements of New York State Department of Labor (NYSDOL) Industrial Code Rule 56: *Asbestos*, cited as 12 NYCRR Part 56; and the United States Occupational Safety and Health Administration (OSHA) *Construction Standard for Asbestos*, cited as 29 CFR 1926.1101, as well as the United States Environmental Protection Agency (USEPA) Asbestos Hazard Emergency Response Act (AHERA), cited as 40 CFR, Part 763, Subpart E.

The survey methodology consists of four (4) basic components: 1) Review of existing building plans and records for references to asbestos used in building construction, renovation or repair; 2) Visual inspection for PACM and suspected miscellaneous ACM throughout the building; 3) Collection and laboratory analyses of samples of PACM and suspected miscellaneous ACM; and 4) Reporting of results of the survey.

Review of Existing Building Plans and Records

Existing building plans and records were requested. Records review of previously performed Asbestos Survey Reports were utilized to mitigate repetitive sampling.

The 2024 *Building Condition Survey, Inventory of Identified Asbestos Containing Materials* report, dated February 3, 2025, as prepared by Energy & Environment, LLC was reviewed. There was no sampling or inventory of any existing roof materials/components within this report.

Visual inspection for PACM and suspected miscellaneous ACM

During the inspection, ten (10) homogeneous suspect materials were identified within the areas of planned renovations. Homogeneity is established through observation of appearance: color and texture; application or use; and vintage or age of installation. No sampling is required if the inspector suspects that the materials are ACM and presumes them to be ACM. However, for a suspect material to be classified as non-ACM, a minimum number of two samples must be collected and laboratory analyses performed deeming the material non-asbestos containing.

Collection and Laboratory Analyses of Samples

Bulk material sampling of suspect asbestos-containing materials (ACM) was conducted within affected, accessible areas of the Facility. Samples were collected in accordance with the industry standard for pre-renovation building surveys. At least two samples of each homogeneous suspect material are collected randomly and preferably from different areas of the facility. Samples are not required to be collected from homogeneous materials that the certified inspector has determined to be non-suspect asbestos-containing material, such as fiberglass or rubber.

Samples are identified with unique sample numbers related to the material type. Sample numbers are established by use of acronyms of the material sampled, such as: "VCT" for *vinyl composition tile*; followed by a running homogeneous material number: 1, 2, 3..., indicating the homogeneous material; and then a letter: A, B, C..., representing the specific, random sample that was collected.

Friable samples were submitted for analysis by polarized light microscopy (PLM) with dispersion staining. Friable samples were analyzed utilizing serial analysis (homogeneous material samples are analyzed in series, stopping analysis at the first positive sample). Cellulose containing ceiling tiles and non-friable organically bound (NOB) materials, such as floor tile, mastic, or other vinyl or bituminous based materials, were analyzed in accordance with New York State Department of Health (DOH) requirements. NOBs are first subjected to an ashing and acid washing procedure to properly break down the material. The sample is then analyzed by PLM for asbestos content. If asbestos is found, the analysis is complete. However, a negative result must be confirmed by using transmission electron microscopy (TEM). All samples were analyzed by AmeriSci of New York, New York. Copies of the applicable laboratory certifications are provided in Attachment A. Please refer to Table 3.1 for a summary of bulk sample results including a listing of suspect homogenous materials identified during this survey.

III Laboratory Analytical Results

Asbestos-Containing Materials (ACM) Results

Laboratory reports and chain-of-custody forms are included in Attachment B. Bulk sample locations are shown on Figures in Attachment C. Bulk sample results are summarized in Table 3. 1 below, with positive asbestos containing material samples listed in **bold** font. The homogenous suspect ACM material sampled during this survey was determined by laboratory analyses to be negative for asbestos.

Table 3.1: Asbestos Containing Materials Sample Analysis Summary – Tioga CSD, Maintenance Building Roof

Sample No.	Material Description	Sample Location	Lab Results (% Asbestos)
BUR-01 A	Black Built Up Roofing – Top Layer (Beneath PVC Membrane)	Lower Roof, Core No. 1	NAD ¹
BUR-01 B		Lower Roof, Core No. 2	NAD
BUR-02 A	Black Built Up Roofing – Middle Layer (Beneath PVC Membrane)	Lower Roof, Core No. 1	NAD
BUR-02 B		Lower Roof, Core No. 2	NAD
VB-03 A	Black Built Up Roofing – Vapor Barrier Bottom Layer (Beneath PVC Membrane)	Lower Roof, Core No. 1	NAD
VB-03 B		Lower Roof, Core No. 2	NAD
FLASH-04 A	Silver/Black Silver Coat on Flashing	Lower Roof, South Parapet	9.5% Chrysotile
FLASH-04 B		Middle Roof, East Parapet	NA/PS²
PARACAP-05 A	Silver Parapet Cap Silver Coating	Lower Roof – East Parapet	9.5% Chrysotile
PARACAP-05 B		Middle Roof – South Parapet	NA/PS
FLCAULK-06 A	Black Flashing Caulk	Lower Roof South Parapet	<1% Chrysotile
FLCAULK-06 B		Lower Roof East Parapet	NAD
FLCAULK-07 A	Grey Flashing Caulk	Middle Roof - West	NAD
FLCAULK-07 B		Middle Roof - North	NAD
DEBRIS-08 A	Black BUR Debris on Middle Roof	Middle Roof – S/E	5.5% Chrysotile
DEBRIS-08 B		Middle Roof – S/E	NA/PS
FLASH-09 A	Silver/Black Parapet Flashing	Lower Roof - East	22% Chrysotile
FLASH-09 B		Lower Roof - West	NA/PS
FLASH-09 C		Middle Roof - West	NA/PS
BUR-10 A	Black Built-Up Roofing	Middle Roof – Core No. 5	NAD
BUR-10 B		Middle Roof – Core No. 6	NAD

¹ NAD = No Asbestos Detected

² NA/PS = Not Analyzed/Positive Stop

IV Report Findings

Through performance of the current survey and referencing previous survey data, E&E identified the following asbestos containing building materials/components within the scope and limitations of the proposed renovations to the building.

Table 4.1: Asbestos Containing Materials Summary – Tioga CSD, Maintenance Building Roof

Identified Asbestos Containing Material (with sample reference)	Location(s)	Condition	Approximate Quantity
		Friability	
Silver/Black Silver Coat on Flashing (FLASH-04)	Perimeter and Penetration Flashing with Silver Roof Coating applied to Parapet Cap Stones on Lower and Middle Roofs	Fair	960 Square Feet
Silver Parapet Cap Silver Coating (PARACAP-05)			
Black BUR Debris on Middle Roof (DEBRIS-08)		Non-Friable	
Silver/Black Parapet Flashing (FLASH-09)			

Sample locations and locations of identified ACM are indicated on the Sample Location Plan (SLP-01) included as an attachment to this report.

Mr. Joshua Roe
Tioga Central School District
Tioga Maintenance Building Roof
Pre-Renovation Survey for Asbestos Containing Materials
April 30, 2026
Page 5

V Recommendations

- **AHERA Documentation**

It is recommended that the District's AHERA reports be updated to reflect the current sampling information and be maintained accordingly.

- **On Site**

The completed hazardous material survey should be kept on the construction site throughout the duration of the remediation project.

VI Survey Limitations

E&E strives to identify all suspect building materials when conducting our surveys, however, it is possible that some suspect building materials may be present in inaccessible areas or beneath other building materials. In the event new suspect materials are encountered during renovations/demolition that were not previously sampled and identified, those materials should be sampled and analyzed prior to disturbance.

If you have any questions, please contact us at (315) 569-2139. It was a pleasure working with you on this project and I hope we can be of service in the future.

Sincerely,

Energy & Environment, LLC



Sean M. Hart

Managing Partner

sean.hart@energyandenvironment.net

Attachments: E&E & Laboratory Certifications
AmeriSci Laboratory Analysis Report - 226041971
Sample Location Plan – SLP-01

Attachment A
Certifications - E&E & Testing Laboratories



Department
of Labor

WORKING FOR YOU

DIVISION OF SAFETY & HEALTH LICENSE AND CERTIFICATE UNIT, STATE OFFICE CAMPUS, BLDG. 12, ALBANY, NY 12226

ASBESTOS HANDLING LICENSE

Energy & Environment, LLC
6443 Ridings Road, Suite 134, Syracuse, NY 13206

License Number: 74537

License Class: RESTRICTED

Date of Issue: 01/22/2026

Expiration Date: 01/31/2027

Duly Authorized Representative: Sean Hart

This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with regard to the conduct of an asbestos project, or (2) demonstrated lack of responsibility in the conduct of any job involving asbestos or asbestos material.

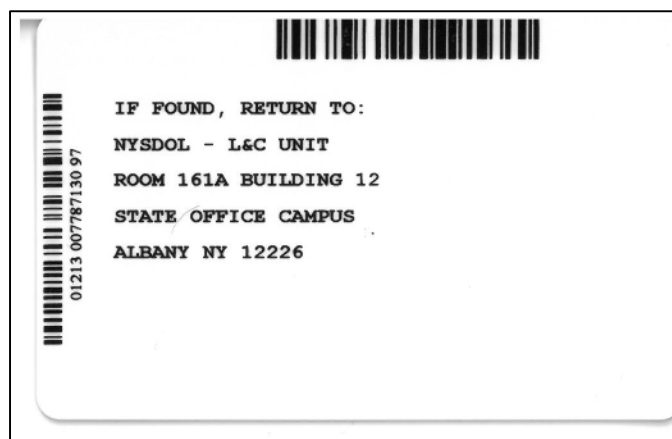
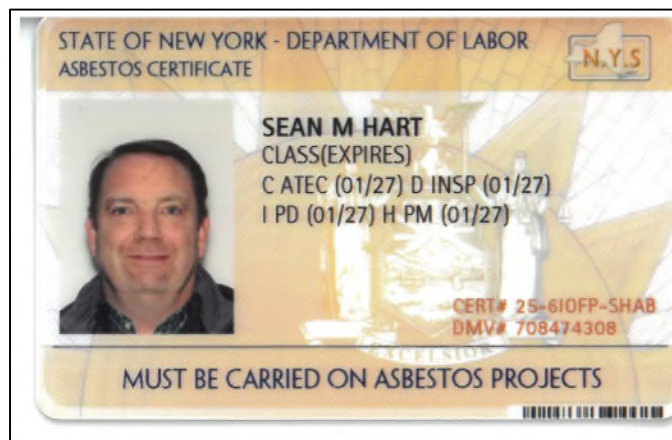
This license is valid only for the contractor named above and this license or a photocopy must be prominently displayed at the asbestos project worksite. This license verifies that all persons employed by the licensee on an asbestos project in New York State have been issued an Asbestos Certificate, appropriate for the type of work they perform, by the New York State Department of Labor.

Amy Phillips, Director
For the Commissioner of Labor

EXCELSIOR

NEW YORK STATE DEPARTMENT OF LABOR ASBESTOS HANDLING CERTIFICATE

Sean M. Hart – 25-610FP-SHAB



Legend - Identification of Letter Designations

A	Asbestos Handler	D	Asbestos Inspector	G	Asbestos Supervisor
B	Allied Trades	E	Management Planner	H	Asbestos Project Monitor
C	Air Sampling Technician	F	Operations & Maintenance	I	Asbestos Project Designer

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2027
Issued April 01, 2026

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. CORY M. PARNELL
AMERISCI RICHMOND
13635 GENITO RD
MIDLOTHIAN, VA 23112

NY Lab Id No: 10984

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Miscellaneous

Asbestos in Friable Material	Item 198.1 of Manual EPA 600/M4/82/020
Asbestos in Non-Friable Material-PLM	Item 198.6 of Manual (NOB by PLM)
Asbestos in Non-Friable Material-TEM	Item 198.4 of Manual
Asbestos-Vermiculite-Containing Mate	Item 198.8 of Manual



Serial No.: 72018

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at <https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/>, by phone (518) 485-5570 or by email to elap@health.ny.gov.

Attachment B
Testing Data - Laboratory Reports & Chain-of-Custody Forms



Please Reply To:

AmeriSci New York

117 EAST 30TH ST.
NEW YORK, NY 10016
TEL: (212) 679-8600 • FAX: (212) 679-3114

LABORATORY ELECTRONIC TRANSMITTAL

To: Sean Hart
Energy & Environment, LLC

Fax #:

Email: sean.hart@energyandenvironment.net,
mark.fiorini@energyandenvironment.net,
anthony.shortt@energyandenvironment.net

From: Khaalid W. Perine
AmeriSci Job #: 226041971
Subject: ELAP-PLM/TEM 5 day Results
Client Project: 26-030; Tioga Central School
District; Maintenance Building
Roof, 27 5th Ave Tioga Center;
NY, Pre-Renovation Sampling

Date: Friday, April 17, 2026

Time: 02:44:15

Comments:

Number of Pages: _____

(including cover sheet)

NOTE: Attached report is to be considered preliminary until final review with accompanying analysis summary letter is issued.

CONFIDENTIALITY NOTICE: Unless otherwise indicated, the information contained in this communication is confidential information intended for use of the individual named above. If the reader of this communication is not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is prohibited. If you have received this communication in error, please immediately notify the sender by telephone and return the original message to the above address via the US Postal Service at our expense. Samples are disposed of in 60 days or unless otherwise instructed by the protocol or special instructions in writing. Thank you.

Certified Analysis

Service 24 Hours A Day • 7 Days A Week

Competitive Prices

visit our web site - www.amerisci.com

Boston • Los Angeles • New York • Richmond

**AmeriSci New York**

117 EAST 30TH ST.
NEW YORK, NY 10016
TEL: (212) 679-8600 • FAX: (212) 679-3114

PLM Bulk Asbestos Report

Energy & Environment, LLC
Attn: Sean Hart
6443 Ridings Road, Suite 134

Syracuse, NY 13206

Date Received 4/11/2026 **AmeriSci Job #** 226041971
Date Examined 04/16/26 **P.O. #**
ELAP # 11480 **Page** 1 **of** 4
RE: 26-030; Tioga Central School District; Maintenance Building Roof,
27 5th Ave Tioga Center; NY, Pre-Renovation Sampling

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos	Notes
BUR-01A 01 Location: Lower Roof, Core No. 1 - Built Up Roofing - Top Layer (Beneath PVC Membrane), Black Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 12%	226041971-01	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Bo Sun on 04/16/26	1
BUR-01B 01 Location: Lower Roof, Core No. 2 - Built Up Roofing - Top Layer (Beneath PVC Membrane), Black Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 15%	226041971-02	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Bo Sun on 04/16/26	1
BUR-02A 02 Location: Lower Roof, Core No. 1 - Built Up Roofing - Middle Layer (Beneath PVC Membrane), Black Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 19%	226041971-03	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Bo Sun on 04/16/26	1
BUR-02B 02 Location: Lower Roof, Core No. 2 - Built Up Roofing - Middle Layer (Beneath PVC Membrane), Black Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 11%	226041971-04	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Bo Sun on 04/16/26	1
VB-03A 03 Location: Lower Roof, Core No. 1 - Built Up Roofing - Vapor Barrier Bottom Layer (Beneath PVC Membrane), Black Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 3.0%	226041971-05	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Bo Sun on 04/16/26	1

PLM Bulk Asbestos Report

26-030; Tioga Central School District; Maintenance Building Roof, 27
5th Ave Tioga Center; NY, Pre-Renovation Sampling

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos	Notes
VB-03B 03 Location: Lower Roof, Core No. 2 - Built Up Roofing - Vapor Barrier Bottom Layer (Beneath PVC Membrane), Black Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 3.2%	226041971-06	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Bo Sun on 04/16/26	1
FLASH-04A 04 Location: Lower Roof, South Parapet - Silver Coat On Flashing, Silver/Black Analyst Description: Black/Silver, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Chrysotile 9.5% Other Material: Non-fibrous 26%	226041971-07	Yes	9.5% (NOB by NYS ELAP 198.6) by Bo Sun on 04/16/26	
FLASH-04B 04 Location: Middle Roof, East Parapet - Silver Coat On Flashing, Silver/Black Analyst Description: Bulk Material Asbestos Types: Other Material:	226041971-08		NA/PS	
PARACAP-05A 05 Location: Lower Roof - East Parapet - Parapet Cap Silver Coating, Silver Analyst Description: Black/Silver, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Chrysotile 7.3% Other Material: Non-fibrous 54%	226041971-09	Yes	7.3% (NOB by NYS ELAP 198.6) by Bo Sun on 04/16/26	
PARACAP-05B 05 Location: Middle Roof - South Parapet - Parapet Cap Silver Coating, Silver Analyst Description: Bulk Material Asbestos Types: Other Material:	226041971-10		NA/PS	
FLCAULK-06A 06 Location: Lower Roof South Parapet - Flashing Caulk, Black Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Chrysotile <0.3 % pc Other Material: Non-fibrous 5.7%	226041971-11	Yes	Inconclusive - Trace Chrysotile detected at 1% or less (NOB by EPA 600/M4-82-020) by Bo Sun on 04/16/26	2
FLCAULK-06B 06 Location: Lower Roof East Parapet - Flashing Caulk, Black Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 1.0%	226041971-12	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Bo Sun on 04/16/26	1

Client Name: Energy & Environment, LLC

PLM Bulk Asbestos Report26-030; Tioga Central School District; Maintenance Building Roof, 27
5th Ave Tioga Center; NY, Pre-Renovation Sampling

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos	Notes
FLCAULK-07A 07 Location: Flashing Caulk, Grey Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 7.0%	226041971-13	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Bo Sun on 04/16/26	1
FLCAULK-07B 07 Location: Flashing Caulk, Grey Analyst Description: Gray, Heterogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 10%	226041971-14	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Bo Sun on 04/16/26	1
DEBRIS-08A 08 Location: Middle Roof - S/E - BUR Debris On Middle Roof, Black Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Chrysotile 5.5% Other Material: Non-fibrous 35%	226041971-15	Yes	5.5% (NOB by NYS ELAP 198.6) by Bo Sun on 04/16/26	
DEBRIS-08B 08 Location: Middle Roof - S/E - BUR Debris On Middle Roof, Black Analyst Description: Bulk Material Asbestos Types: Other Material:	226041971-16		NA/PS	
FLASH-09A 09 Location: Lower Roof - East - Parapet Flashing, Silver/Black Analyst Description: Black/Silver, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Chrysotile 22% Other Material: Non-fibrous 33%	226041971-17	Yes	22% (NOB by NYS ELAP 198.6) by Bo Sun on 04/16/26	
FLASH-09B 09 Location: Lower Roof - West - Parapet Flashing, Silver/Black Analyst Description: Bulk Material Asbestos Types: Other Material:	226041971-18		NA/PS	
FLASH-09C 09 Location: Middle Roof - West - Parapet Flashing, Silver/Black Analyst Description: Bulk Material Asbestos Types: Other Material:	226041971-19		NA/PS	

Client Name: Energy & Environment, LLC

PLM Bulk Asbestos Report26-030; Tioga Central School District; Maintenance Building Roof, 27
5th Ave Tioga Center; NY, Pre-Renovation Sampling

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos	Notes
BUR-10A 10 Location: Middle Roof - Core No. 5 - Built-Up Roofing, Black Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 63%	226041971-20	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Bo Sun on 04/16/26	1
BUR-10B 10 Location: Middle Roof - Core No. 6 - Built-Up Roofing, Black Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 7.0%	226041971-21	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Bo Sun on 04/16/26	1

Reporting Notes:

- (1) NAD results by NYS 198.6 are inconclusive and are not considered non-ACM
- (2) Trace <1% results by NYS 198.6 are inconclusive and are not considered non-ACM

Analyzed by: Bo Sun

Date: 4/16/2026



Reviewed by: Khaalid W. Perine



*NAD/NSD = no asbestos detected; NA = not analyzed; NA/PS = not analyzed/positive stop, (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; PLM Bulk Asbestos Analysis using Olympus, Model BH-2 Pol Scope, Microscope, Serial #: 229003, by Appd E to Subpt E, 40 CFR 763 quantified by either CVES or 400 pt ct as noted for each analysis (NVLAP 200546-0), ELAP PLM Method 198.1 for NY friable samples, which includes the identification and quantitation of vermiculite, or ELAP 198.6 for NOB samples, or EPA 400 pt ct by EPA 600-M4-82-020 (NY ELAP Lab 11480); Note: PLM is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non asbestos-containing in NY State (also see EPA Advisory for floor tile, FR 59,146,38970,8/1/94) National Institute of Standards and Technology Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the lab. This PLM report relates ONLY to the items tested. RI Cert AAL-094, CT Cert PH-0186, Mass Cert AA000054, NJ Lab ID #NY031.

END OF REPORT

Client Name: Energy & Environment, LLC

Table I
Summary of Bulk Asbestos Analysis Results by NYS ELAP 198.4

26-030; Tioga Central School District; Maintenance Building Roof, 27 5th Ave Tioga Center; NY, Pre-Renovation Sampling

AmeriSci Sample #	Client Sample#	HG Area	NOB Sample Weight (gram)	NOB Heat Sensitive Organic %	NOB Acid Soluble Inorganic %	NOB Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
01	BUR-01A	01	0.658	79.5	7.6	12.8	NAD	NAD
Location: Lower Roof, Core No. 1 - Built Up Roofing - Top Layer (Beneath PVC Membrane), Black								
02	BUR-01B	01	0.418	67.7	16.4	15.9	NAD	NAD
Location: Lower Roof, Core No. 2 - Built Up Roofing - Top Layer (Beneath PVC Membrane), Black								
03	BUR-02A	02	0.379	77.8	2.7	19.5	NAD	NAD
Location: Lower Roof, Core No. 1 - Built Up Roofing - Middle Layer (Beneath PVC Membrane), Black								
04	BUR-02B	02	0.619	76.3	12.4	11.4	NAD	NAD
Location: Lower Roof, Core No. 2 - Built Up Roofing - Middle Layer (Beneath PVC Membrane), Black								
05	VB-03A	03	0.334	90.1	6.9	3.0	NAD	NAD
Location: Lower Roof, Core No. 1 - Built Up Roofing - Vapor Barrier Bottom Layer (Beneath PVC Membrane), Black								
06	VB-03B	03	0.283	96.1	0.7	3.2	NAD	NAD
Location: Lower Roof, Core No. 2 - Built Up Roofing - Vapor Barrier Bottom Layer (Beneath PVC Membrane), Black								
07	FLASH-04A	04	0.225	63.0	1.5	26.1	Chrysotile 9.5	NA
Location: Lower Roof, South Parapet - Silver Coat On Flashing, Silver/Black								
08	FLASH-04B	04	0.253	61.6	2.8	35.6	NA/PS	NA
Location: Middle Roof, East Parapet - Silver Coat On Flashing, Silver/Black								
09	PARACAP-05A	05	0.327	37.0	1.2	54.5	Chrysotile 7.3	NA
Location: Lower Roof - East Parapet - Parapet Cap Silver Coating, Silver								
10	PARACAP-05B	05	0.227	49.9	3.9	46.2	NA/PS	NA
Location: Middle Roof - South Parapet - Parapet Cap Silver Coating, Silver								
11	FLCAULK-06A	06	0.385	93.0	1.2	5.5	Chrysotile <0.3	Chrysotile <1.0
Location: Lower Roof South Parapet - Flashing Caulk, Black								
12	FLCAULK-06B	06	0.386	98.8	0.2	1.0	NAD	NAD
Location: Lower Roof East Parapet - Flashing Caulk, Black								
13	FLCAULK-07A	07	0.255	49.5	43.6	7.0	NAD	NAD
Location: Flashing Caulk, Grey								
14	FLCAULK-07B	07	0.240	44.9	44.7	10.4	NAD	NAD
Location: Flashing Caulk, Grey								
15	DEBRIS-08A	08	0.636	54.1	4.8	35.6	Chrysotile 5.5	NA
Location: Middle Roof - S/E - BUR Debris On Middle Roof, Black								
16	DEBRIS-08B	08	0.516	39.8	1.8	58.4	NA/PS	NA
Location: Middle Roof - S/E - BUR Debris On Middle Roof, Black								

See Reporting notes on last page

Client Name: Energy & Environment, LLC

Table I
Summary of Bulk Asbestos Analysis Results by NYS ELAP 198.4

26-030; Tioga Central School District; Maintenance Building Roof, 27 5th Ave Tioga Center; NY, Pre-Renovation Sampling

AmeriSci Sample #	Client Sample#	HG Area	NOB Sample Weight (gram)	NOB Heat Sensitive Organic %	NOB Acid Soluble Inorganic %	NOB Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
17	FLASH-09A	09	0.449	42.9	1.4	33.4	Chrysotile 22	NA
Location: Lower Roof - East - Parapet Flashing, Silver/Black								
18	FLASH-09B	09	0.403	44.7	4.4	50.9	NA/PS	NA
Location: Lower Roof - West - Parapet Flashing, Silver/Black								
19	FLASH-09C	09	0.483	64.3	8.6	27.0	NA/PS	NA
Location: Middle Roof - West - Parapet Flashing, Silver/Black								
20	BUR-10A	10	0.352	11.7	25.2	63.1	NAD	NAD
Location: Middle Roof - Core No. 5 - Built-Up Roofing, Black								
21	BUR-10B	10	0.336	86.8	6.2	7.0	NAD	NAD
Location: Middle Roof - Core No. 6 - Built-Up Roofing, Black								

Analyzed by: Khaalid W. Perine

Date: 4/17/2026



Reviewed by: Khaalid W. Perine



**Quantitative Analysis (Semi/Full); Bulk Asbestos Analysis - PLM by Appd E to Subpt E, 40 CFR 763 or NYSDOH ELAP 198.1 for New York friable samples or NYSDOH ELAP 198.6 for New York NOB samples; TEM (Semi/Full) by EPA 600/R-93/116 (or NYSDOH ELAP 198.4; for New York samples). Analysis using Hitachi, Model H7000-Noran 7 System, Microscope, Serial #: 747-05-06. NAD = no asbestos detected during a quantitative analysis; NA = not analyzed; Trace = <1%; (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; Quantitation for beginning weights of <0.1 grams should be considered as qualitative only; Qualitative Analysis: Asbestos analysis results of "Present" or "NVA = No Visible Asbestos" represents results for Qualitative PLM or TEM Analysis only (no accreditation coverage available from any regulatory agency for qualitative analyses): NVLAP (PLM) 200546-0, NYSDOH ELAP Lab 11480, NJ Lab ID #NY031.

Warning Note: PLM limitation, only TEM will resolve fibers <0.25 micrometers in diameter. TEM bulk analysis is representative of the fine grained matrix material and may not be representative of non-uniformly dispersed debris for which PLM evaluation is recommended (i.e. soils and other heterogenous materials).

6443 Ridings Road
Suite 134
Syracuse, NY 13206
Ph. (315) 569-2139

Asbestos Bulk Sample Chain-of-Custody

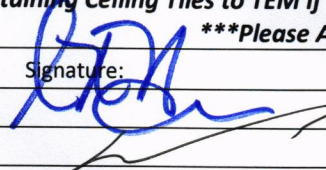
Client:	Tioga Central School District	Project #:	26-030
Project:	Maintenance Building Roof	Date Sampled:	April 10, 2026
	27 5th Ave Tioga Center, NY	Sampled By:	Sean M. Hart
	Pre-Renovation Sampling	NYSDOL Cert. No.:	25-610FP-SHAB

Analysis: ☐ PLM only ☒ NY ELAP PLM/TEM with NOB Prep. ☐ Other

Report Results to: Sean Hart			Email: sean.hart@energyandenvironment.net
Turn-Around Time: ☐ RUSH ☐ 24-Hr. ☐ 48-Hr. ☐ 72 Hr. ☒ 5 Day			
Homogenous Material #	Color	Sample Description	Sample Location
BUR-01	A	Built Up Roofing – Top Layer (Beneath PVC Membrane)	Lower Roof, Core No. 1
	B		Lower Roof, Core No. 2
BUR-02	A	Built Up Roofing – Middle Layer (Beneath PVC Membrane)	Lower Roof, Core No. 1
	B		Lower Roof, Core No. 2
VB-03	A	Built Up Roofing – Vapor Barrier Bottom Layer (Beneath PVC Membrane)	Lower Roof, Core No. 1
	B		Lower Roof, Core No. 2
FLASH-04	A	Silver Coat on Flashing	Lower Roof, South Parapet
	B		Middle Roof, East Parapet
PARACAP-05	A	Parapet Cap Silver Coating	Lower Roof – East Parapet
	B		Middle Roof – South Parapet
FLCAULK-06	A	Flashing Caulk	Lower Roof South Parapet
	B		Lower Roof East Parapet
FLCAULK-07	A	Flashing Caulk	
	B		
DEBRIS-08	A	BUR Debris on Middle Roof	Middle Roof – S/E
	B		Middle Roof – S/E
FLASH-09	A	Parapet Flashing	Lower Roof - East
	B		Lower Roof - West
	C		Middle Roof - West
BUR-10	A	Built-Up Roofing	Middle Roof – Core No. 5
	B		Middle Roof – Core No. 6

Send NOB's & Cellulose Containing Ceiling Tiles to TEM if <1% by PLM ****Stop at First Positive for each DUPLICATE OR TRIPLICATE Set****

Please Analyze ALL Joint Compound Samples

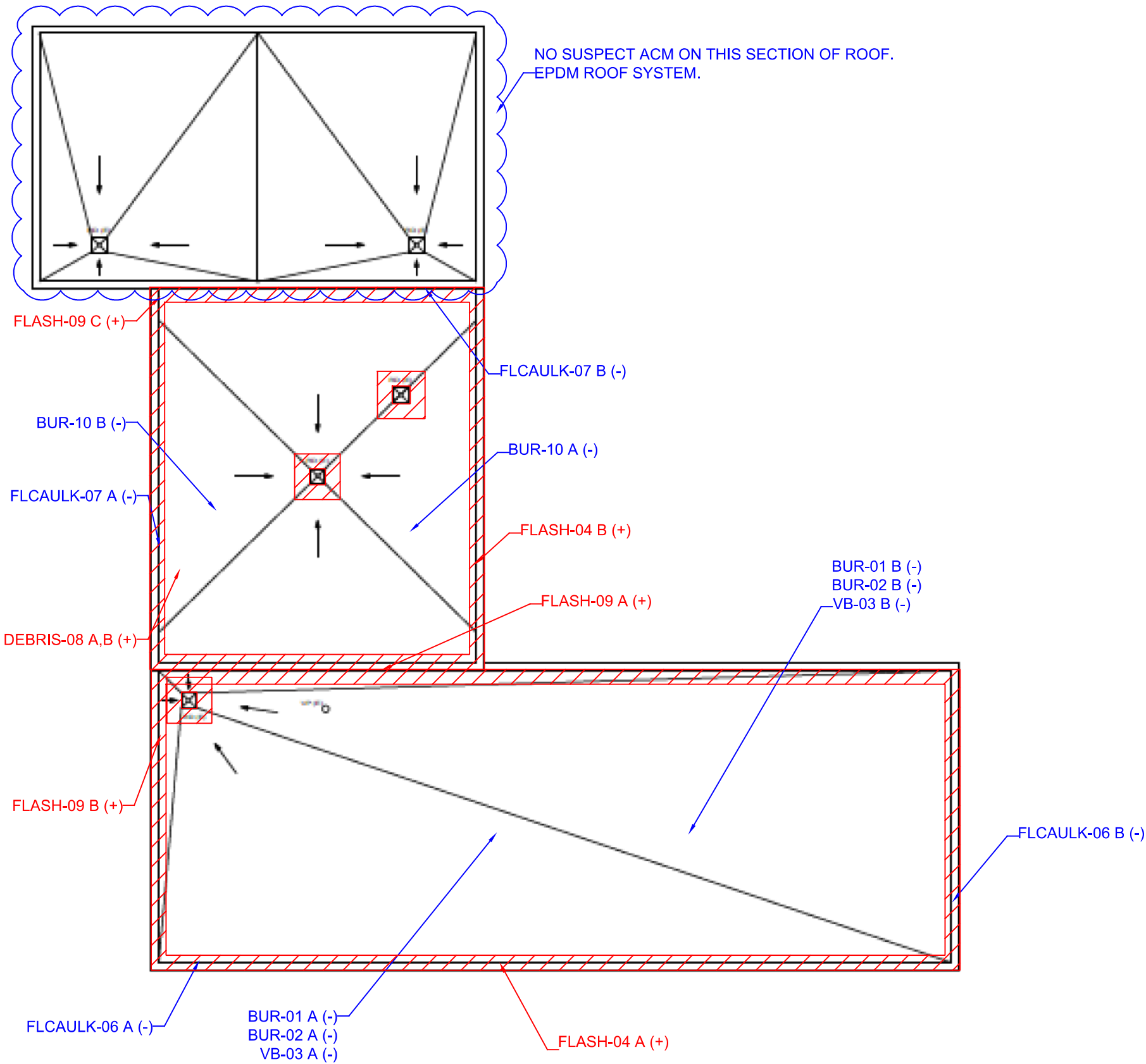
Chain of Custody:	Signature: 	Date/Time: 4/10/26	Comments:
Relinquished by:			Thank you! #226041971
Received by:			
Relinquished by:			
Received by:			

FIELD ID CODES

FLVCT- Floor Tile FLVCS- Sheet Flooring FLMAS- Floor Mastic RFSH- Roof Shingle RLRF- Rolled Roof CAULK- Caulking SR- Sheetrock JC- Joint Compound FLASH- Roof Flashing DI- Duct Insulation VAP- Vapor Barrier PIPE- Pipe Insulation ASPH- Asphalt Siding FIT- Pipe Fitting TRAN- Transite WLMAS- Wall Mastic GROUT- Tile Grout CET- Ceiling Tiles BPLAST- Base Plaster FPLAST- Finish Plaster

Attachment C
Sample Locations / Floor Plan Drawings

File: \\EESERVER\Shared Folders\Projects\2026\26-030_Tioga CSD_MB_Roof_PRJ\CADD\I&E Drawings\Working Files\26-030_SLP-01_4-29-2026.dwg Layout: SLP-01
User: seanh Plotted: Apr 30, 2026 - 10:44am



LEGEND

XXX-00 A,B (+) Asbestos Sample Location with (+/-)
XXX-00 A,B (-) Designation

Asbestos Containing Roof
Flashing/Silver Parapet Coating
Approximately 960 Square Feet

8				
7				
6				
5				
4				
3				
2				
1				
0				
REV.	DESCRIPTION	DWN	APP	DATE

Energy & Environment
6443 Ridings Road, Suite 134
Syracuse, New York 13206
(315) 569-2139


Tioga Central School District
5th Avenue, Tioga Center, New York

Tioga Central School District
Maintenance Building Roof Replacement
**Tioga CSD, Maintenance Building
Pre-Renovation Asbestos Survey
Sample Location Plan**

DRN: SMH	DSN:	CHK: MAF	APP:
Do not scale this document. All measurements must be obtained from stated dimensions.			
PROJECT NUMBER: 26-030			
DRAWING NUMBER: SLP-01			
Sheet 1 of 1			
REVISION			0

SECTION 010000 – LABOR RATES

1.0 PART 1 – GENERAL

1.1 WAGE RATE SCHEDULES

- A. The following New York State, Tioga County schedule of prevailing wage rates and supplements have been provided by the New York State Department of Labor.
- B. This prevailing wage rate schedule is listed on the New York State Department of Labor's web site (<http://wpp.labor.state.ny.us/wpp/showFindProject.do?method=showIt>) using PRC# 2026009766.
 - 1. It is each Contractor's responsibility to determine and pay the current wage rates and supplements, at the time of payment, throughout the term of the project.

2.0 PART 2 – PRODUCTS (Not Applicable)

3.0 PART 3 – EXECUTION (Not Applicable)

END OF SECTION 010000

SECTION 010640 – SAFETY REQUIREMENTS

PART 1 - GENERAL

1.1 PRIME CONTRACTOR RESPONSIBILITIES

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections apply to this Section and are requirements of all Prime Contractors, unless otherwise specified. These Contractor Safety Responsibilities (“Safety Responsibilities” or “Terms and Conditions”) are prerequisites and mandated for any work performed for Tioga Central School District (“Owner”) on the Capital Project (“Project”) project site. These Prime Contractor Safety Responsibilities are binding for all Prime Contractors (“Prime Contractor”) to which the Owner issues a Prime Contract (the “Prime Contract”).
- B. In these Safety Responsibilities:
 - 1. “Owner refers to the Owner or its affiliate, as applicable.
 - 2. “Prime Contractor” refers to the first-tier Prime Contractor holding the Prime Contract and all persons and Subcontractors at any tier who are responsible to that Prime Contractor, directly or indirectly. This includes but is not limited to: employees, Subcontractors, suppliers and vendors. Prime Contractors shall also be responsible for any visitors they invite or allow to have access to the site, in line with site-specific requirements.

1.2 GENERAL

- A. Prime Contractor will prepare a Prime Contractor’s Site-Specific Safety Plan (SSSP) that encompasses all of its work scope and activities. This plan will incorporate any owner/site specific requirements.
 - 1. Prime Contractor Site Specific Safety Plan (SSSP) shall include a Written Lead Compliance Program as required per Specification Section 02 8313 – LEAD-SAFE WORK PRACTICES.
- B. The Prime Contractor must:
 - 1. Submit and receive Owner’s approval of the Prime Contractors SSSP prior to the start of work.
 - 2. Update the SSSP as the work scope progresses, as conditions change or as other scopes or potential hazards are introduced.
 - 3. Ensure flow down of all SSSP requirements to all subcontractor at each tier.
- C. The Prime Contractor shall plan and execute all work while complying with:
 - 1. All current applicable laws (including but not limited legally binding federal, state and /or local codes, standards, and regulations regarding environmental, safety and/or health matters) as they occur.
 - a. If applicable laws and/or provisions of these Safety Responsibilities and the SSSP differ, the more stringent requirement, as determined by the Owner, shall apply.
 - 2. These Prime Contractor Safety Responsibilities / Terms and Conditions, processes and procedures, Owner Jobsite Safety process, the SSSP and all safety-related provisions of the Prime Contract.
 - 3. Any special or additional requirements communicated by the Owner.

- D. Prime Contractor is directly responsible for communicating to and ensuring adherence and accountability by all lower-tier contractors, subcontractors, suppliers, vendors, and their employees (including delivery drivers). To achieve this, the Prime Contractor will develop a defined “flow down” strategy and process to assure compliance, which shall include formal kick-off sessions with each tiered Prime Contractor, ongoing compliance monitoring and immediate response to deficiencies.
- E. In accordance with the terms and conditions of the Contract, the Owner or its agent, reserves the right to take appropriate actions to remedy any non-compliance at the Prime Contractor’s costs/expense. Owner also reserves the right to withhold payment pending correction and abatement of all noted or discussed hazards.

1.3 OPERATION / TRAINING / MEETINGS

- A. All Prime Contractor employees, employees, and each subcontractor employee, will read and acknowledge that they understand the SSSP and this Prime Contractor Safety Responsibilities document prior to starting work.
- B. Prime Contractor foremen, supervisors and superintendents assigned to the Owner’s sites will be OSHA 30-hour certified or in pursuit thereof. All Prime Contractor personnel will be trained and/or certified in accordance with all federal, state, city and owner standards. Owner reserves the authority to require additional training of Prime Contractor or Subcontractors personnel as deemed necessary or appropriate.
- C. In addition to the Owner orientation, the Prime Contractor or its Subcontractor shall provide an initial safety orientation to each new employee, including all sub-tier employees, prior to the start of work at the site. At a minimum, the orientation shall include training on general safety hazards, site-specific safety policies and procedures, personal protective equipment, fall protection, cranes and rigging, stored energy, injury reporting and protocols, emergency evacuation, and preferred medical providers. All orientations shall be documented by the Prime Contractor and verifiable by the Owner.
- D. Prime Contractor shall provide for Toolbox safety meetings for all employees under it direct or indirect supervision. A copy of the Toolbox topics including sign-off sheets must be maintained and submitted to Owner.
- E. Prime shall conduct periodic safety meetings with employees, foremen, and Subcontractors at all tiers to address safety, lessons learned and high-hazard activities.

1.4 INTENT OF DOCUMENTS

- A. Plans and Specifications supplement each other and require the contractor to provide in their bid:
 - 1. All labor, material, tools, equipment, supervision, layout, delivery, shop drawings, submittals, appurtenances, transportation, related items, safety monitoring, etc., necessary to complete the work described in the trade contract summary of work for each Contract.
 - 2. All systems complete and left in good and/or specified operating condition.
 - 3. Any apparatus, appliance, material or work not shown on Drawings but mentioned in Specifications, or vice versa.
 - 4. Any accessories, reasonably inferable from Drawings and Specifications and as may be required by the manufacturer of such materials or equipment necessary to make the work complete.
 - 5. Any item, labeled in one location but not another, is typical, reasonably inferable from Drawings and Specifications and as may be required.

- B. All sections of these Specifications as outlined in the trade contract summary of work shall apply in full to the contractor and their respective subcontractors. Notes or instructions shown on any one drawing apply to all other drawings.
- C. Install all work in compliance with Plans and Specifications in excess of requirements of codes and regulations and not contrary to them.
- D. The Contract Documents contemplate a finished piece of work of such character and quality as is reasonably inferable from them. The contractor shall provide full cooperation in coordinating the installation of its work with the work of others and to make its work complete and operational and in compliance with good practice. The contractor further acknowledges 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 the event of such conflict between and among the parts of the Contract Documents, the more expensive way of doing the work, the better the quality or the greater the quantity of material shall govern unless the Construction Manager otherwise directs.
- E. The Drawings are schematic in nature and are not intended to show every offset and detail. The Contractor shall make adequate provisions in their bid to accommodate the actual conditions without additional cost to the Owner.
- F. Prime Contractor's employees, Subcontractor and all sub-tier employees shall participate in daily sunrise huddles and job-wide safety stand-downs as held by the Owner.
- G. Prime Contractor and all Subcontractors management shall attend safety meetings as scheduled by the Owner.

1.5 MONITORING AND INSPECTION

- A. Prime Contractor shall conduct daily visual inspections of all work areas and a formal and documented weekly safety inspection, notifying Subcontractor and Owner of any recognized hazards. A copy of the Owner weekly jobsite inspection form, or equivalent, will be provided to Owner within 24 hours.
- B. Prime Contractor shall appoint and submit in writing to Owner the name of all "competent or qualified persons" (via OSHA standard) who are authorized and able to recognize and anticipate hazards. The qualifications of all these individuals shall be made available to Owner upon request. Such persons shall have authority to take prompt corrective action to abate hazards, including the authority to alter, modify or stop work in the process of hazard review or abatement.
- C. Prime Contractor shall submit to Owner, and appropriately post, emergency contact information, including work, mobile telephone numbers and email addresses for all applicable operations and safety management personnel.
- D. Prime Contractor will confirm and record headcount and hours worked each week by each tier Subcontractor and provide this report to the Owner at the end of each week. The report will contain a section to formally document any incident, near miss or injury.
- E. Prime Contractor shall:
 - 1. Develop a Hazard Communications program that follows the OSHA Hazard Communications and Globally Harmonized System (GHS) standard;
 - 2. Ensure that all employees are trained to address potential chemical exposures/interfaces;

3. Provide Owner with a copy of its written program (upon mobilization) and all SDS/MSDS's used in the performance of the Work.
 4. Maintain a copy of the program and library of SDS/MSDS used in the scope of work and also confirm program compliance by all tiered subcontractors.
- F. Where applicable and in line with regulatory standards, Prime Contractor shall develop a respiratory protection program to include pulmonary baselines and fit testing per regulatory guidelines. A copy of the respiratory protection program will be provided to Owner prior to the start of work activity. All respirators will be used in accordance with OSHA standard, Prime Contractors program shall cover the requirements for Appendix D, Voluntary Respirator Use. The Prime Contractor will retain all signed copies of Appendix D used on the project and provide copies to Owner on request.

1.6 INCIDENT PREVENTION, EMERGENCY PREPAREDNESS

- A. Prime Contractors will ensure the development of a comprehensive severe weather plan to address extreme cold, heat and related conditions. Prime Contractor will also adhere to the Owner's program and any requirements established therein.
- B. All Prime Contractor employees and Subcontractors at all tiers will be actively engaged in the Owner's Stop Work Authority (SWA) program. The Prime Contractor will highlight this program during kick-off, orientation and other employee forums. The Stop Work Program grants each employee the authority to pause or stop work to ask questions or to simply verify that conditions are safe. Employees that use the Stop Work Authority Program will not be retaliated against in any form.
- C. Prime Contractor shall use the Owner's Task Hazard Analysis (THA) pre-planning process to address each separate work task/activity prior to the start of work on each shift. Prime Contractor will – with participation by subcontractors and employees – complete a [THA form](#) (or an Owner-approved alternative form) for each task. Each employee will start each shift having completed and engaged in at least one THA. Any changes in task or condition will warrant a new or modified THA. Prime Contractor will submit copies of each THA to Owner for review daily.
- D. Prime Contractor shall provide adequate safety measures and controls to address potential occupational exposures such as gases, fumes, silica, dusts, chemicals, noise, and confined spaces. See the related Owner policies and standards. A specific plan to address silica is required prior to the start of work activity.
- E. Prime Contractor shall provide Personal Protective Equipment (PPE) to all employees as required per [Owner PPE requirements](#) or regulatory requirements. Prime Contractor and all tiers shall take immediate corrective action for non-compliance up to and including removal toolbox
- F. Prime Contractor will provide competent flaggers as needed for the safe access and egress of all heavy loads, trucks and equipment. Flaggers shall be trained in accordance with OSHA, DOT or other state or federal standards.
- G. Prime Contractor shall implement immediate corrective action to eliminate unsafe practices and conditions as they are observed or reported. In cases where immediate or "On the Spot" actions are not taken, Owner reserves the option to abate the condition at the expense of the Prime Contractor, Subcontractor or both.
- H. Prime Contractor shall comply with Specification Section 10 4400 – LEAD-SAFE WORK PRACTICES.

1.7 INCIDENT REPORTING AND RETURN TO WORK

- A. Prime Contractor shall notify Owner within Two (2) hours of any incident involving injury/damage (or near miss of injury/damage) to any person or property. In addition, each Prime Contractor shall investigate such incidents, document findings in an incident report, and submit the report to the Owner, or Owner's Agent, within 24 hours of the incident. All incident reports must contain, but not be limited to:
 - 1. Date of Incident
 - 2. Chain of events leading to incident
 - 3. Witness Statements
 - 4. Impacted or injured parties (i.e., name, craft, position)
 - 5. Impacted property and estimated damage costs
 - 6. Immediate corrective measures taken
 - 7. Lessons learned for wider application by Prime Contractor or Owner
 - 8. Other items as requested by the Owner
- B. The Owner, or Owner's Agent, will conduct formal incident review in response to any serious incidents. The Prime Contractor will participate and be represented by site and corporate management during any scheduled incident review sessions. Injured parties and witnesses to the incident may also be required to attend.
- C. Prime Contractor shall implement an aggressive Return to Work and Modified Work policy and procedure. The procedure will include, but not be limited to:
 - 1. Identification of preferred local occupational medical provider.
 - 2. Prime Contractor approved work assignments and light duty work options for any and all injured parties who receive a physician's restricted-duty diagnosis. Owner reserves the right and authority to penalize Prime Contractor up to \$1,500.00 per day for each day a fully released or restricted duty employee is not accommodated for modified work.

1.8 TOOLS AND EQUIPMENT

- A. All equipment and tools shall be used per the manufacturer's recommendations and equipment with manufacturer-provided handles, safeguards and shields.
- B. Prime Contractor will ensure the inspection of all hand tools and extension cords prior to their use and immediately remove any defective items from service.
- C. Prime Contractor will ensure that no power tools have positive locking trigger. Each power tool shall be equipped with a constant pressure trigger.
- D. Prime Contractor Prime Contractor shall ensure that all power tools and cords are protected by an operable Ground Fault Circuit Interrupter (GFCI) plugged in at the power source or GFCI circuit breaker or GFCI "pigtail." Above 110V, all cord sets and plug sets shall be protected via GFCI or Assured Equipment Grounding Conductor Program (AEGCP).
- E. In addition to specific requirements established in OSHA §1926.304 and .304(f), Owner requires all Prime Contractor woodworking tools and machinery meet other applicable requirements of ANSI 01.1-1961. Section 3.1.3(c) of the ANSI standard. On applications where injury to the operator might result if motors were to restart after power failures, the Prime Contractor must incorporate an effective means of preventing the machine from automatically restarting upon restoration of power.

1.9 WORKING FROM HEIGHTS / FALL PROTECTION

- A. Prime Contractor will utilize a 100% 6-foot fall protection policy and program. Each person on a walking or working surface with an unprotected side or edge that is 6 feet or more above the next lower level shall be protected from falls using the Hierarchy of Controls (elimination, substitution, engineering, administrative, and personal protective equipment). As such, personal fall arrest systems (PFAS) shall be considered as the last option. All personnel at all tiers will comply with this requirement, including Roofers, Ironworkers, Erectors, and Connectors, regardless of any exemptions that might otherwise be available under OSHA, trade agreements or other applicable laws.
- B. The following exceptions to the 100% 6-foot fall protection requirement may exist, depending on site-specific requirements:
 - 1. Proper use of a step ladder (up to 12 feet) on a stable and level foundation.
 - 2. Proper use of an approved and inspected extension ladder (up to 24 feet) for movement between levels (not as a working platform).
 - 3. Step and extension ladders shall be positioned so as not to expose the employee to a secondary fall hazard (ex; window opening, stairway, etc.)
 - 4. Other extraordinary circumstances only if (i) Prime Contractor's competent person determines that neither engineering controls nor a PFAS would be feasible; (ii) Owner provides prior approval in writing; and (iii) the method of proceeding complies with all applicable laws.
- C. Equipment, such as scaffolding and ladders, shall be inspected for defects by Prime Contractor's competent person prior to use. Any equipment found to be defective or unserviceable will be immediately taken out of service and removed from site.
- D. Job-made shall be built in accordance with ANSI A14.4 and OSHA standards and only after an alternate fall protection plan has been submitted and approved by the Owner or its Agent.
- E. Prime Contractor shall ensure that any wooden or aluminum ladder used is approved through Owner ESH. These ladders are to be used only if all other approved methods have been deemed infeasible.
- F. When operating/working in scissor lifts and from aerial work platforms, all Prime Contractor employees shall use personal fall restraint systems.
 - 1. Prime Contractors will ensure any scissor lifts delivered on site are equipped with manufacturer approved anchor points, and employees must be tied off to those anchor points.
 - 2. Standing on mid-rails and handrails is strictly prohibited and considered an imminent danger violation.
 - 3. Blocks or steps are not permitted for stepping or to access a higher elevations.

1.10 CRANES AND RIGGING

- A. When working with mobile cranes or tower cranes, Prime Contractor shall appoint a certified signal person and qualified rigger prior to any lift. Documentation on qualifications/certifications will be provided to the Owner. The Prime Contractor will adhere to all current and subsequent Owner crane and rigging policies and practices.

1.11 STORED ENERGY

- A. All electrical tasks will be carried out in compliance with NFPA 70E, OSHA and [Owners Stored Energy program](#). Additionally, Prime Contractor will only handle or engage de-energized wiring or circuits after appropriate Lock and Tag and a secondary confirmation of source isolation via a working voltage detector or similar instrument.
- B. Prime Contractor shall ensure that all work on live electrical components is performed only when all other alternatives have been deemed infeasible. Any work on live/energized sources requires advance notice and written approval and consent by Owner's team (superintendent, ESH, senior management) and the owner (if required) – no exceptions.
- C. Prime Contractor shall ensure that all permanent and temporary electrical deficiencies are locked and labeled with controlled access. All de-energized electrical and power systems will be locked out in accordance with appropriate lock and tagging guidelines.
- D. Prime Contractor shall develop and submit a Pressure Testing Safety Plan to the Owner or owner's agent prior to performing any pneumatic, hydrostatic or other pressure testing of pipes or vessels. Prime Contractor shall not use pneumatic testing as a testing medium unless required by the design and approved well in advance by the Owner and owner's agent.
- E. Pressure Testing Policy and Procedures.
 - 1. Definitions:
 - a. Hydrostatic Testing – The utilization of a fluid (typically water) as the medium for testing pressure.
 - b. Pneumatic Testing – The utilization of a gas (typically air or nitrogen) as the medium for testing pressure
 - 2. Pressure Test Permit: Planning & Approval
 - a. Develop a pressure test safety plan.
 - i. Hydrostatic pressure testing reviewed by EHS.
 - ii. Pneumatic pressure testing reviewed and signed by the Construction Manager.
 - b. Identify the prime contractors' competent person(s).
 - c. Submit verification of training for all employees involved in the testing procedures.
 - d. Establish the proper exclusion zones and mark a print showing along with barricading.
 - i. Adequate hydrostatic pressure testing exclusion zones must be established; determined by the project team.
 - ii. Pneumatic pressure testing exclusion zones must be a minimum of 11 feet or what is agreed by the Construction Manager.
 - e. Utilize cinch sacks on all caps or pipe ends that could potentially be worked on, removed, or could expose employees to sudden release of stored energy.
 - f. Pressure testing areas must be clearly identified with "Danger – Under Pressure" tags or signs.
 - g. Identify all relief mechanisms to be used in the de-pressurization process. This is best shown on the print outlining the piping and barricading area.
 - h. Notify all site personnel of the upcoming test, at a minimum 24 – 48 hours in advance.
 - i. Performing the test during off hours, weekends, or when there are limited personnel in the test area is highly preferred.
- F. Lockout / Tagout Procedures
 - 1. This procedure establishes the minimum requirements for lock out and tag out of energy isolating devices. It shall be used to ensure that all authorized and affected employees working on or near energized equipment are protected from potentially hazardous release of any stored energy.

2. In addition to this procedure, prime contractors and subcontractors who maintain or service equipment where the unexpected start-up may cause injuries shall develop and use a written Lockout/Tagout program that complies with OSHA 29 CFR 1910.147.
3. Authorization / Responsibility
 - a. Only authorized and trained personnel in 'Lock Out / Tag Out' procedures will be allowed to perform lock out / tag out.
 - b. It shall be the responsibility of the Prime Contractor to ensure proof of training has been received and validate for all personnel performing Lock Out / Tag Out. Such proof of training will be delivered to the Construction Manager and maintained on site.
4. RULES
 - a. Locks, chains, wedges or other hardware which meets the requirements defined in 1910.147 (5) (ii) shall be provided by the prime contractor who is to apply such device.
 - b. Locks for lockout devices shall be singularly identified and have only one key. They shall be the only devices used for controlling energy and shall not be used for other purposes.
 - c. All stored energy, machines and or equipment shall be locked out to protect against accidental or inadvertent operation when such operation could cause injury to personnel. Lockout will also apply when working on or near deenergized sore energy.
 - d. No worker shall attempt to operate any switch, valve, or other energy – isolating device which is lockout.
 - e. Each lockout device shall only be removed by the employee who applied the device.
 - f. No locked-out system will be energized without the knowledge and approval of the Construction Manager. This is to ensure that such system is ready for energization in accordance with the project schedule and start up requirements.
5. Preparation for Shutdown
 - a. No system shall be energized, de-energized or connected to an existing system without a pre-planning session with consisting at a minimum of the Construction Management Team (Project Manager and/or Superintendent), controlling Prime contractor for the installed system and any Prime contractors who could be inadvertently affected by such system being energized, de-energized or connected to an existing system. The owner and their representative will be in attendance for such pre-planning as required.
 - b. In preparation for lockout, an initial survey must be made to locate and identify all energy isolating devices to be certain which switch, valve, or other energy isolating devices applied to the stored energy, equipment or machine to be locked out. More than one energy source (electrical, hydraulic, pneumatic, chemical, thermal, or others) may be involved.
 - c. Before an authorized or affected worker turns off any system, equipment or machine, the authorized worker must have knowledge of the type and magnitude of the energy to be controlled, and methods to the energy.

- d. A Task Hazard Analysis (THA) shall be completed and appropriate permit obtained prior to work or execution on all energized sources and prior to lock-out/tag-out.
 - e. The Construction Manager for the project shall have a lock and tag on the System(s) to prevent accidental release of energy at the point of main energy source. Any potential secondary energy points whereas the system may be energized will also be locked out by the Construction Manager.
6. Machine or Equipment Shutdown
- a. All affected workers shall be notified that a lockout system is to be utilized and the reason for it, before the controls are applied.
 - b. If machine or equipment is operating, shut it down by normal stopping procedures.
7. Machine or Equipment Isolation
- a. Physically locate and operate the switch, valve, or other energy isolating devices so that the equipment is isolated from its energy sources and apply adequate hardware.
8. Stored Energy
- a. All stored or residual energy in pneumatic, hydrostatic, hydraulic, mechanical systems, etc. shall be blocked or dissipated. If there is a possibility of reaccumulating stored energy, verification of isolation must be continued until testing, servicing, or maintenance is complete.
9. Electrical Panels
- a. During new construction or renovations, feeder lines shall not be connected to any operable panels until all work on the circuit is completed.
 - b. All electrical panels shall be controlled and accessed solely by qualified Electricians or in an emergency, a competent Construction Manager representative.
 - c. When energized, all electrical panels will be clearly labeled with appropriate warning signage. The signage will be clear and visible for all workers and the owner's staff.
 - d. All breakers in all electrical panels shall be clearly and legibly marked and identified.
 - e. The Lock-Out/Tag-Out process will be carefully implemented and monitored for all work on energized circuits. Additionally, the company and all subcontractors will follow and comply with all provisions of OSHA Standard 1926.417.
 - f. All equipment, panels and circuits that are de-energized must be rendered inoperative and include a physical lock and tag. This directive also applies to each breaker in each temporary or permanent electrical panels. This applies to all voltages, including 110.
 - g. The Electrical Contractor shall provide the Construction Manager a list of competent persons how are responsible for the implementation of OSHA Subpart K 1926.400.
10. Lockout Device Application
- a. Authorized workers shall lockout the energy isolating devices with assigned individual locks.

- b. Lockout devices shall be applied so that they will hold the energy isolating devices in a 'Neutral' or 'off' position.

11. Verification of Isolation

- a. Prior to starting work on any stored energy system, equipment or machinery that has been locked and after ensuring that no personnel are exposed, the authorized worker shall confirm the absence of energy using a secondary means of verification, i.e. voltmeters, checking pressure gauges, proper testing equipment, or engaging start buttons, prior to working on potentially energized systems.

12. Removal of Lockout Devices

- a. After the testing, servicing or maintenance is completed and before the lockout devices are removed and energy is restored, the following sequence of activities shall be completed by the authorized worker(s).
- b. If the authorized worker who applied the lock is not available, the supervisor shall take the following steps:
 - i. Attempts to contact the individual must be taken. It is best if the individual can return to remove his/her own lock before proceeding with this process.
 - ii. Document each step on a specific THA for the lock removal process.
 - iii. Clear the stored energy system, equipment or machinery of tools and materials.
 - iv. Remove workers & staff from the stored energy, equipment or machinery areas.
 - v. Removed the lockout device.
 - vi. Energize and proceed with testing or positioning.
 - vii. Deenergize all systems and reapply energy control measures in accordance with 'Lockout Procedures and Techniques'.

1.12 VIOLATIONS, DISCIPLINARY ACTION

- A. Prime Contractor and all tiered subcontractors shall adhere to and enforce all requirements established by Owner or Agent's Safety Disciplinary Actions and Imminent Dangers procedure.
 - 1. At the discretion of Owner management, serious or imminent danger violations will warrant immediate action, up to and including termination and/or removal from the project.
 - 2. Any supervisor or manager who knowingly exposes employees to imminent danger situations is subject to immediate termination.
- B. Imminent danger situations include, but are not limited to, the following:
 - 1. Violation of Stored Energy Program and Lockout/Tagout Procedure, including removing another lockout sign or tag without authorization and working on equipment or circuits that could be accidentally or unintentionally energized. In all cases, failure to develop, submit or follow a pipe/vessel pressure test plan will be considered an imminent danger violation and grounds for termination or removal from site.

2. Violation of the 100% 6-Foot Fall Protection and Prevention Policy, including standing on top of first rung of a step ladder of any height.
 3. Violation of the Cranes and Rigging Policy, including operating a crane (lifting, swinging or loading) adjacent to energized power lines less than 20 feet away and using rigging equipment in excess of the recommended safe workload capacity.
 4. Violation of the Confined Space Procedure, including unauthorized entry to a confined space.
 5. Violation of the Excavation/Trenching Procedure, including working in or authorizing work in unsloped, unshored or unprotected trenches or excavations.
 6. Violation of the mobile equipment procedures including operating mobile equipment (ex. Fork lifts and skid steers) without appropriate certification, training, authorization or inspection.
 7. Violation of procedures related to caught-in/struck-by hazards, including entering the line of fire (i.e. walking under a suspended load).
 8. Violation of the Drug and Alcohol Policy, including distribution or working under the influence of mind-altering substances.
 9. Accessing exclusion zones/red barricaded areas without authorization.
 10. Conscious disregard of a 'DO NOT OPERATE', 'DANGER' or 'WARNING' sign.
 11. Intentionally removing a guard or safety mechanism designed for employee safety.
- C. Additional items that warrant immediate removal or termination include: fighting and verbal abuse, exhibiting open disregard for Owner safety or project safety programs, theft, sabotage, firearms, smoking in non-designated areas, falsifying a company document (i.e. accident investigation, testimony, equipment inspection, certifications, etc.)
- D. If Owner or its agent determines safety performance standards are not being met, Prime Contractor may be required to designate a full-time, on site, dedicated safety professional. This determination may be based upon: on site injury/illness rates; safety violations/concerns issued by Owner or a regulatory authority; or lack of participation in required safety forums, activities and meetings. Any designated safety professional shall meet the qualification requirements as defined by Owner.

1.13 WORKSITE RULES

- A. The Owner and its Agents, reserves the right to remove a party, employee, or contractor from the site at any time and for any reason.
- B. The following work rules are important to the safety of all personnel on Owner sites and shall be adhered to at all times.
1. Possession of or working under the influence of alcohol or drugs is prohibited and subject to immediate dismissal.
 2. Hazard Communication and Lockout/Tag-out Programs shall be observed.
 3. Unsafe conditions or acts, along with any accidents or near misses shall be reported to your immediate supervisor and am member of the Owner's management team.
 4. Appropriate Personal Protective Equipment shall be worn at all times. Minimum requirements in construction areas are hard hats, safety glasses, high-visibility vests/shirts/jackets and durable boots covering the feet and ankle. Task appropriate work gloves are required for all employees at all times while on site.
 5. Modifying or altering any piece of personal protective equipment is strictly prohibited.
 6. All Prime Contractor delivery drivers, vendors, trucking or concrete drivers will adhere to all site PPE requirements.
 7. Work wear shall not be offensive or inappropriate.
 8. Maintaining good housekeeping is mandatory at all times. Prime contractor is responsible for ensuring daily clean up.

9. "Horseplay", harassment, fighting, workplace violence, and other inappropriate behaviors are strictly prohibited.
10. Taking photos, picture or video is limited to verifying the proper execution of work. Only authorized members of management shall take photos, pictures, or video of incidents and accidents that occur.
11. Tampering with fire protection, firefighting or life safety equipment, or removing it from its assigned location, is prohibited and grounds for immediate termination/removal.
12. Only authorized, licensed and properly instructed site employees shall operate machinery, equipment, vehicles, and tools. This includes but is not limited to cranes, forklifts, lulls, skid steers, front-end loaders, flatbed trucks, nail guns, and drill presses.
13. Vehicles are to be operated and driven in a safe manner at all times.
14. Firearms are prohibited on site or in parking lots at all times.
15. No one should enter barricaded areas without proper authorization.
16. Adhere to "No Smoking" rules. Smoking and the use of tobacco products are prohibited by New York State law on all School grounds.
17. All gasoline engines shall be shut off and allowed to cool prior to refueling.
18. The use of plastic gas cans for storing combustible/flammable liquids on the site is prohibited. Use only approved metal containers.
19. The use of FM/AM radios, iPods and MP3 players on site is prohibited at all times.
20. Cell phones are strictly prohibited while performing trade / craft work. Bluetooth headsets and Augmented Reality / AI glasses are prohibited unless used in the execution of a specific task or job.

END OF SECTION 010640

SECTION 011200 – MULTIPLE CONTRACT SUMMARY

PART 1 - GENERAL

1.0 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 and are requirements of all Prime Contractors, unless otherwise specified.
- B. All items in Articles 1.1 through 1.14 of section 011200 are requirements for all Prime Contractors, unless otherwise specified.

1.1 WORK COVERED BY THE CONTRACT DOCUMENTS

- A. The work of this project is separated into Six (6) Prime Contracts.
- B. Each Contractor shall take note that their contract incorporates ALL drawings, details and specifications. Though specific drawings and specification sections are the basis of each contract, the other documents in the set may also contain information relative to the work of that contract.
- C. Each Contractor is aware that these Documents involve work at Two (2) buildings located on the School District's Main Campus. The address of the main campus is:
 - 1. 27 5th Avenue, Tioga Center, NY 13734
- D. The Work of this Project is separated by the Construction Manager, Owner and Architect into a number of Prime Contracts. The Construction Manager and Architect have determined which portions of the Work of this Project belong to each Prime Contract.
- E. The Prime Contracts for this project are listed as follows:
 - 1. Contract (GC) General Construction Work
 - 2. Contract (PC) Plumbing Work
 - 3. Contract (EC) Electrical Work
 - 4. Contract (MC) Mechanical Work
 - 5. Contract (RC) Roofing Work
 - 6. Contract (SC) Site Work

1.2 WORK UNDER SEPARATE CONTRACTS

- A. One set of documents is issued covering all multiple Prime Contracts. Each Prime Contractor is to review all drawings and specifications for complete understanding and knowledge of the work.
- B. Prime Contracts, in the context used in this Section, are separate contracts that represent significant elements of the Work that are performed concurrently with and in

close coordination with work performed on the project under other prime contracts with the Owner.

1.3 INTENT OF DOCUMENTS

- A. Plans and Specifications supplement each other and require the contractor to provide in their bid:
 - 1. All labor, material, tools, equipment, supervision, layout, delivery, shop drawings, submittals, appurtenances, transportation, related items, safety monitoring, etc., necessary to complete the work described in the trade contract summary of work for each Contract.
 - 2. All systems complete and left in good and/or specified operating condition.
 - 3. Any apparatus, appliance, material or work not shown on Drawings but mentioned in Specifications, or vice versa.
 - 4. Any accessories, reasonably inferable from Drawings and Specifications and as may be required by the manufacturer of such materials or equipment necessary to make the work complete.
 - 5. Any item, labeled in one location but not another, is typical, reasonably inferable from Drawings and Specifications and as may be required.
- B. All sections of these Specifications as outlined in the trade contract summary of work shall apply in full to the contractor and their respective subcontractors. Notes or instructions shown on anyone drawing apply to all other drawings.
- C. Install all work in compliance with Plans and Specifications in excess of requirements of codes and regulations and not contrary to them.
- D. The Contract Documents contemplate a finished piece of work of such character and quality as is reasonably inferable from them. The contractor shall provide full cooperation in coordinating the installation of its work with the work of others and making its work complete and operational and in compliance with good practice. The contractor further acknowledges 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 the event of such conflict between and among the parts of the Contract Documents, the more expensive way of doing the work, the better the quality or the greater the quantity of material shall govern unless the Construction Manager otherwise directs.
- E. The Drawings are schematic in nature and are not intended to show every offset and detail. The Contractor shall make adequate provisions in their bid to accommodate the actual conditions without additional cost to the Owner.

1.4 GENERAL REQUIREMENTS OF THE CONTRACT

- A. One set of documents is issued covering all multiple Prime Contracts. Each Prime Contractor is to review all drawings and specifications for complete understanding and knowledge of the work.
- B. Prime Contracts, in the context used in this Section, are separate contracts that represent significant elements of the Work that are performed concurrently with and in

close coordination with work performed on the project under other prime contracts with the Owner.

- C. All Prime Contractors are responsible for all work under their contract no matter what drawing on which that work appears, including drawings of other trade disciplines.
- D. All Trade Contractors are responsible to provide and complete all Permits and Inspections, including any associated fees that may be required by any local and state code agency relative to the work of their contract.
- E. All work must conform to any applicable codes including but not limited to OSHA, Federal, State, Local and Governmental Agencies having jurisdiction and / or Owner requirements.
- F. Contractors shall comply with all applicable federal, state, county, and municipal laws concerning pollution of surrounding public waters. All work shall be performed in such a manner that objectionable conditions will not be created in public waters through or adjacent to the project areas.
- G. Local custom trade union jurisdictional settlements do not control the scope of the Work of each contract. When a potential jurisdictional dispute or similar interruption of work is first identified or threatened, affected contractors shall promptly negotiate a reasonable settlement to avoid or minimize interruption and delays. Prime Contractors affected by such disputes shall be responsible for any related schedule and / or cost impact.
- H. Union business shall not be conducted on site. Any Union Representative that visits the site must declare what Contractor's personnel they represent and must be escorted by that Contractor's Union Steward at all times. No visitors, sales representative or non-working personnel shall be permitted on site without prior consent of the Construction Manager. No photographs shall be taken without the Construction Manager's prior approval.
- I. Indoor Air Quality because of construction activity must be controlled. The transmission, movement or infiltration of construction dust, odors, vapors and/or other particulates is prohibited. Each Contractor is responsible for this and must take appropriate measures to control all dust, odors, vapors and/or other particulates using fans, negative air machines and/or off-shift work. Any degradation of IAQ in spaces will necessitate the shutdown of such operations until the IAQ in the spaces can be rectified. Failure to control the IAQ due to construction activities shall require the completion of the work during off hours.
- J. Construction operations such as sanding, painting, the use of mastics, and other construction operations, that may produce an odor or a dust condition, shall be scheduled with the Construction Manager 72 hours in advance of when such operation might occur. The Construction Manager and the Owner will review the request to proceed with said construction operation and decide if the operation can be done at that time, will have to be rescheduled, or if additional precautions need to be implemented by the Construction Manager or the Owner and shall be carried out by the Contractor at no additional cost to the project.

- K. Decisions required from the Construction Manager, Architect and/or Engineer shall be anticipated by the Contractor to provide ample time for inspection, investigation or detailed drawings. A "Request for Information" shall be submitted electronically to the Construction Manager for further processing. Verbal requests for information will not be acted upon. Any verbal responses are not binding.
- L. Cost of repair of any damage to existing or new structure, finishes, ceilings, walls, flooring, equipment, fixtures etc. caused by defective or ill-timed work shall be borne by the responsible Contractor.
- M. Provide Complete all surface preparation, prime and seal substrates in accordance with the Manufacturer's recommendations for the type of substrate involved. Each Contractor shall verify the compatibility of substrates as supplied by others. Starting of work shall constitute acceptance of substrates. Do not proceed with surface preparation or painting application until conditions are suitable.
- N. Each Contractor is responsible for providing material to the jobsite in a manner consistent with the Bid Schedule and Phasing Plans.
- O. Equipment furnished by all Contractors shall be factory painted and field protected until acceptance by the Owner. If proper protection has not been provided or maintained, the material will be refinished, repaired, or replaced by the Contractor, at the discretion of the Construction Manager at no cost to the Owner.
- P. Trenches for the Work of each contract shall be provided by each contractor for their own work unless otherwise noted. This includes put back sub-base, infill, concrete and finish product.
- Q. Through-penetration fire stopping for the Work of each contract shall be provided by each Contractor for its own Work.
- R. Except for those tests or inspections indicated to be provided by the Owner, each Contractor shall provide all testing required by the specifications or as required by various product manufacturers for the work in that contract. Copies of the test reports shall be furnished to the Architect, Construction Manager and Owner and shall be included in the O & M Manuals at project close out.
- S. Substitutions: Each contractor shall cooperate with all other contractors involved to coordinate approved substitutions with the remainder of the work.
- T. Provide schedules in accordance with Division 01 Section CONSTRUCTION SCHEDULES, PHASING AND SITE LOGISTICS.
- U. Contractors shall proceed with critical shop drawing submittals upon receipt of a letter of intent to award.
- V. Each Contractor will review other trades' shop drawings, submittals and actively participate in resolving discrepancies, conflicts, interferences, etc.
- W. Contractors are aware that the intention of the Work is to follow a logical sequence; however, the Contractor may be required by Construction Manager to temporarily omit

or leave out any section of its work or perform its work out of sequence. All such out of sequence work and time to revisit these areas shall be performed at no additional cost.

- X. Temporary Facilities: In accordance with and in addition to Division 01 Section TEMPORARY FACILITIES each Contractor will:
1. Bear the responsibility for their own storage, office trailers, and telephone usage (all related bills). The Prime Contractors shall be responsible for their own office space (if needed by the contractor) using an office trailer located on site as directed by the Construction Manager. Storage space for materials will be limited; however, where possible, the coordination and location of jobsite storage trailers will be permitted by the Construction Manager's Superintendent. Because the lay-down area available at these sites is limited, each Contractor shall plan to obtain and pay for the use of additional off-site storage or off-site work areas needed for operations, at no additional cost to the contract.
 2. Have access to temporary toilet facilities as provided under Division 01 Section TEMPORARY FACILITIES. Contractor's personnel will not be permitted to use the School District's facilities including telephone, food services, toilet, etc. for their own benefit. The contractor's Superintendent must explain this to all their field forces.
 3. Daily, each contractor must clean up their own debris and deliver that debris to the proper dumpster.
 4. Plan, provide and maintain their own access, ramping and egress as required into and out of the site, staging of trailer(s), materials, machinery and equipment in agreement with the Construction Manager's Superintendent, unless indicated differently in other sections of the Contract Documents.
 5. Review Division 01 Section TEMPORARY FACILITIES for the requirements related to their scopes of work, for the temporary heat, water, ventilation and electrical requirements.

1.5 WORK SEQUENCE

- A. The work will be conducted to provide the least possible interference to the activities of the Owner's operation.
- B. Work is to be performed weekdays (Monday through Friday) from 7:00AM to 3:30 PM unless otherwise noted. Work cannot be performed in occupied buildings. Work in occupied spaces shall be scheduled during off-hours, vacations and weekends and coordinated with and approved by the Construction Manager/Owner. A Construction Manager Representative and Prime Contractor Supervisor shall be on site at all times that work is being performed. If a Contractor fails to maintain the progress as indicated by the milestone schedule by no other fault but its own, and requires overtime to complete the work; the Contractor shall make arrangements with the Construction Manager 24 hours in advance and pay for a Construction Manager's superintendent and an Owner's representative on an overtime rate. In the event that the cause for delay

is multi-contract, then the costs shall be distributed proportionately across the affected Contracts.

- C. Coordination of any utility and/or power interruption must be coordinated with the Construction Manager and Owner and shall be scheduled a minimum of 72 hours in advance. Shutdowns must occur during off hours and non-occupied days only. Each Contractor shall provide complete all terminations, removals and tie-ins as required by their Contract. Include all necessary premium time or shift work as required. Shift work must be approved in advance by the Construction Manager.
 - 1. Obtain permits and pay all fees associated with required shut downs, disconnections, or relocations. All existing life safety type systems and utilities are to remain operational during installation of new systems. All temporary work required to keep existing systems operational is the responsibility of the Contractor performing the work.

1.6 MANPOWER / SUPERVISION

- A. Each Contractor understands that time is of the essence and will adequately man the job to successfully complete the Contract Work in accordance with the Construction Manager's Milestone Schedule. The option to work extended hours and weekends at the Contractor's expense under prior agreement with the Construction Manager may be made available to meet this schedule at no additional cost to the Owner.
- B. The Construction Manager shall have the authority to direct the contractors and subcontractors to work overtime including weekends to maintain the schedule at no additional cost to the Owner. Contractors warrant that the work shall be physically complete, including punch list, startup and commissioning, within the early start and late finish milestones.
- C. Each Prime Contractor shall provide multiple crews to maintain the project schedule. Each crew shall have its' own supervision, cranes, scaffold and other means necessary to maintain the Project Schedule.
- D. Each Contractor shall employ the appropriate trade personnel for their work as required. These people shall be experienced in their trades. A shortage of labor in the industry shall not be accepted as an excuse for not properly staffing each project.
- E. The General Construction (GC) Contractor shall provide full-time, non-working, onsite supervision (with tools) from project commencement until completion or such time as determined by the Construction Manager. This is to include supervision for all subcontractors. If supervision is reduced or terminated without the consent of the Construction manager, the Construction Manager will appoint an individual to manage work under this contract with all cost borne by the Contractor and continues to assume all responsibilities for the appointed individual and the work of this Contract. The contractor's on-site superintendent shall be on a Full-Time basis in a managerial capacity to continuously expedite, direct, supervise and coordinate the work and shall not engage in performing of actual work. The primary duties of the On-Site Supervisor are supervision of subcontractors and personnel along with coordination. A working Foreman shall not be designated by the contractor as a Superintendent.

- F. All other Contractors are required to provide a working Supervisor for the duration of the project. This Working Supervisor will be required to perform all duties of an on-site Supervisor per the Contract including but not limited to: responsibility for safety, attend meetings, coordinate and expedite the work and work of subcontractors. The primary duties of the Working Supervisor are supervision of subcontractors and personnel, along with coordination.
- G. The proposed Contractors' Project Manager and Field Superintendent for the project are to have sufficient experience and be successful in the proposed position. Each successful bidder shall submit resumes to the Construction Manager for the proposed Project Manager and Field Superintendent for the project. This information will be reviewed with the Owner, Architect and Construction Manager for approval. Should the Project manager and/or Superintendent prove unqualified for the position at any point during the project, the construction manager shall issue a letter stating that the person is to be removed from involvement in the project. Contractor shall replace with a qualified individual promptly. Such full-time Field Superintendent shall be required on site until such time as all Contract Work, including punch list work, is completed and accepted.

1.7 SITE LOGISTICS / ACCESS

- A. Construction access to the site shall be limited to those designated for personnel, equipment and deliveries by the Owner. The Construction Manager shall coordinate Contractors' staging, parking and storage.
- B. Each Contractor shall limit their operations, including storage of materials and prefabrication to areas designated by the Construction Manager. Contractor shall move at their own expense any stored products under Contractors' control, including excavated material, which interfere with operations of the Owner or other Contractors.
- C. The Construction Manager shall indicate to the Contractors entry points to the construction areas and routes through Owner occupied areas. The Contractor will ensure that their employees use only these entry points and routes through Owner occupied areas. A specific stairwell should be assigned for construction worker use during work hours. In general, workers may not use corridors or stairs designated for the Owner.
- D. Each Contractor will minimize their presence in areas that are occupied by students and staff. Construction work in these areas will generally be performed when students and staff are not present. This may require construction operations to take place at night or on weekends when the students and staff are not present. The Construction Manager's decision of when the work can take place will not entitle the Contractor to additional compensation.
- E. When work is required in occupied areas of the building, contractors are to submit a written request in the form of Task Hazard Assessment (THA) to the Construction Manager 72 hours prior to the date on which work is to be performed. This written "THA" shall describe the work that is to be performed, the possible impact on the Owner's operation, time of when the work would be performed, length of time to complete the operations, safety precautions shall be indicated by the contractor to ensure the safety / comfort of the Owner's occupants and the protection of the Owner's

property. The construction Manager and Owner reserve the right to suspend work activities performed without proper notice. The THA for is also to be utilized for all MEP shutdowns that may be required.

- F. All Contractors must plan, provide and maintain their own access, ramping and egress as required into and out of the site, staging of trailers, materials, machinery and equipment in agreement with the Construction Manager's Superintendent. Each Contractor shall provide complete all planking and protection for walks, pavements, and curbs, etc. which are to be crossed by equipment. Trucking and delivery operations should be coordinated with Construction Manager's Superintendent and all other trades.
- G. During excavation and backfill operations that interfere with other Prime Contractors means of access and egress to the site, the Prime Contractor performing the work must provide an alternate means of access and egress. Any damage to finished grades shall be repaired by the Contractor responsible for the damage.
- H. The General Construction Contractor (GC) shall provide general snow and ice removal at staging and work areas. Each Contractor shall provide ice and snow removal at roof areas, as required for their work. Each Contractor is responsible for providing safe access to their work area.
- I. Trucking and delivery operation will be coordinated with Construction Manager's Superintendent, all other trades and bus schedules.

1.8 COORDINATION

- A. Each Contractor shall take special care in verifying that his equipment matches the characteristics of the power being supplied. Provide written confirmation to the Construction Manager.
- B. Each Contractor is required to review and include in their price all work as described and shown on Contract Documents and described in The Multiple Contract Summary. This work will include coordination of like work as required. This requirement does not exclude any cross reference within these sections or as described in the Contract Documents. If there is a discrepancy between the drawings and specifications, the Contractor shall provide the greater quantity and/or the more costly installation.
- C. Each Contractor will be responsible for providing safe access in order to perform their own work, i.e., Confined space work, OSHA designated ladders for access only, scaffolding, stairs, lifts, removal of snow and ice, etc.
- D. Each Contractor shall verify all field conditions and field dimensions. It is anticipated that actual conditions may vary from conditions shown on the drawings. The Contractor is responsible to accommodate such existing conditions and modify the work in a manner acceptable to the Architect.
- E. Refer to Division 01 Section PROJECT MANAGEMENT AND COORDINATION for Coordination Drawing requirements.

- F. There will be contractors, outside of this project, working at various sites. All contractors shall cooperate and coordinate with all associated contractors working on all sites.
- G. Each Prime Contractor shall coordinate scheduling and installation of their work with the work of other Contractors, sub-contractors and normal building operations. All Prime Contractor on Site Supervisors shall communicate directly with each other, for coordination purposes.
- H. Each Prime Contractor shall supply and coordinate exact locations of embedded items in concrete or masonry work with the General Construction, Concrete, Masonry, etc. Contractor. Each Prime Contractor shall monitor such items throughout concrete/masonry activities to ensure proper placement.
- I. All valves, switches, controllers, devices, equipment, etc. that will require any type of access shall NOT be installed above existing/proposed 'hard' ceilings. The nearest available accessible area shall be utilized. Coordinate any such location with the Construction Manager prior to start of work.
- J. HVAC, Plumbing and Electrical Prime Contractors shall be responsible for providing any **new** wall, ceiling and floor rough opening for the General Construction (GC) Contractor. HVAC, Plumbing and Electrical Prime Contractors shall be responsible for any rework or additional work required due to their failure to provide this information prior to the scheduled start of wall, Ceiling or flooring construction.
- K. All Prime Contractors shall coordinate all device and rough-in locations required with the casework shop drawings.
- L. Each Project Manager and ON-Site Supervisor shall have an email account with daily access.

1.9 SURVEY & LAYOUT

- A. All Prime Contractors shall work from benchmarks identified in the Contract Documents and verified by a licensed surveyor employed by the Contractor.
- B. Each Contractor is responsible for layout and elevations for all their work, and is required to transfer all lines and grades to correctly perform all their work.
- C. Each Contractor shall establish the exact position of their work from reference points as shown on the Contract Drawings and shall additionally be responsible to coordinate and check other work that relates to their work before proceeding.
 - 1. Any error, apparent discrepancy or absence in or of data shown or required for accurately accomplishing work layout by the contractor, shall be referred to the Construction manager for interpretation when such is observed or required.
 - 2. Survey crewmen and grade foreman of the Contractor shall be knowledgeable and experienced in construction layout acceptable to the Construction Manager and Architect.
 - 3. Contractors shall be responsible for the accuracy of their work and shall construct all improvements in the proper locations as shown on the Contract Drawings, or as modified by Change Order or Field Work Directive.

4. Contractors shall keep records of all layout and calculations and shall make copies of such records available to the Construction Manager and Architect at any time.

1.10 CLEAN UP REQUIREMENTS

- A. Refer to Division 01 Sections PROJECT PROCEDURES FOR RENOVATIONS and TEMPORARY FACILITIES for detailed information related to clean-up requirements.
- B. In addition to the requirements in Division 01 Sections PROJECT PROCEDURES FOR RENOVATIONS and TEMPORARY FACILITIES the following shall apply:
 1. Daily cleanup shall be considered a safety issue. If the work area is not cleaned to the satisfaction of the Construction Manager, each Contractor shall cease all work in progress and utilize all available manpower to clean the work area as necessary.
 2. Work may progress only after the area is cleaned to the satisfaction of the Construction Manager. The Construction Manager may clean up the work area with outside forces and deduct all costs from the responsible Contractor(s).

1.11 PRIME CONTRACTOR RESPONSIBILITIES

- A. Each Prime Contractor shall be responsible for de-watering all excavations pertaining to their scope of work for the duration that the excavations must remain open and to maintain the project schedule.
- B. Unless specifically indicated on the Contract Documents that a ceiling system is being removed, re-installed or replaced by others, **each Prime Contractor shall be responsible for the removal and reinstallation of all existing ceiling systems where they have work to be installed above the ceiling.** Any damage to these existing ceiling systems due to the removal and reinstallation process shall be that Contractor's responsibility to repair or replace the ceiling as directed by the Construction Manager at no additional cost to the Owner.
- C. Each Prime Contractor is to survey existing work and submit to the Construction Manager a list of damaged areas (i.e. ceiling tiles, concrete sidewalks... etc.) prior to commencing work. Any damaged areas not identified prior to the work shall be the responsibility of the contractor(s) working in that area.
- D. Each Prime Contractor is to provide sufficient protection for their work throughout the construction period by use of Kraft paper, plastic, plywood or other means acceptable to the Construction Manager.
- E. Each Prime Contractor will provide proper protection for all exterior windows and doors, as it pertains to their scope of work. A review of the proposed protection and plan on how it is used must be done with the Construction Manager and accepted prior to starting work.
- F. Each Prime Contractor is responsible for locating (via instrument) all existing below-grade utilities; including but not limited to telephone, cable, data, water, sewer, gas, storm drains, fiber optics, etc. prior to any excavation work.

- G. Each Contractor shall cut openings and patch as required for their work. All patching of surfaces shall be completed by tradesmen experienced in the respective type of work.
- H. All Contractors must be aware that there will be no additional compensation to Contractor because of inflation on materials that will be required for the project. Contractors must include in their Original Bid any anticipated escalation cost in material or purchase said material at time of award and store the materials at the Contractors expense until such time the materials can be incorporated into the project.

1.12 PROJECT REPORTING / PROJECT CONTROLS

- A. Refer to Division 01 Section – PROJECT MANAGEMENT AND COORDINATION.

1.13 ALL CONTRACTS

- A. Each Contractor shall provide all labor, materials, services, supervision, engineering, equipment, scaffolding, layout, deliveries, trucking, hoisting, rigging, shop drawings, submittals, and all other items related, or required to complete all work in accordance with the contract documents and all applicable codes.
- B. Each Contractor represents they have expertise in the performance of work for these trades and assures all systems will be complete, fully functional, and installed in accordance with the best practices consistent with premium quality material and workmanship.
- C. Provide complete the work of Division 01 General Requirements unless stated otherwise. The listing of drawings and specifications is intended as a guide and does not relieve the Contractor of the responsibility of reviewing all drawings and specifications for bidding and coordinating like work with other Contractors during construction.
- D. In accordance with Division 01 Section – TEMPORARY FACILITIES, each Contractor shall provide all items related or listed in this section as being by the Contractor.
- E. Provide complete all repairs to any damages to adjacent property or other Trades work for which the Contractor is responsible. This includes, but is not limited to, restoration of all site conditions upon removal of debris and equipment, grass, landscape, paving, sidewalks, etc.
- F. All Contractors shall provide Cutting and Patching as required for their work. Refer to Specification Section 017329 CUTTING AND PATCHING, for additional information.
- G. All contractors shall provide Lead-Safe Work Practices as required for their work. Refer to Division 02 Section LEAD-SAFE WORK PRACTICES, for additional information.

- H. Each Contractor is responsible for fire stopping all penetrations through walls, floors, ceilings, etc. as it relates to their work regardless of the sequence of installation (i.e. if gypsum board goes up after your install, each contractor still needs to firestop their penetrations). Refer to Division 7 for requirements.
- I. Blocking, backing panels, sleeves, and metal fabrication supports for the work of each contract shall be the work of each contract for their own work.
- J. Furnishing of access panels for the work of each contract shall be the work of each contract for their own work. Installation of access panels shall be the work of each contract for their own work.

1.14 GENERAL CONSTRUCTION WORK CONTRACT (GC)

- A. The General Construction Contractor (GC) is responsible for all General Construction related work.
- B. Provide complete the work of Division 01 – GENERAL REQUIREMENTS unless stated otherwise. The listing of drawings and specifications is intended as a guide and does not relieve the Contractor of the responsibility of reviewing all drawings and specifications for bidding and coordinating with other contractors during construction.
- C. General Construction Contractor (GC) shall provide all items related General Construction Contractor related items listed in Division 01 Section – TEMPORARY FACILITIES.
- D. The General Contractor shall remove existing ACT ceilings (to be reinstalled at a later date) in areas where the new roof drains are to be installed and tied into existing roof drain piping. Removal must be enough for the MEP trades to perform their work above ceilings. Coordinate with MEP teams before removal.
- E. The General Contractor shall remove and dispose of second ceilings above existing ACT in areas where the new roof drains are to be installed and tied into existing roof drain piping. Removal must be enough for MEP trades to perform scope of work. Coordinate with MEP teams before removal
- F. GC to store ACT ceilings in a safe area not to be damaged. ACT to be reinstalled. Any damaged tile or grid is to be replaced by the GC at no extra cost to the district. Replaced tile and grid to match existing.
- G. The General Construction Contractor shall perform cutting and patching for MEP trades if specifically called out in contract documents. If cutting and patching is not specifically called out in the contract documents, each contractor is responsible for cutting and patching as it pertains to their own work.
- H. During demo and install GC to protect rooms/areas, in their entirety including but not limited to, floors, carpet, walls, auditorium seating, stage and existing equipment. This includes egress/pathway from work area to dumpster/disposal area. This includes work areas by other trades that the GC does not have work.

- I. Provide complete the work shown on the following drawings:
 - 1. ALL STRUCTURAL DRAWINGS
 - 2. ALL ARCHITECTURAL DRAWINGS
- J. Refer to all drawings and specifications for work related to the General Construction (GC) Contract.
- K. Provide/ complete the work shown in the following General (Information Common to All Buildings) Drawings:
 - 1. ALL CODE REVIEW DRAWINGS
 - 2. ALL GENERAL INFORMATION DRAWINGS
- L. Provide complete the work of DIVISION 03 – CONCRETE
- M. Provide complete the work of DIVISION 05 – METALS
- N. Provide complete the work of DIVISION 06 – WOOD, PLASTICS AND COMPOSITES
- O. Provide the work of DIVISION 07 – THERMAL AND MOISTURE PROTECTION
 - 1. 079200- Joint Sealants
- P. Provide complete the work of DIVISION 08 – OPENINGS
- Q. Provide complete the work of DIVISION 09 – FINISHES
- R. Trade Specific Labor Allowances:
 - 1. Provide twenty (20) Laborer hours, to be used as directed by the Construction Manager.
 - 2. Provide twenty (20) Carpenter hours, to be used as directed by the Construction Manager.
 - 3. Provide twenty (20) Painter hours, to be used as directed by the Construction Manager.
- S. Coordinate all site utilities with the agency having authority at the point of connection or materials incorporated into the project. If discrepancies exist, notify the Construction Manager.
- T. The General Construction Contractor (GC) shall take part in the coordination of its work with all affected trades and shall sign off on the Contractor's coordinated drawings.
- U. General Contractor to provide all dumpsters and temporary toilet facilities needed for the duration of the project. Minimum (1) temporary toilet required per work area. Additional may be required pending number of workers onsite. Follow DOH guidelines if additional toilet facilities are needed.

- V. GC to repair or replace any damage to lawn, sidewalks, parking lots, flooring, walls, doors and ceilings related to equipment such as trucks, toilets, dumpsters, lull lifts, scaffolding, scissor lifts as it pertains to their work.

1.15 PLUMBING WORK CONTRACT (PC)

- A. The Plumbing Work Contractor (PC) is responsible for all Plumbing-related work.
- B. The (PC) will provide the following required submittals two weeks after signed Letter of Intent and/or Contract:

[New Roof Drains and Piping]

- C. Provide all labor, material, services, supervision, engineering, equipment, scaffolding, layout deliveries, trucking, hoisting, rigging, shop drawings, submittals and all other items related and required to complete all work in accordance with the Contract Documents and all applicable codes having jurisdiction.
- D. The contractor represents they have expertise in the performance of work for these trades and assures all systems will be complete, fully functional, and installed in accordance with the best practices consistent with premium quality material and workmanship.
- E. PC to coordinate with the Roofing Prime and complete all work related to roof drain install.
- F. Provide complete the work of Division 01 – GENERAL REQUIREMENTS unless stated otherwise. The listing of drawings and specifications is intended as a guide and does not relieve the Contractor of the responsibility of reviewing all drawings and specifications for bidding and coordinating with other contractors during construction.
- G. Provide complete the work shown on the following drawings:
 - 1. ALL PLUMBING DRAWINGS
- H. Provide the work of DIVISION 22 – PLUMBING.
- I. Refer to all drawings and specifications for work related to the (PC) Contract.
- J. Plumbing Contractor to Lay out and mark areas on roof and in classrooms where GC is to remove ceilings, roofing material and roof decking as shown in the contract documents. Coordination with GC is required daily during removals.
- K. Provide (20) Hours of Journeymen Hours to be used as directed by the Construction Manager
- L. PC is responsible for damage of existing ceilings to remain, flooring, walls and/or equipment done during scope of work.

1.16 ELECTRICAL WORK CONTRACT (EC)

- A. The Electrical Work Contractor (EC) is responsible for all Electrical related work.[]

- B. Provide all labor, material, services, supervision, engineering, layout, deliveries, trucking, hoisting, rigging, shop drawings, submittals and all other items related and required to complete all work in accordance with the Contract Documents and all applicable codes having jurisdiction.
- C. The Contractor represents they have expertise in the performance of work for these trades and assures all systems will be complete, fully functional, and installed in accordance with the best practices consistent with premium quality material and workmanship.
- D. Provide complete the work of Division 1 General Requirements unless stated otherwise. The listing of drawings and specifications is intended as a guide and does not relieve the Contractor of the responsibility of reviewing all drawings and specifications for bidding and coordinating with other contractors during construction.
- E. In accordance with Division 01 – TEMPORARY FACILITIES, the Electrical Work Contractor (EC) shall provide all items related or listed in this section and all items listed below.
 - 1. Provide temporary electric services and (EC) items per Division 01 Section - TEMPORARY FACILITIES.
 - 2. Provide generators for temporary power, lighting and life safety systems during any power shutdowns and switchovers. (EC) to provide a safety plan to the Construction Manager for approval of proposed schedule within 30 days of award. Provide for the use of generators as required to maintain power and life safety systems during shutdowns and switchovers.
- F. Provide complete the work shown on the following drawings:
 - 1. ALL ELECTRICAL DRAWINGS
- G. Provide complete the work of DIVISION 26 – ELECTRICAL.
- H. Provide complete the work of DIVISION 28 – ELECTRONIC SAFETY AND SECURITY.
- I. Refer to all drawings and specifications for work related to the (EC) contract.
- J. Remove and reinstall all electrical, security, lights, telecommunication, fire alarm, speakers, etc. at all locations where existing ceilings are to be removed and reinstalled including classrooms, corridors and auditorium areas. Coordinate with GC and RC.
- K. Provide Twenty (20) Journeyman Electrical hours, to be used as directed by the Construction Manager.
- L. If any Life Safety/Security System is not completed per the construction schedule, the Electrical Work Contractor (EC) shall provide a full-time security guard 24 hours/day, at each site that is not complete. If the prime contractor (EC) cannot provide the security guard, then the Owner will obtain the services and pass the cost on to the

Electrical Work Contractor (EC). Life Safety/Security Systems include fire alarm, access control, surveillance cameras, and public address.

- M. The Electrical Work Contractor (EC) shall be responsible for maintaining the fire alarm and security systems at each building under construction. The contractor shall check, and repair as required, to ensure that the systems are fully operational at the end of each work day.
- N. Maintain electric service to all buildings while new electric service is provided. The Contractor's proposed method shall be approved by the A/E, CM and the Owner.
- O. The Contractor is responsible to provide all lead safe work practices. The contractor shall presume all paint on steel contains lead and shall test and abate as required to perform their work.
- P. EC to provide temporary Lighting in all areas MEP work is being performed including classrooms, corridors and auditorium areas.

1.17 MECHANICAL WORK CONTRACT (MC)

- A. The Mechanical Work Contractor (MC) is responsible for all Mechanical-related work.
- B. The (MC) will provide the following required submittals two weeks after signed Letter of Intent and/or Contract:
 - [HVAC Equipment and roof curbs]
- C. Provide all labor, material, services, supervision, engineering, equipment, scaffolding, layout deliveries, trucking, hoisting, rigging, shop drawings, submittals and all other items related and required to complete all work in accordance with the Contract Documents and all applicable codes having jurisdiction.
- D. The contractor represents they have expertise in the performance of work for these trades and assures all systems will be complete, fully functional, and installed in accordance with the best practices consistent with premium quality material and workmanship.
- E. Provide complete the work of Division 01 – GENERAL REQUIREMENTS unless stated otherwise. The listing of drawings and specifications is intended as a guide and does not relieve the Contractor of the responsibility of reviewing all drawings and specifications for bidding and coordinating with other contractors during construction.
- F. Provide complete the work shown on the following drawings:
 - 1. ALL MECHANICAL DRAWINGS
- G. Provide the complete work of DIVISION 23 – HVAC.
- H. Refer to all drawings and specifications for work related to the (MC) Contract.

- I. Mechanical Contractor to lay out and mark areas on roof and in classrooms where GC is to remove ceilings, roofing material and roof decking as shown in the contract documents. Coordination with GC is required daily during removals and RC during installation.
- J. Provide (20) Hours of Journeymen Hours to be used as directed by the Construction Manager.
- K. Roof-mounted equipment curbs supplied by HVAC manufacturer, installed by Mechanical Prime and flashed by Roofing Prime.
- L. MC is responsible for damage of existing ceilings to remain, flooring, walls and/or equipment done during scope of work.

1.18 ROOFING WORK CONTRACT (RC)

- A. The Roofing Work Contractor (RC) is responsible for all Roof-related work.
- B. Provide all labor, material, services, supervision, engineering, equipment, scaffolding, layout deliveries, trucking, hoisting, rigging, shop drawings, submittals and all other items related and required to complete all work in accordance with the Contract Documents and all applicable codes having jurisdiction.
- C. The contractor represents they have expertise in the performance of work for these trades and assures all systems will be complete, fully functional, and installed in accordance with the best practices consistent with premium quality material and workmanship.
- D. Provide complete the work of Division 01 – GENERAL REQUIREMENTS unless stated otherwise. The listing of drawings and specifications is intended as a guide and does not relieve the Contractor of the responsibility of reviewing all drawings and specifications for bidding and coordinating with other contractors during construction.
- E. Provide complete the work shown on the following drawings:
 - 1. ALL DRAWINGS RELATED TO ROOF ALTERATIONS OR INSTALLATIONS
- F. Provide the work of DIVISION 07 – THERMAL AND MOISTURE PROTECTION
 - 1. 074100- Preformed Roof Wall Panels
 - 2. 075323- EPDM Roofing
 - 3. 076200- Sheet Metal Flashing
- G. Refer to all drawings and specifications for work related to the (RC) Contract.
- H. Coordination with Electrical, Plumbing, and Mechanical Prime Contracts for equipment removal/ accessibility Prior to/during roofing installation.
- I. Provide (20) Hours of Journeymen Hours to be used as directed by the Construction Manager.

- J. RC is responsible for damage of existing ceilings to remain, flooring, walls and/or equipment done during scope of work.
- K. Roofer to provide dumpsters for their scope of work

1.19 SITE WORK CONTRACT (SC)

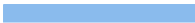
- A. The Site Work Contractor (SC) is responsible for all Site-related work.
- B. Provide all labor, material, services, supervision, engineering, equipment, scaffolding, layout deliveries, trucking, hoisting, rigging, shop drawings, submittals and all other items related and required to complete all work in accordance with the Contract Documents and all applicable codes having jurisdiction.
- C. The contractor represents they have expertise in the performance of work for these trades and assures all systems will be complete, fully functional, and installed in accordance with the best practices consistent with premium quality material and workmanship.
- D. Provide complete the work of Division 01 – GENERAL REQUIREMENTS unless stated otherwise. The listing of drawings and specifications is intended as a guide and does not relieve the Contractor of the responsibility of reviewing all drawings and specifications for bidding and coordinating with other contractors during construction.
- E. Provide complete the work shown on the following drawings:
 - 1. ALL CIVIL DRAWINGS
- F. Provide the complete work of DIVISION 31- EARTHWORK.
- G. Provide the complete work of DIVISION 32- EXTERIOR IMPROVEMENTS.
- H. Provide the complete work of DIVISION 33- UTILITIES.
- I. Refer to all drawings and specifications for work related to the (SC) Contract.
- J. Provide (20) Hours of Journeymen Hours to be used as directed by the Construction Manager.

END OF SECTION



ID		Task Name	Duration	Start	Finish	22	Apr '26	May '26	Jun '26	Jul '26	Aug '26	Sep '26	Oct '26	Nov '26	Dec '26	Jan '27
1		Tioga CSD- 2021 CIP Phase 1	146 days	Thu 6/11/26	Thu 12/31/26											
2		Bus Garage Renovations	146 days	Thu 6/11/26	Thu 12/31/26											
3		Administrative	11 days	Thu 6/11/26	Thu 6/25/26											
4		Pre-bid walk	1 day	Thu 6/11/26	Thu 6/11/26											
5		RFI cutoff	1 day	Thu 6/18/26	Thu 6/18/26											
6		Bid opening	1 day	Thu 6/25/26	Thu 6/25/26											
7																
8		Construction	134 days	Mon 6/29/26	Thu 12/31/26											
9		Site work	40 days	Mon 6/29/26	Fri 8/21/26											
10		GC Work	79 days	Mon 9/14/26	Thu 12/31/26											
11		Mechanical Work	79 days	Mon 9/14/26	Thu 12/31/26											
12		Electrical Work	79 days	Mon 9/14/26	Thu 12/31/26											
13		Plumbing Work	79 days	Mon 9/14/26	Thu 12/31/26											
14		Roofing Work	79 days	Mon 9/14/26	Thu 12/31/26											
15																
16		Maintenance Building Renovations	79 days	Mon 9/14/26	Thu 12/31/26											
17		Construction	79 days	Mon 9/14/26	Thu 12/31/26											
18		GC Work	79 days	Mon 9/14/26	Thu 12/31/26											
19		Mechanical Work	79 days	Mon 9/14/26	Thu 12/31/26											
20		Electrical Work	79 days	Mon 9/14/26	Thu 12/31/26											
21		Plumbing Work	79 days	Mon 9/14/26	Thu 12/31/26											
22		Roofing Work	79 days	Mon 9/14/26	Thu 12/31/26											

Task



Project Summary



Manual Task



Start-only



Deadline



Split



Inactive Task



Duration-only



Finish-only



Progress



Milestone



Inactive Milestone



Manual Summary Rollup



External Tasks



Manual Progress



Summary



Inactive Summary



Manual Summary



External Milestone



SECTION 012100 - ALLOWANCES

1.0 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.
- B. Attention is directed to Paragraph 3.8 (as amended in the SGC) of the General Conditions for further description.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing allowances.
 - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
 - 1. Contingency allowances.
- C. Related Sections include the following:
 - 1. Division 01 Section "Unit Prices" for procedures for using unit prices.

1.3 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect from the designated supplier.

1.4 SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION

- A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by the Architect to the Construction Manager for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
 - 1. All overhead and profit associated with the contingency allowance shall be included in the base bid. The contingency allowance shall be used for construction cost only (See Item B).
- B. Contractor's related costs for products and equipment ordered by Owner under the contingency allowance are as follows:
 - 1. Cost of Product(s) to Contractor less any trade discounts.
 - 2. Cost of delivery to site, on-site handling, unloading, uncrating, and storage.
 - 3. Cost of applicable taxes.
 - 4. Protection from the elements or from damage.
 - 5. Labor costs for installation, finishing, and testing; except where labor is specified not to be included in the allowance.
 - 6. Subcontractor's overhead and profit (only) at the stipulated rate of 15%. Prime contractors are entitled to one markup per subcontractor per change event. Subcontractors that contract out work are not entitled to additional overhead and profit beyond that noted above.
- C. Change Orders or Change Directives authorizing use of funds from the contingency allowance will include only Contractor's related costs as described above.
- D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.7 UNUSED MATERIALS

- A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Architect, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Architect, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

2.0 PART 2 - PRODUCTS (Not Used)

3.0 PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Site Work

- 1. Allowance No. SC-01 (Contingency Cash Allowance): Include a lump sum allowance of **\$10,000** for use upon the Owner's instructions. This allowance is to be included in the Site Contractor's Base Bid sum.

B. General Work

- 1. Allowance No. GC-01 (Contingency Cash Allowance): Include a lump sum allowance of **\$10,000** for use upon the Owner's instructions. This allowance is to be included in the General Contractor's Base Bid sum.

C. Roof Work

- 1. Allowance No. RC-01 (Contingency Cash Allowance): Include a lump sum allowance of **\$10,000** for use upon the Owner's instructions. This allowance is to be included in the Roofing Contractor's Base Bid sum.

D. HVAC Work

- 1. Allowance No. MC-01 (Contingency Cash Allowance): Include a lump sum allowance of **\$20,000** for use upon the Owner's instructions. This allowance is to be included in the HVAC Contractor's Base Bid sum.

E. Plumbing Work

- 1. Allowance No. PC-01 (Contingency Cash Allowance): Include a lump sum allowance of **\$10,000** for use upon the Owner's instructions. This allowance is to be included in the Plumbing Contractor's Base Bid sum.

F. Electrical Work

- 1. Allowance No. EC-01 (Contingency Cash Allowance): Include a lump sum allowance of **\$10,000** for use upon the Owner's instructions. This allowance is to be included in the Electrical Contractor's Base Bid sum.

END OF SECTION 012100

SECTION 012200 – UNIT PRICES

1.0 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. This Section includes administrative and procedural requirements for unit prices.
- B. Related Sections include the following:
 - 1. Division 01 Section "Allowances" for procedures for using unit prices to adjust quantity allowances.

1.3 DEFINITIONS

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

1.4 PROCEDURES

- A. Unit prices include all necessary materials, plus costs for delivery, installation, and taxes (when applicable).
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

2.0 PART 2 – PRODUCTS (Not Used)

3.0 PART 3 – EXECUTION

3.1 LIST OF UNIT PRICES

A. Site Construction Work (SC):

1. UNIT PRICE NO. SC-01 UNDERCUTTING:

a. Description: Undercutting where unsatisfactory soils are discovered. This includes excavation, removal and haul away of unsuitable material, backfill and compaction with imported granular material as specified in Section 311201.

b. Unit of Measurement: Cubic yard, installed.

2. UNIT PRICE NO. SC-02 SOIL STABILIZATION FABRIC:

a. Description: Woven soil stabilization fabric furnished and installed as described in Section 321201.

b. Unit of Measurement: Square yard, installed.

3. UNIT PRICE NO. SC-03 HEAVY DUTY ASPHALT:

a. Description: Heavy duty asphalt, stabilization fabric and stone subbase as described in Section 321201. This includes excavation and removals for placement of heavy duty asphalt.

b. Unit of Measurement: Square yard, installed.

4. UNIT PRICE NO. SC-04: SELF-ADHERING WATERPROOF MEMBRANE:

a. Description: Surface preparation/priming, furnishing and installation of 12" wide self-adhering waterproof membrane as specified in Section 321201. Note: Providing and installing 1,000 linear feet of 12" wide self-adhering waterproof membrane is in the Base Bid.

b. Unit of Measurement: Linear foot, installed.

5. UNIT PRICE NO. SC-05: MILLING, TACK COAT, AND TOP COURSE ASPHALT:

a. Description: One and a half inch (1-1/2") Asphalt milling and removal off site of existing top course asphalt and installation of new top course asphalt. This includes milling, removal, sweeping, crack repairs, tack coating, and new one and half inch (1-1/2") minimum top course asphalt as specified in Section 321201.

b. Unit of Measurement: Square yard, installed.

6. UNIT PRICE NO. L-6 ROCK EXCAVATION(S):

- a. Description: Rock excavation and removal off site as described in Section 312201.
- b. Unit of Measurement: Per cubic yard open rock as measured in the ground prior to excavation.

END OF SECTION 012200

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section covers the procedures for substitutions of manufacturers for project materials.

1.3 DESCRIPTION

- A. This section specifies administrative and procedural requirements for handling requests for substitutions made after award of the Contract.

1.4 ACCEPTABLE MANUFACTURERS

- A. The lists of acceptable manufacturers in the various sections are names of manufacturers believed to be capable of supplying one or more of the items specified in that section. Where one certain kind, type, brand or manufacture of material is named, it shall be regarded as the required standard of quality. The absence of the "or equal" clause is not meant to exclude competition in any way; similar products of other manufacturers which are equal in quality, performance and equally adaptable for the intended purposes, in the opinion of the Architect/Engineer, and are submitted as specified herein will be considered and may be accepted and shall form the basis of comparison.
- B. Where two or more kinds, types, brands, manufactures, or materials are named in these specifications, they are to be regarded as the required standard of quality and are presumed to be equal. The contractor may select one of these items or, if the contractor desires to use any kind, type, brand, manufacturer, or materials other than those named in the specifications, the contractor shall indicate in writing, when requested, and prior to the award of contract, what kind, type, brand, manufacturer or material is included in the base bid for the specified item.
- C. To be accepted as equal, the equipment or material must fit the space available for it in the building. No item will be accepted as an equal if alterations of building structure or space are made necessary for a proposed product.
- D. If equipment or materials is accepted as an equal, the Contractor is required to make all necessary corrections to design, details, clearances, etc., add to, furnish and install all additional materials or items required, as determined by the Architect at no additional cost to the Owner.
- E. Refer to Section 01 33 00 for submittal requirements.

1.5 DEFINITIONS

- A. "OR EQUAL "
 - 1. Wherever used in Contract Documents, the phrase "or equal" means that materials, components and equipment may be proposed for use in lieu of those named. They will be considered acceptable if, in the opinion of the Architect/Engineer, they will perform the functions imposed by the general design, if they meet the standards of the named items, and are submitted as herein specified.
- B. SUBSTITUTIONS
 - 1. Following the notification of award, the notified bidder may propose substitutions that in his opinion meet the standards of quality and/or performance criteria of the products identified on the Drawings or in the Specifications. Proposals are eligible to be considered for approval until fifteen (15) calendar days after receipt of notification of award of contract.

- a. These requests for approval of proposed substitutions will be reviewed by the ARCHITECT/ENGINEER from successful bidders only.
2. Requests for approval of proposed substitutions after fifteen (15) calendar days following receipt of notification of award of contract will be considered by the ARCHITECT/ENGINEER ONLY in the following cases:
 - a. The named product cannot be obtained because of strikes, lockouts, bankruptcies or discontinuance of manufacture and, the proposed equivalent is equal to the named product in the opinion of the ARCHITECT/ENGINEER and, the use of the proposed equivalent, in the opinion of the ARCHITECT/ENGINEER, is appropriate to the project.
3. Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions". The following are not considered substitutions:
 - a. Revisions to Contract Documents requested by the Owner, Construction Manager or Architect/Engineer and approved by the Architect/Engineer.
 - b. Specified options of products and construction methods included in Contract Documents.

1.6 SUBSTITUTION REQUEST SUBMITTAL

- A. Requests for substitution will be considered if received in a timely manner allowing adequate duration for processing and review so as not to delay any portion of the Project, and no later than 10 days, after Notice of Award of Contract. Requests received more than 10 days after award of Contract may be considered or rejected at the discretion of the Architect/Engineer and Construction Manager and shall be submitted as follows:
 1. Submit the required number of each request for substitution for consideration.
 2. Identify the date of request for substitution and Contract(s) involved. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information as appropriate:
 - a. Product Data, including Drawing and descriptions of products, fabrication and installation procedures.
 - b. Samples, where applicable or requested.
 - c. A detailed comparison of significant qualities of the proposed substitution with those of the work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
 - d. Coordination information, including a list of changes or modifications needed to other parts of the work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.
 - e. A statement indicating the substitution's effect on the Contractor's construction schedule compared to the schedule without approval of the substitution.
 - f. Accurate cost data on proposed substitution in comparison with product or method specified.
 - g. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time, that may subsequently become necessary because of the failure of the substitution to perform adequately.
 - h. Name and address of similar projects on which product was used and date of installation.
- B. The Architect/Engineer will review the request for substitution and notify the Construction Manager who will then notify Contractor of acceptance or rejection of the proposed substitution.

1.7 CONDITIONS FOR SUBSTITUTIONS

- A. The Contractor's substitution request may be received and considered by the Architect/Engineer when the following conditions are satisfied, as determined by the Architect/Engineer; otherwise, requests will be returned without action except to record non-compliance with these requirements.
1. Revisions to Contract Documents are not required.
 2. Proposed changes are in keeping with the general intent of Contract Documents.
 3. The request is timely, fully documented and properly submitted.
 4. The request is directly related to an "or equal" clause or similar language in the Contract Documents.
 5. The equipment or material must fit the space available for it in the building. No item will be considered if alteration of building structure or space is made necessary by a proposed substitution.
 6. If a substitution of material or any equipment item is accepted, the Contractor is required to make all necessary corrections to details, clearances, etc., add to, furnish and install all additional materials or items required by the substitution, as determined by the Architect at no additional cost to the Owner.
 7. If requested substitution provides the specified warranty.
- B. In making request for substitution, Contractor represents:
1. That the Contractor has personally investigated the proposed substitute product and determined that it is equal to or superior in all respects to the specified project.
 2. That the Contractor will provide the same warranty for the substitution that is required for the specified product.
 3. Certifies that the substitution will not result in a cost disadvantage to the Owner; that all cost data presented is complete and that the Contractor waives all claims for additional costs related to the substitution which subsequently become apparent.
 4. Will coordinate the installation of the substitution, if accepted, making such changes as may be required to make the work complete in all respects.
 5. The contractor requesting substitution shall bear additional costs to all parties due to his substitution including Architect/Engineer redesigns and costs' associated but under separate contract.
- C. The Contractor's submittal and Architect/Engineer's acceptance of shop drawings, product data or samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Do not permit submittals marked "Revise and Resubmit" to be used at the Project site, or elsewhere where work is in progress.

1.2 SUMMARY

- A. This section covers the requirements and procedures for the schedule of values and applications for payment.

1.3 DESCRIPTION

- A. Submit the Schedule of Values to the Construction Manager, within ten (10) days of Award of Contract for review and approval.
- B. The Schedule of Values shall be the basis of Contractor's Application for Payment.

1.4 FORM OF SUBMITTAL

- A. Submit typewritten Schedule of Values on AIA Documents G702/CMA and G703.
- B. Provide dollar values for labor and material for each category of work, broken out by each location, per building and SED number, addition and renovation, wing, area, floor, etc.
- C. Refer to Example found in Section 00 85 20 – Project Forms and Documents.

1.5 PREPARING SCHEDULE OF VALUES

- A. Itemize separate line-item cost for each of following general cost items by building or SED #
 - 1. Performance and Payment Bonds
 - 2. Project Insurance
 - 3. Mobilization (Total cost not to exceed 0.005% of total contract value)
 - 4. Demobilization
 - 5. Field Supervision (Total cost paid equally on a monthly basis based on duration of project)
 - 6. Surveys and Layout
 - 7. Temporary Facilities
 - 8. Project Meetings
 - 9. Project Safety
 - 10. Cleaning-Up (Daily) (Total cost paid equally on a monthly basis based on duration of project)
 - 11. Mockups and Samples
 - 12. Coordination Drawings
 - 13. Submittals and Shop Drawings
 - 14. Specification Section – Labor (For Each Specification Section with cost)
 - 15. Specification Section – Material (For Each Specification Section with cost)
 - 16. Operations and Maintenance Manual (including construction record drawings)
 - 17. As-Built Drawings
 - 18. Testing & Commissioning
 - 19. Training
 - 20. Project Close-Out. An amount of at least one percent (1%) of the Contract value shall be carried for this line item, but not less than \$25,000.
 - 21. Warranties
 - 22. Punchlist
 - 23. Each Allowance associated with the Contract
 - 24. Each Alternate accepted
 - 25. Each Change Order as it is issued

- B. Show total costs including overhead and profit.

1.6 REVIEW AND RESUBMITTAL

- A. After review by Construction Manager, revise and resubmit Schedule of Values, as needed.
- B. First Application for Payment will not be approved until Construction Manager and/or Architect approves Schedule of Value format.

1.7 REQUIREMENTS AND SUBMITTAL PROCEDURE

- A. Labor Rate Breakdown
 - 1. For each Labor Classification employed or for which employment is anticipated, submit a detailed breakdown of the components of the Total Hourly Rate on the form in section 00 85 20 "Project Forms and Documents". Prime Contractors shall also secure and submit an hourly labor rate breakdown for each of the Subcontractor's classifications contracted with the Prime Contractor.
 - 2. Furnish separate pages for each time period for which labor rates are effective.
 - 3. Calculations on the labor rate breakdown shall reflect actual costs and shall be in accordance with Contract Requirements. Hourly Rates shown on the Labor Rate Breakdown shall be the basis upon which changes for approved time and material Work is charged.
- B. Submit Approved Applications for Payment to the Construction Manager / Architect by the 25th of each month.
 - 1. Draft copies (Digital Pencil Copy) shall typically be received by the 15th of each month or by the dates provided on the Payment Application Schedule (see Specification Section 00 85 20) for review and approval by the Construction Project Manager/Superintendent prior to formal submission.
 - 2. Applications shall reflect an accurate projection of work, which the Contractors anticipate will be completed through the end of each month, as agreed to by Construction Manager and the Architect/Engineer.
- C. With permission of the Construction Manager, stored materials can be billed for in the monthly payment application at invoice cost. No Overhead & Profit will be allowed on stored materials. Contractors will be allowed to bill for the Overhead & Profit, once the stored material is incorporated into the project. Invoices for material stored must be provided with the Monthly Application for Payment when billing for stored materials. This is a requirement for materials stored on or offsite. Materials stored off site must have a certificate of insurance for said material stored offsite at a particular location. The Construction Manager may request photos be provided of materials being stored off site to verify materials are marked for this project.
- D. Billing for change work will only be authorized once the work is complete and an Allowance Authorization document has been issued or a Change Order has been fully executed by all parties.

1.8 FORMAT AND DATA REQUIRED

- A. All amounts shall be rounded to WHOLE DOLLARS on the Application form.
- B. All substantiating data and attachments required by the Contract Documents shall accompany each Application for Payment upon submission in the form required by the Construction Manager.
 - 1. Substantiating Data for Applications for progress payments include, but are not limited to, the following requirements:
 - a. Affidavit and Waiver of Lien* on the form in section 00 85 20.
Forms indicated thus (*) are for the previous month's application and are therefore to be

- submitted with every Application through and including the latest pay period prior to the date of submittal of the Application.
 - b. Digital Copies of Certified Payrolls on standard New York Department of Laborforms.
 - c. Invoices for stored material.
- C. When the Construction Manager requires additional substantiating data, Contractors shall promptly submit suitable information with a cover letter.
- D. Payments will not be allowed on work items without approved Submittals.
- E. Transmittal: Submit one (1) digital signed and notarized original copies of each Application for Payment to the Construction Manager. All copies shall be complete, including waivers of lien and similar attachments.

1.9 FINAL APPLICATION FOR PAYMENT

- A. Completion of all Work includes completion of all items noted on all Punch Lists, which have been forwarded to the Contractors.
- B. Upon final completion of all work, Contractors may submit an Application for Final Payment, which shall include:
- 1. Executed "Final Release" (Final Waiver of Claims and Liens and Release of Rights).
 - 2. Contractor's Affidavit Of Payment Of Debt And Claims, AIA Document G706.
 - 3. Contractor's Affidavit Of Release Of Liens, AIA Document G706A.
 - 4. Executed "Final Release from Subcontractor or Supplier" from each Subcontractor and Supplier written on the form in section 00 85 20.
 - 5. Executed "Consent of Surety Company to Final Payment"(AIA Document G707), if applicable.
- C. Full and Final Payment will not be made until the following have been supplied, approved and accepted by the Owner, Construction Manager and the Architect/Engineer.
- 1. One (1) year written warranty.
 - 2. Current certificate of insurance to coincide with the warranty period.
 - 3. The required number of copies of all written guarantees, warranties, operating and maintenance manuals, and test results.
 - 4. Documentation that all verbal and written instructions and instruction sessions required by the Contract have been completed.
 - 5. The required number of copies of all Project Record Documents including "As-built" drawings, approved Shop Drawings and Product Data.
 - 6. All materials and equipment required as stock.
 - 7. Any other requirement of the Contract Documents which is outstanding.

1.10 REQUISITIONING INSTRUCTIONS

- A. Any requisitions submitted using other forms than those found in Section 00 85 20 will be returned. Submission of all required forms is a condition precedent to payment.
- B. The Partial Waiver of Lien is to be for the current requisition and the Affidavit of Payments is to be for the previous requisitions and is to be submitted starting with the second requisition. The Final Waiver of Lien is to accompany the final requisition.
- C. All insurance certificates and bonds must be submitted and approved in accordance with the contract requirements prior to submitting or processing of requisitions. NO PAYMENTS WILL BE MADE UNTIL SATISFACTORY INSURANCE CERTIFICATES AND BONDS ARE RECEIVED.

- D. Requisitions are to be submitted according to the Payment Application Schedule (see Specification Section 00 85 20) and shall reflect work anticipated to be completed by the end of the month. Requisitions submitted after the dates shown on the Payment Application Schedule may not be processed until the following month. Once an amount has been approved for payment, no further monies can be approved until a new requisition has been received. Until final payment has been made on a contract, requisitions should be submitted each month.
- E. Application for Payment
 - 1. This schedule includes the following:
 - a. The figures under the Contract and Orders and Value of Work Completed are the totals and should be indicated on a summary page.
 - b. Deductions include retained percentage and amount as per the contract, total payments received by the date of the requisition and back-charge totals to date.
 - c. The balance due for payment at this request is the value of the work completed less deductions.
- F. Time and Material work is handled by the issuance of Change Orders or authorized against the Allowance and can be processed only upon completion of the Rate Sheets for each labor category in conformance with the Contract.
- G. Field tickets are to be submitted to the Construction Manager's Superintendent for verification of work performed. The contractor must obtain the written approval of the Superintendent for all field tickets. Field tickets without the Superintendent's approval will not be processed.
- H. Invoices are to be submitted to the Construction Manager for issuance of a Change Order or Allowance authorization with a copy of the approved field ticket.

END OF SECTION

SECTION 013100 – PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

SUMMARY

Section includes administrative provisions for coordinating construction operations on Project, including but not limited to, the following:

General coordination procedures.

Coordination Drawings

Requests for Information (RFI's)

Project websites and management tools

Project Meetings

DEFINITION

RFI = Request for Information from Contractor seeking information or clarifications of Contract Documents.

INFORMATIONAL SUBMITTALS

Subcontractor / Supplier List: Prime Contractors shall prepare a written summary identifying individuals or firms proposed for each portion of Work, including those who are to furnish products or equipment fabricated to a special design. Including the following information:

Name, address, and telephone number of entity performing subcontract or supplying products.

Number and title of Specification Section(s) covered by the subcontract.

Drawing number and detail references, as appropriate, covered by the subcontract.

Key Personnel Names & Contact Information: Within fifteen (15) days of starting construction operations, submit list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone number, including home, office and mobile telephone numbers and email addresses. Provide names, addresses and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

GENERAL COORDINATION PROCEDURES

Coordination: Each Prime Contractor shall coordinate the work of its contract with the like work of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each Prime Contractor shall coordinate its operations with operations included in different Sections that depend on each other for proper installation, connection and operation.

Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service and repair.

Make adequate provisions to accommodate items scheduled for later installation.

Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service and repair of all components, including mechanical and electrical.

Prime Contractors shall prepare notices for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

Prepare similar notices for Owner and separate contractors if their Coordination / Work is required.

Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of Work. Such administrative activities include, but are not limited to the following:

Preparation of Prime Contractor's construction schedule.

Preparation of Schedule of Values.

Installation of temporary facilities and controls.

Delivery and processing of submittals.

Progress Meetings.

Pre-installation conferences.

Project closeout activities.

Startup, commissioning and adjustment of systems.

All Contractors shall cooperate with the School District with respect to security of the building and the rules that they have developed to maintain security. This would include but not be limited to keeping doors to the school locked all the time, to prevent unauthorized entry into the construction area or into the school's occupied areas. The Contractor shall not admit entrance into the school building or the construction area any person not associated with the construction project. All students, staff and school visitors shall enter the building through designated entrances as established by the School District. All construction personnel shall enter the construction area and/or the school at entrances designated by the Construction Manager. Propping open of doors at any time is not allowed.

LOCATION STREAMERS

The HVAC, Electrical and Plumbing Contractors shall hang streamers from all above ceiling equipment that will require access. This is in addition to any specification requirements for tags, labels, etc. Shop drawings should also highlight these areas for Architect/Engineer's review. In addition, the Contractors shall notify the Construction Manager and Architect/Engineer of all areas where equipment maintenance access is difficult. Coordinate architecturally placed access doors with points of mechanical / electrical systems requiring that access.

REQUESTS FOR INFORMATION (RFI)

General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Prime Contractor shall prepare and submit an RFI to the Construction Manager, using PROCORE.

If deemed relevant, Construction Manager will forward RFI to Architect.

The Construction Manager will return RFI's submitted by other entities controlled by Prime Contractor with no response.

Coordinate and submit RFI's in a prompt manner to avoid delays in Prime Contractor's Work or work of subcontractors.

Content of RFI: Include a detailed, legible description of item needing information or interpretation and the following:

Project name.

Project number.

Date.

Name of Prime Contractor.

Name of Architect and Construction Manager.

RFI number, numbered sequentially per Prime Contract.

RFI subject.

Specification Section number and title and related paragraphs, as appropriate.

Drawing number and detail references, as appropriate.

Field dimensions and conditions, as appropriate.

Prime Contractor's suggested resolution.

If Prime Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.

Prime Contractor's signature.

Attachments: Include sketches, descriptions, measurements, photos, product data, shop drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

Attachments shall be electronic files in Portable Data File (PDF) format.

Architect's and Construction Manager's Action: Architect and Construction Manager will review each relevant RFI, determine action required, and respond. Allow seven (7) working days for Architect's response for each RFI. RFI's received by Architect or Construction Manager after 1:00 p.m. will be considered as received the following working day.

The following Prime Contractor generated RFI's will be returned without action:

Request for approval of submittals.

Requests for approval of substitutions.

Requests for approval of Contractor's means and methods.

Requests for coordination information already indicated in the Contract Documents.

Requests for adjustments in the Contract Time or the Contract Sum.

Requests for interpretation of Architect's actions on submittals.

Incomplete RFI's or inaccurately prepared RFI's.

Unnecessary or frivolous RFI's.

Architect's action may include a request for additional information, in which case the Architect's time for response will date from time of receipt of additional information.

Architect's action on RFI's that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to the General Conditions of the Contract.

PROJECT WEBSITES AND MANAGEMENT TOOLS

Prime Contractors shall use Architect's and Construction Manager's Project Websites for purposes of managing project communication and documentation until Final Completion.

Construction Manager's and Architect's Project Website will be PROCORE . Prime Contractors (and Construction Manager) will receive a no-cost electronic invitation to participate as "external members", and will be able to send and review Submittals, RFI's and other documents.

Each Contractor shall provide its management / administrative personnel assigned to the Project with access to personal computers and the internet, using a reliable ISP.

Contractors shall visit the Project Websites on a daily basis, and as necessary to be kept fully apprised of Project developments, for correspondence, assigned tasks and other matters that transpire on the site.

Prime Contractors shall use RAKEN to submit their daily reports on their activities for each day they are on site. These reports will be submitted in the prescribed format and detail required. These daily reports shall be entered in a timely manner (within seven (7) days of the work being done). If these reports are not entered in a timely manner or in acceptable detail, it will have a direct effect on approvals of monthly payment applications.

Information required:

- Day, Date.
- Name of Contractors/Subcontractors.
- Manpower breakdown by Contractor/Subcontractor with hours worked.
- Description of where working and operations.
- Description of work being performed – Base Contract, Change Order or Disputed Work.
- General description of material delivered.
- List of visitors.
- Remarks on accidents, progress of work, etc.
- List of equipment.
- Listing of Man Hours per trade and classifications to be used.
- Temperature and weather conditions.
- Submit complete record of Daily Reports at end of Project.

MAINTENANCE OF DOCUMENTS – PROJECT RECORD DOCUMENTS

Maintain, at job site, one copy of:

- Contract Drawings
- Specifications
- Addenda
- Approved Shop Drawings
- Supplemental Instructions
- Change Orders
- Other Modifications to Contract
- Project Record Drawings / As-Build Drawings
- Field Test Reports
- Correspondence File
- Safety Data Sheets
- All documentation required by OSHA, State, Federal and Local Authorities.

Store documents in approved locations, apart from documents used for construction.

013100-PROJECT MANAGEMENT AND COORDINATION

Provide files and racks for storage of documents.

Maintain documents in clean, dry, legible condition.

Do not use record documents for construction process.

Make documents available at all times for inspection by Construction Manager,
Architect/Engineer and Owner.

File documents in accordance with Project Filing Format of Uniform Construction Index.

MARKING DEVICES

Provide felt marking pen for marking, conforming to following color code:

Red for general construction work.

Blue for plumbing work.

Green for heating, ventilating work.

Brown for electrical work.

Black for other written notations.

RECORDING

Label each document "PROJECT RECORD" in two inch high printed letters.

Keep record documents current.

Do not permanently conceal any work until required information has been recorded.

Contract Drawings

Legibly mark to record actual construction:

All items from Addendums

Depths of various elements of foundation in relation to the finish floor.

Horizontal and vertical location of underground utilities and
appurtenances referenced to permanent surface improvements.

Location of internal utilities and appurtenances concealed in construction
referenced to visible and accessible features of structure.

Field changes of dimension and detail.

Changes made by Supplemental Instructions of Change Order.

Details not on original Contract Drawings.

Specifications and Addenda

Legibly mark-up each section to record:

All items from Addenda

Manufacturer, trade name, catalog number and supplier of each product
and item of equipment actually installed.

Changes made by Supplemental Instructions of Change Order.

Other matters not originally specified.

Shop Drawings: Maintain as record documents. Legibly mark-up approved shop
drawings to show changes made after review.

Upon completion of the project, the Contractor shall transfer all "As Built" information to one (1) set of reproducible drawings and shall provide one (1) copy in portable document (pdf) format on digital media. These accurate "As Built" must be submitted and reviewed by Architect/Engineer prior to the release of retainage. "As Built documents shall not bear the seal or signature of the Architect/Engineer".

PROJECT RECORD DOCUMENTS – SUBMISSION REQUIREMENTS

Each Prime Contractor will be required to input Daily Report information into VIEWPOINT on a daily basis.

At completion of project, deliver record documents to Construction Manager on digital media in portable document (pdf) format. And include in Operation and Maintenance Manual.

Accompany submittal with transmittal letter, in duplicate containing:

- Date
- Project title and number
- Contractor's name and address
- Title and number of each record document
- Certification that each document as submitted is complete and accurate.
- Signature of Contractor, or authorized representative.

PROJECT MEETINGS

General: Construction Manager shall schedule and conduct meetings and conferences at Project site unless otherwise indicated.

Attendees: Construction Manager will inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.

- Construction Manger
- Architect/Engineer
- Prime Contractor and pertinent Subcontractors
- Owner's Representative

Pre-Construction Meeting Minimum Agenda:

Introduction and sign-in of attendees.

Prime Contractor to submit:

- List of major Subcontractors and Suppliers
- Tentative procurement and construction schedule.
- Staff names.
- Preliminary Submittal Schedule
- Labor Rate Sheets: Provide for each trade classification of Prime Contract workforce on form per Section 008520 – PROJECT

FORMS AND DOCUMENTS.

Construction Manager to provide an overview of projected milestones and schedules.

Designation of responsible personnel for coordination of work between Contractors.

Safety and Job Site Rules.

Change Orders: Overhead and Profit markups.

Distribution of Contract Documents.

Shop Drawing, product data and samples.

Record Documents.

Use of premises:

Field office and storage areas.

Owner's requirements.

Identification badges.

Working hours.

Telephone use.

Project Orientation.

Major equipment deliveries and priorities.

Clean-up procedures.

Location and time for progress meetings.

Preinstallation Conferences

Construction Manager shall conduct pre-installation conferences at Project site before each construction activity that requires coordination with other construction and as identified in individual specification sections.

Prime Contractors shall request preinstallation conferences dates well in advance of the installation of the work.

Attendees: Prime Contractor, Installation and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Construction Manager shall advise the Architect of scheduled meeting dates.

Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

Deliveries.

Possible conflicts including compatibility concerns.

- Conformance with Milestone Project Schedule.
- Projected weather limitations.
- Manufacturer's written recommendations.
- Warranty requirements and manufacturer's inspection notification.
- Acceptability of substrates.
- Testing and inspection requirements, if any.

Construction Manager: Record significant conference discussions, agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within five (5) days of the meeting. Do not proceed with installation if Conference is not successfully concluded. Construction Manager shall initiate required actions to resolve impediments to performance of Work and reconvene the conference at the earliest date feasible.

Progress Meetings

Schedule for regular weekly Foreman Meetings will be set up at the Pre-Construction Meeting.

Schedule for regular bi-weekly Progress Meetings will be set up at the Pre-Construction Meeting.

Attendance:

- Construction Manager
- Prime Contractor's Project Superintendent and relevant Foremen
- Prime Contractor's Project Manager
- Subcontractors pertinent to agenda
- Architect and Engineer
- Owner's Representative

Minimum Agenda:

- Review of Safety issues. Safety Leadership Team shall attend quarterly.
- Review minutes of previous meeting.
- Review and note field observations, problems, and decisions.
- Identify present problems and necessary resolutions.
- Prime Contractors shall provide three week look ahead schedules to be reviewed in conjunction with the project master schedule.
- Review status of shop drawings and submittals.
- Product procurement and deliveries.
- Status of RFI's.
- Coordinate occupancy arrangements and access requirements with Owner as required.
- Status of Change Related items.
- Owner Issues.
- Architect & Engineer issues.
- Open Discussion.
- Location and time for next meeting.

Prime Contractors are required to attend Progress Meetings. Unexcused absences from Progress Meetings will result in a deduct change order in

the amount of \$150.00 for each absence. Meeting attendees shall have the authority to make decisions on behalf of the firm they represent.

Other Meetings

Pre-demolition Conference.

Coordination Drawing Meetings.

Safety Skills Meetings & Tool Box Talks.

Personnel

Supervision: Each Prime Contractor's project manager, field superintendent and foremen throughout the project duration shall have five years experience minimum in the proposed position.

Two (2) years minimum of the five (5) years experience for position shall be with Prime Contractor's firm.

Should in the opinion of the Construction Manager, Architect or Owner, the Project Manager, Superintendent or other Contractor's employees or subcontractor personnel prove unqualified for their position at any point in the project, the Construction Manager shall issue a letter stating that the person is to be removed from involvement in the project.

Action must be made by Prime Contractor within seven (7) working days of receipt of such letter.

Staff Names: At Preconstruction Conference each Prime Contractor shall submit a list of principal staff assignments, including superintendent and other personnel in attendance with Project site. Identify individuals and their duties and responsibilities. List business addresses and telephone numbers, including business office, field office, cellular and facsimile. Each Prime Contractor shall submit a list of emergency contact names and phone numbers.

Post Copies in Project Meeting Room, each temporary field office and at each temporary telephone.

Provide corresponding identification badge number for each staff listed.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Each Contractor shall participate in all project meetings in order to facilitate coordination between trades.

1.3 DESCRIPTION

- A. Construction Manager shall schedule and administer project meetings.
- B. Architect/Engineer and Owner may attend meetings.

1.4 PRE-CONSTRUCTION MEETING

- A. Schedule within fifteen (15) days after notice of award of Contracts.
- B. Attendance:
 - 1. Construction Manager
 - 2. Architect/Engineer
 - 3. Contractor and pertinent Subcontractors
 - 4. Owner's Representative
- C. Minimum Agenda:
 - 1. Introduction and sign in of attendees.
 - 2. Contractor to submit:
 - a. List of major Subcontractors and Suppliers.
 - b. Tentative procurement and construction schedule.
 - c. Staff names.
 - d. Preliminary Submittal Schedule.
 - e. Labor Rate Sheet: Provide for each trade classification of Prime Contract workforce on form per Section 00 85 20 "Project Forms and Documents."
 - 3. Construction Manager to provide an overview of projected construction milestones and schedules.
 - 4. Designation of responsible personnel for coordination of work between Contractors.
 - 5. Safety and job rules.
 - 6. Change Orders: Overhead and profit markups.
 - 7. Distribution of Contract Documents.
 - 8. Shop drawing, product data, and samples.
 - 9. Record Documents.
 - 10. Use of premises:
 - a. Field office and storage area.
 - b. Owner's requirements.
 - c. Identification badges.
 - d. Working hours.
 - e. Telephone use.
 - 11. Project Orientation.
 - 12. Project Safety requirements and training.
 - 13. Distribution of Contract Documents.
 - 14. Major equipment deliveries and priorities.
 - 15. Coordination Drawings.
 - 16. Clean-up procedures.

17. Location and time for progress meetings.

1.5 PREINSTALLATION CONFERENCES

- A. Construction Manager shall conduct pre-installation conferences at Project site before each construction activity that requires coordination with other construction and as identified in individual specification Sections as follows:
- B. Attendees: Prime Contractor, Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Construction Manager shall advise Architect of scheduled meeting dates.
- C. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - 1. Deliveries.
 - 2. Possible conflicts including compatibility problems.
 - 3. Conformance with Construction Manager's Project construction schedule.
 - 4. Projected weather limitations.
 - 5. Manufacturer's written recommendations.
 - 6. Warranty requirements and manufacturers inspection notification.
 - 7. Acceptability of substrates.
 - 8. Testing and inspecting requirements, if any.
- D. Construction Manager: Record significant conference discussions, agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within five (5) days of the meeting.
 - 1. Do not proceed with installation if Conference is not successfully concluded. Construction Manager shall initiate required actions to resolve impediments to performance of Work and reconvene the Conference at the earliest date feasible.

1.6 PROGRESS MEETINGS

- A. Schedule for regular weekly Foreman Meetings will be set up at the Pre-Construction Meeting.
- B. Schedule for regular biweekly unless a weekly Project Manager and Architect Meetings will be set up at the Pre-Construction Meeting.
- C. Attendance:
 - 1. Construction Manager
 - 2. Contractors' Project Superintendent
 - 3. Contractors' Project Manager
 - 4. Subcontractors pertinent to agenda
 - 5. Architect and Engineer
 - 6. Owner's Representative
- D. Minimum Agenda:
 - 1. Review of Safety issues.
 - 2. Review minutes of previous meeting.
 - 3. Review and note field observations, problems, and decisions.
 - 4. Identify present problems and necessary resolutions.
 - 5. Contractors shall provide three week look ahead schedules to be reviewed in conjunction with the project master schedule.
 - 6. Review status of shop drawings and submittals.

7. Product procurement & deliveries.
 8. Status of RFI's.
 9. Coordinate occupancy arrangements and access requirements with Owner as required.
 10. Status of Change Events.
 11. Owner issues.
 12. Architect & Engineers issues.
 13. Open Discussion.
 14. Location and time for next meeting.
- E. Contractors are required to attend Progress Meetings. Unexcused absences from Progress Meetings will result in a deduct Change Order in the amount of \$150.00 for each absence. Meeting attendees shall have the authority to make decisions on behalf of the firm they represent.

1.7 OTHER MEETINGS

- A. Pre-demolition Conference.
- B. Coordination Drawing Meetings – Refer to Specification 01 31 00 for additional information.
- C. Incident & Injury Free (IIF) Supervisory Skills Meetings – Refer to Specification 01 35 00 for additional information.
- D. Project Success Planning Meetings – Refer to Specification 01 31 30 for additional information.

1.8 PERSONNEL

- A. Supervision: Each Prime Contractor's project manager and field superintendent throughout project duration shall have five years' experience minimum in the proposed position.
 1. Two (2) years minimum of the five (5) years' experience for position shall be with Prime Contractor's firm.
- B. Should in the opinion of the Construction Manager, Architect or Owner, the project manager, superintendent or other Contractor's employees or subcontractor personnel prove unqualified for their position at any point in the project, the Construction manager shall issue a letter stating that the person is to be removed from involvement in the project.
 1. Action must be made by Prime Contractor within seven working days of receipt of such letter.
- C. Staff Names: At Preconstruction conference each Prime Contractor shall submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities. List business addresses and telephone numbers, including business office, field office, cellular, and facsimile. Each prime contractor shall submit a list of emergency contact names and phone numbers.
 1. Post copies in Project meeting room, each temporary field office and at each temporary telephone. Provide corresponding identification badge number for each staff listed.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the requirements for the submittals procedures.

1.3 SUBMITTAL REQUIREMENTS

- A. Each Prime Contractor shall provide a Submittal register indicating submittals required for each section of the Specifications.
- B. Two (2) copies of the Submittal register shall be provided to the Construction Manager with submittal date column filled in, indicating anticipated dates for submission of each submittal. Establish anticipated submittal dates after coordinating delivery lead times with the current Project Master Schedule. This register shall be completed and submitted before first Application for Payment will be approved. This register is required within fifteen (15) days of contract award.
- C. Schedule all submittals to be completed within sixty (60) days after Contract execution unless otherwise specified. Indicate items requiring more than sixty (60) days with an explanation for the additional time and on what dates they will be submitted. The dates indicated for each submittal shall take into account the lead-time required for ordering and fabricating of the various items. It is the Contractor's responsibility to expedite submittals / product data as required to maintain the Construction Master Schedule.

1.4 PROCUREMENT LOG REQUIREMENTS

- A. All Prime Contractors shall submit to the Construction Manager an "Equipment / Fixture Procurement Report" two (2) weeks after the Contractor is notified of award. The Contractor shall list all equipment items, which are being purchased, drawing submittals, samples, etc., for a complete composite report.
- B. The report shall be resubmitted to the Construction Manager with updated information weekly until such time as the Construction Manager notifies the Contractor that only monthly reports are required.

1.5 SHOP DRAWINGS

- A. Original drawings, prepared by Contractor, Subcontractor, supplier or distributor, which illustrate some portion of the work showing fabrication, layout, setting or erection details.
 - 1. Identify details by reference to sheet and detail numbers shown on shop drawings.
 - 2. Sheet size, multiple of 8 1/2 X 11 inches, not to exceed size of contract drawings when unfolded.
 - 3. Photographic reproductions of contract drawings will not be accepted as shop drawings and will be rejected.
 - 4. Submittals traced or copied from Contract Drawings are not acceptable and will be returned without review.

1.6 PRODUCT DATA

- A. Manufacturers catalog sheets, brochures, diagrams, schedules, performance charts and other standard descriptive data.
 - 1. Modify product data to delete information that is not applicable to project.
 - 2. Supplement standard to provide additional information applicable to project.
 - 3. Clearly mark each copy to identify applicable materials, products or models.

4. Show dimensions and clearances required.
5. Show performance characteristics and capacities.
6. Show wiring or piping diagrams and controls.

1.7 SAMPLES

- A. Physical examples to illustrate materials, equipment or workmanship, and to establish standards by which completed work is judged.
 1. Office samples to be of sufficient size and quantity to clearly illustrate:
 - a. Functional characteristics of product or material, with related parts and method of attachment.
 - b. Full range of color samples.
- B. Field samples and mock-ups:
 1. Erect at project site at location acceptable to the Construction Manager and Architect/Engineer.
 2. Construct samples or mock-up complete, including work of all trades required in finish work.

1.8 CONTRACTOR RESPONSIBILITIES

- A. Do not start, fabricate or install work requiring submittals until submittals meeting Contract Requirements have been returned to the Contractor.
- B. In the event material and/ or equipment is installed prior to obtaining approval of shop drawings, and in the sole opinion of the Owner's Agent, this material and/ or equipment does not meet the specifications, the Contractor shall be liable for the removal and the replacement at no additional cost to the contract.
- C. Review, stamp and sign shop drawings, product data and samples prior to submission to Architect through the Construction Manager.
- D. Before release of fabrication or purchase, Contractor must verify:
 1. Field measurements.
 2. Field construction criteria.
 3. Catalog numbers and other data.
- E. Coordinate each submittal with requirements of Work and Contract Documents.
- F. Contractor's responsibility for mistakes and oversights in submittals is not relieved by the Construction Manager or Architect/Engineer's review of submittals.
- G. Contractor's responsibility for deviations in submittals from requirements of Contract Documents is not relieved by Architect/Engineer's review of submittals unless Architect/Engineer gives written acceptance of the specific deviations.
- H. Notify the Construction Manager and Architect/Engineer in writing, at time of submission, of deviations in submittals from requirements of Contract Documents.
- I. The Contractor shall send all submittals to the Construction Manager for review. The Architect/Engineer will return all copies of the approved submittals to the Construction Manager who in turn will return copies to the Contractor.

1.9 SUBMISSION REQUIREMENTS

- A. Schedule submissions to allow at least fifteen (15) working days for review. Large submissions may take longer.
- B. For product data and shop drawings, submit ten (10) copies.
- C. Submit at least the number of samples specified in each technical section and no less than two (2) each, plus the number that Contractor needs returned.
- D. Submittal Cover Sheet:
 - 1. Submittal cover sheets must be filled out completely and attached to each copy of all submissions. Submissions without the Submittal Cover Sheet will be returned without review. Refer to Section 00 85 20 Forms.
- E. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related elements of the work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - a. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.
- F. Submittals shall be bound adequately so as to remain intact during use in the jobsite environment, and shall be indexed with labeled dividers if they include more than one product or material.
- G. Submissions shall include:
 - 1. Date and revision dates.
 - 2. Relationship to all adjacent structure or materials.
 - 3. Field dimensions clearly identified as such.
 - 4. Applicable standards.
 - 5. Notification and identification of deviations from Contract Documents via cover letter and clear markings on the submission.
 - 6. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with Contract Documents.
 - 7. Submittals without Contractor's stamp will be returned without being reviewed.
 - 8. Additional pertinent data.
 - 9. Work or item represented by submittal.
- H. Should additional copies be required, Contractor shall make required copies for distribution of shop drawings and product data that have been stamped and signed by the Architect/Engineer.
- I. Submittals shall be identified by reference to drawing numbers, detail numbers, schedule numbers, room numbers, and identification systems used in the Contract Documents.
- J. All items that require color selection shall be submitted as soon as possible. The Architects' review and coordination of color selections cannot be completed until all items are submitted.

- K. Submissions that are incomplete due to lack of Contractor's approval, lack of proper identification, incorrect number or type of submittal items or similar reasons shall be returned without action for correct submission.

1.10 RESUBMISSION REQUIREMENTS

A. Shop Drawings

1. Revise initial drawings as required and resubmit as specified for initial submittal.
2. Indicate on drawings changes that have been made other than those requested by the Architect/Engineer.

B. Product Data and Samples: Submit new data and samples as required for approval.

1.11 CONTRACTOR'S DISTRIBUTION OF SUBMITTALS

A. Distribute copies of shop drawings and product data which carry the Architect/Engineer stamp to:

1. Contractor's Subcontractors and Suppliers, as required for coordination.
2. Other Contractors for coordination purposes.

1.12 ARCHITECT/ENGINEER

- A. Review by the Architect will be for conformance to design intent, materials, and general dimensions, but shall not relieve any Contractor of their responsibility for furnishing proper equipment or materials nor for undetected errors in the drawings, unless attention to same is noted in writing at the time of submission of Drawings. Review of shop drawings does not relieve Contractor of responsibility for proper fit, not detail design of connections nor for supplying all necessary material or quantities.
- B. Review of separate items does not constitute review of an assembly in which item functions.
- C. Stamp and initial or sign to indicate review of submittal.
- D. Return submittal to the Construction Manager for distribution.
- E. Do not permit submittals marked "Revise and Resubmit" to be used at the Project site, or elsewhere where work is in progress.

1.13 ADDITIONAL INSTRUCTIONS

- A. The Construction Manager may from time-to-time issue additional instructions to the Contractor as may be necessary to amplify, augment, modify or clarify the Contractor Documents. These may be in the form of drawings, Specifications, interpretations, orders and supplemental agreement, Change Order or minor change. Submittals shall be resubmitted and otherwise kept up to date as required by additional instructions.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. NYSED REGULATIONS / SCHOOL DISTRICT REGULATIONS

1. The occupied portion of any school building shall always comply with the minimum requirements necessary to maintain a certificate of occupancy.
2. General safety and security standards for construction projects per NY State Education Department code Rule 155 shall be met by all Contractors.
 - a. All construction materials shall be stored in a safe and secure manner.
 - b. Fences around construction supplies or debris shall be maintained.
 - c. Gates shall always be locked unless a worker is in attendance to prevent unauthorized entry.
 - d. During exterior renovation work, overhead protection shall be provided for any sidewalks or areas immediately beneath the work site or such areas shall be fenced off and provided with warning signs to prevent entry.
 - e. Workers shall be required to wear photo-identification badges at all times for identification and security purposes while working at occupied sites.
3. Separation of construction areas from occupied spaces: Construction areas which are under the control of a Contractor and, therefore, not occupied by staff or students shall be separated from occupied areas. Provisions shall be made to prevent the passage of dust and contaminants into occupied parts of the building. Periodic inspection and repairs of the containment barriers must be made to prevent exposure to dust or contaminants. gypsum board must be used in exit ways or other areas that require fire rated separation. Heavy duty plastic sheeting may be used only for a vapor, fine dust or air infiltration barrier, and shall not be used to separate occupied spaces from construction areas.
 - a. A specific stairwell and/or elevator should be assigned for construction worker use during work hours. In general, workers may not use corridors, stairs or elevators designated for students, staff or public.
 - b. Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. There shall be no movement of debris through halls of occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.
 - c. All occupied parts of the building affected by renovation activity shall be cleaned at the close of each workday. Buildings occupied during a construction project shall maintain required health, safety and educational capabilities at all times that classes are in session.
4. Prior to beginning construction or demolition, contractors shall submit a plan detailing how exiting required by the applicable building code will be maintained.
5. Prior to beginning construction or demolition, contractors shall submit a plan detailing how adequate ventilation will be maintained during construction.
6. Construction and maintenance operations shall not produce noise in excess of 60 dba in occupied spaces or shall be scheduled for times when the building or affected building spaces are not occupied or acoustical abatement measures shall be taken. Noise level measurements (dba) shall be taken with a type 2 sound level meter in the occupied space in a location closest to the source of the noise.

7. All Contractors shall be responsible for the control of chemical fumes, gases, and other contaminants produced by welding, gasoline or diesel engines, roofing, paving, painting, etc. to ensure they do not enter occupied portions of the building or air intakes.
8. All Contractors shall be responsible to ensure that activities and materials which result in "off-gassing" of volatile organic compounds such as glues, paints, furniture, carpeting, wall covering, drapery, etc. are scheduled, cured or ventilated in accordance with manufacturers recommendations before a space can be occupied. Contractor schedules are to include sufficient time for "off-gassing" of volatile organic compounds introduced during construction before occupancy is allowed, as part of meeting project schedule milestones.
9. All areas to be disturbed by renovation and demolition will be tested for Lead & Asbestos prior to the start of the project.
10. Lead:
 - a. Surfaces that will be disturbed by reconstruction must have a determination made as to the presence of lead. Any construction or maintenance operations which will disturb surfaces that contain lead will require abatement of those areas pursuant to protocols detailed in the "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing" (June 1995; U.S. Department of Housing and Urban Development, Washington, D.C. 20410; available at the Office of Facilities Planning, Education Building Annex, Room 1060, State Education Department, Albany, NY 12234). All areas scheduled for construction as well as areas of flaking and peeling paint shall be tested for the presence of lead and abated or encapsulated in accordance with the above noted guidelines.
11. Large and small asbestos abatement projects as defined by 12NYCRR56 shall not be performed while the building is occupied. Whenever air clearance is required for an asbestos project, T.E.M. will be used for final air clearance.
 - a. Asbestos: Asbestos abatement protocols. All asbestos abatement projects shall comply with all applicable Federal and State laws including but not limited to the New York State Department of Labor industrial code rule 56 (12 NYCRR 56), and the Federal Asbestos Hazard Emergency Response Act (AHERA), 40 CFR part 763 (Code of Federal Regulations, 1998 Edition, Superintendent of Public Documents, U.S. Government Printing Office, Washington, DC 20402; 1998; available at the Office of Facilities Planning, Education Building Annex, Room 1060, State Education Department, Albany, NY 12234). Minor asbestos projects defined by 12 NYCRR 56 as an asbestos project involving the removal, disturbance, repair, encapsulation, enclosure or handling of 10 square feet or less of asbestos or asbestos material, or 25 linear feet or less of asbestos or asbestos material may be performed in unoccupied areas of an occupied building in accordance with the above referenced regulations.
 - i. Asbestos Industrial Code Rule 56: Large and small asbestos abatement projects as defined by 12NYCRR56 shall not be performed while the building is occupied except as determined by AICR56 with proper isolation.
 - ii. Labor Rule 56 and AHERA both must be followed for asbestos projects in schools. Whenever air clearance is required by Labor Rule 56 or AHERA, TEM must be used for the final air clearance test.
 - iii. Labor Rule 56 addresses final air clearance for tall asbestos work including minor glove bag projects when there is a breaching containment. AHERA requires that TEM be used for final air clearance for work in schools, but does not speak to minor project air clearance.
 - iv. NOTE: It is NYS State Education Department's interpretation that the term "building" as referenced in this section, means a wing or major section of a building that can be completely isolated from the rest of the building with a sealed non-combustible construction. The isolated portion of the building must contain exits, which do not pass through the occupied portion, and ventilation systems must be physically separated and sealed at the isolation barrier.

12. Exterior work such as roofing, flashing, siding, or soffit work may be performed on occupied buildings provided proper variances are in place as required, and complete isolation of ventilation systems and at windows is provided. Care must be taken to schedule work so that classes are not disrupted by noise or visual distraction.
13. Use of shipping containers as material storage facilities shall be readily operable from the egress side of the door without the use of a key or special knowledge or effort. Every container shall have a louver incorporated into one side. The louver shall be large enough to aid ventilation according to the materials stored inside.
14. Occupied spaces shall be protected against visual distraction due to construction activities.
15. All holes in floors and walls shall be sealed with a fire-resistive material. All contractors shall provide fire-resistive materials throughout the project in association with the work of their contract. All Contractors shall maintain proper operation of fire extinguishers, fire alarm, and smoke/fire detection systems and all items shall be maintained throughout the project.
16. During construction, daily inspections of occupied areas shall be conducted by each Contractor's Superintendent to assure that construction materials, equipment or debris do not block fire exits or emergency egress windows.
17. All personnel involved with the construction project will be required to wear a Photo Identification Badge, when on the project jobsite. Any person related to the project, who does not have one of these photo identification badges, will not be allowed on site. The Owner will supply these badges at no cost to the Contractor. The badges will be made up at a designated location at the project site. All new personnel will report to this designated location upon arriving on site to be issued a badge. The loss or theft of these badges shall be reported immediately to the Construction Manager. There will be a \$10.00 charge to the Contractor for the replacement of any lost or stolen badges. These badges will remain the property of the School District and shall be returned to the Construction Manager once the personnel that the badge was issued to are no longer onsite.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Contractor shall comply with Owner occupancy, public use, and phasing requirements.
- B. Contractor shall limit his use of the premises for work and for storage, to allow for:
 - 1. Work by other Contractors
 - 2. Owner occupancy
 - 3. Public use
- C. Contractor shall limit their operations, including storage of materials and prefabrication, to areas within the Contract Limit Lines unless otherwise permitted by the Construction Manager at the Owner's option.
- D. Contractor shall coordinate the use of premises with the Owner and Construction Manager and shall move, at his own expense, any stored products under Contractor's control, including excavated material, which interferes with operations of the Owner or separate contractors.
- E. Contractor shall obtain and pay for the use of additional storage or work areas needed for operations.
- F. Contractor shall assume full responsibility for the protection and safekeeping of Products under this Contract stored on the site and shall cooperate with the Construction Manager to ensure security for the Owner's property.
- G. The contractors shall take all measures necessary to protect the existing landscaping in and around the construction site. No alterations of any kind to trees scheduled to remain will be permitted.
- H. In the utilization of ground area, each Contractor shall protect pavement, curbs, walks, structures, and other permanent components that are designated to remain and shall maintain such protection. Any damage to the area used shall be repaired and/or restored to previous condition by the responsible contractor.
- I. Each Contractor and their Subcontractors, material suppliers and fabricators shall provide full and free access for the Owner's Representative, Consultants and/or other designated representatives of the Owner to inspect job materials, equipment, fabrication facilities and storage locations, both at and away from the job site.
- J. Work in Owner occupied spaces shall be restricted to essential activities. Such activities shall be scheduled in advance with the Construction Manager and Owner.

1.2 AREA AVAILABLE FOR CONTRACTOR'S USE

- A. The Contractor shall confine its operations to those portions of the Owner's property, and to the rights-of-way or easements, temporary or permanent, acquired or designated for the work of the Contract as shown on the Drawings.
- B. Private property adjacent the site shall not be entered upon or used by the Contractor for any purpose without the written consent of the Owner thereof. A copy of such consent shall be filed with the Construction Manager prior to the start of work.
- C. Only project managers and field superintendents will be permitted to park within the construction fence.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the site condition requirements without limiting the generality implied by the Specifications and Drawings. Refer to Section 01 10 00 for summary / scope of work.

1.3 PRE-BID INSPECTION & EXAMINATION

- A. The Contractor warrants and represents that prior to submitting his Bid, that they are satisfied as to the location and nature of the work and the quantity, quality, type and nature of both surface and subsurface structures and materials likely to be encountered.

1.4 BORINGS

- A. Any data on subsurface conditions that may have been obtained by the Owner prior to the advertisement for bids, through test borings, test pits, seismic explorations, or other means, was obtained by the Owner for its sole use and purpose. Any such data, known or recalled as of the date of Advertisement or Notice for Bids, are shown on separate drawings or in separate schedules and reports which are not any part of the Contract Documents. All such data are made available to Bidders, the Contractor, and other interested parties only as a convenience and without express or implied representation, assurance or other guarantee that any of the information is complete, correct, adequate, or representative of a true or typical picture of subsurface conditions on the site.
- B. The Contractor, both during its status as Bidder and after execution of the Contract, shall satisfy themselves as to the nature, character, quality, and quantity of above ground and below ground conditions likely to be encountered. Any reliance on data made available by the Owner shall be at the Contractor's sole risk.
- C. No claim whatsoever shall be made by the Contractor against the Owner or Construction Manager for or on account of such data available, or neglected to be made available, by the Owner or Construction Manager.
- D. The Contractor at any time, and any holder of Bidding Documents during the period between advertisement for and receipt of bids, will be permitted to make test borings, test pits, soundings or similar subsurface investigations on the Site. Prior to making these investigations the Contractor and/or holder of Bidding Documents must notify the Construction Manager when and where they propose to make such investigations.
- E. The locations where test boring samples may be examined, if any, is given in the Subsurface Exploration and Geotechnical Evaluation Report.

1.5 PROTECTION OF EXISTING STRUCTURES

- A. The Contractor shall at all times have onsite, suitable and sufficient plant and materials to adequately protect, support and sustain any and all existing structures and facilities, whether above or below ground, and shall use same as may be necessary or required to protect, support and sustain any and all such structures as may become weakened, endangered, undermined, or uncovered.
- B. The Contractor shall, at its own expense, support and sustain in their places and protect from direct or indirect damage all water, gas, steam, air or other mains or pipes, sanitary and storm water sewers and drains, conduits, subways, service connections, buildings, poles, wires, fences, pavements, sidewalks, curbs, railways, trees and other structures and property and appurtenances thereto on or in the vicinity of the site, and shall assume all liability for damage thereto,

including damage arising out of settlement or lateral movement of walls of excavations, whether occurring during performance of the work or the 12-month period of guarantee.

- C. In the event of damage or danger to any structure or facility, the Contractor shall immediately notify the Construction Manager, and shall promptly repair or protect the structure, at its own expense, as the Construction Manager may direct.

1.6 EXISTING STRUCTURES BELOW GROUND

- A. The Contract Drawings show the location and character of certain existing subsurface structures and facilities likely to be encountered in excavations or located in such proximity to the work as to require precautions for their protection. The sizes, materials, locations and depths shown are only approximate, and the Contractor shall satisfy itself as to the accuracy and completeness of such information. The Contractor shall not be relieved from any of its obligations, nor be entitled to claim for damages or additional compensations, sustained or arising out of inadequacy or inaccuracy of the information given.

1.7 ABANDONED STRUCTURES

- A. Any structures, facilities or appurtenances therefore which are abandoned or become so by reason of the work, shall, at the Contractor's expense, be broken up and filled with approved material, if directed by the Construction Manager.

1.8 LATENT SUB-SURFACE CONDITIONS

- A. In the event that latent sub-surface conditions are found to materially differ from those on which the plans and Specifications are based, the Contractor shall immediately notify the Construction Manager before they are disturbed. After prompt investigation, the Architect/Engineer will determine what changes, if any, should be made in the Plans and Specifications because of the revealed conditions, and shall advise the Construction Manager.

1.9 ADJUSTMENT OR CHANGES OF EXISTING STRUCTURES

- A. If an underground pipe or other structure requires realignment or relocation not included in the Plans or Specifications, the Architect will issue a clarification and the Construction Manager will issue a Change Order for such work, and the Contractor shall be compensated. The Contractor shall strip or uncover and support or sustain the structure at its own expense prior to such Change Order, as part of its work under the original Contract, and shall not be entitled to claim for damage or delay due to its presence or discovery.
- B. Wherever existing utilities comes within limits of the work; the Contractor shall notify both the Construction Manager and the Utility before in any way disturbing it. Any work of realignment, relocation, removal or extension of the utilities shall be done as mutually agreed by the Utility, the Contractor and the Architect. The Contractor shall maintain satisfactory drainage of the excavation at all times from revelation of the structure until completion of its realignment or readjustment. Interruption of service by utilities shall be kept to a minimum. Prior to interruption, Contractor to notify Owner/Construction Manager of precise condition, and provide a brief event schedule outlining procedures and anticipated times of delays.
- C. The Contractor shall not cause nor permit interference with or hindrance to any municipal department, individual, public service corporation, or other company in protecting its structures and facilities, nor in removing, replacing or relocating it.

1.10 NOTIFICATION OF OTHER PARTIES

- A. In addition to notices to Utilities and others required elsewhere herein, the Contractor shall give written notice of its proposed construction operations to the owner of all public and private utilities at least seven days in advance of breaking ground in any area in which a utility is located. Copies of each such notice shall be simultaneously sent to the Construction Manager.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.
- B. Specification Section 01 51 00 – Temporary Facilities

1.2 SUMMARY

- A. This Section includes the requirements for the project procedures during renovations and phased construction.

1.3 MAINTENANCE OF BUILDING CIRCULATION AND EXITS

- A. Contractor shall maintain circulation corridors, exits and stairs in all building areas occupied by Owner or Public. The existing buildings will remain operational and open to the public during portions of the work.
- B. Where temporary emergency egress from Owner occupied areas through construction areas are required; those areas shall be adequately protected to ensure the safety of occupants through the construction areas. This would include but not limited to protective – covered walkway through the construction area. It shall be the responsibility of the General Construction Contractor to provide this protection as directed by the Construction Manager.
- C. All construction areas shall be secure by lock and key. If the construction areas are means of emergency egress from the construction area or means of egress from the Owner-occupied areas through construction areas; the doors shall swing outward in the direction of egress. These doors shall be provided with “panic” hardware installed in a manner to allow egress outward from the building, but upon closing of the door prevent unauthorized entry into the building. Contractors shall anticipate that these barriers and protective items will need to be modified and adjusted during the course of construction and shall include these changes as part of their Base Bid.
- D. All Contractors shall cooperate with the Owner with respect to security of the building and the rules that they have developed to maintain security. This would include but not be limited to keeping doors locked all the times to prevent unauthorized entry into the construction area or into the Owner’s occupied areas. The Contractor shall not admit entrance into the existing facility or the construction area any person not associated with the construction project. All patrons, staff and visitors shall enter the building through designated entrances as established by Owner and/or Construction Manager. All construction personnel shall enter the construction area and/or the existing facility at entrances designated by the Construction Manager.

1.4 TEMPORARY CONTAINMENT PARTITIONS

- A. Temporary dust containment partitions will be provided in accordance with Section 01 51 00 – Temporary Facilities to isolate all areas of construction work from occupied portions of existing buildings to prevent the spread of dust, odors and noise.
- B. The work areas shall be maintained at a negative pressurization with respect to adjoining occupied areas. For the purpose of dust and contaminant isolation from occupied areas, containment partitions shall be air tight and capable of maintaining the construction areas negatively pressurized with respect to the occupied areas. Non-air tight construction barriers will not constitute acceptable containment partitions.
- C. In the event a failure of a containment barrier during the course of work, when directed by the Construction Manager or the Indoor Environmental Consultant, Contractors shall cease work in the potentially affected area until the containment barrier failure is corrected and acceptable pressurization is restored and verified.

PART 2 - PRODUCTS

2.1 REMOVED MATERIALS AND EQUIPMENT

A. General:

1. All materials and equipment to be removed as part of the work shall become the property of the Contractor and be removed from the jobsite at the Contractor's expense unless otherwise shown on the drawings or specified.
2. When debris is transported through occupied areas of the existing building, receptacles shall be sealed and covered to eliminate the spread of dust and debris.

B. Items Retained by Owner:

1. The items that remain the property of the Owner after removal by the Contractor will be listed in each Contract or indicated on the drawings.
2. These items shall be carefully removed by the Contractor without damage and turned over to the Owner.

C. Items Re-Used As Part of the Work:

1. Items indicated to be re-used shall be carefully removed and stored by the Contractor until such time as they may be reinstalled.
2. Items removed by others and indicated to be reinstalled per the Contract Documents are to be coordinated with the Construction Manager for pickup.

END OF SECTION

PART 1 - DESCRIPTION

1.1 WORK AFTER DARK

- A. Unless specifically required elsewhere herein, no contractor shall perform exterior work after dark except in emergencies. When time permits, a contractor shall inform the Construction Manager in advance of such work and shall obtain approval. When time does not permit advance notice to the Construction Manager, they shall inform the Construction Manager at the earliest possible moment.
- B. The placing of concrete shall be so scheduled as to be started early enough in daylight hours to allow sufficient time for the completion of the section under construction before dark, including the work of finishers.
- C. When, in order to minimize interference with existing structures or utilities, or maintain traffic, it may, in the opinion of the Construction Manager, be expedient or necessary to do work after dark, such work shall be performed by the Contractor at no additional cost to the Owner, and the Contractor shall provide adequate lighting.
- D. Nothing in this section should preclude any contractor from working on the interior of the building after dark, as long as sufficient electric lights exist in the area of the work.

1.2 SATURDAY/OVERTIME/SHIFT WORK

- A. Each Contractor shall provide at all times sufficient manpower to maintain the progress of the Work to the satisfaction of the Construction Manager and/or the Owner. The option to work extended hours and weekends with prior agreement with the Construction Manager may be made available to meet the schedule. Costs for premium time shall be borne by each individual Prime Contractor.
- B. No Saturday or overtime work shall be scheduled or performed by Contractors without prior approval by the Construction Manager. Proposed work schedule shall be submitted to the Construction Manager a minimum of 24 hours prior to proposed start unless otherwise directed or approved by Construction Manager.
- C. If performing work in an occupied building, it will be necessary for contractors to work night shifts, this is expected and encouraged. Any contractor(s) that want or find it necessary to work night shifts in order to complete the work as scheduled, should contact the Construction Manager 24 hours in advance of when the contractor(s) want to start the night shift. The Construction Manager will make every effort to schedule this night shift work with the Owner and activities that take place in these buildings at night. Other hours can be scheduled with the approval of the Construction Manager and the Owner. Any Contractor that does work a night shift shall be responsible to:
 - 1. Maintain security of the building at the end of the night shift by insuring that all windows and doors are closed and locked.
 - 2. Maintain security in the building by not allowing anyone other than its own work force to enter the building
 - 3. Insure that the work area is usable for its intended purpose for the next days use by the Owner. This includes that all Life/Safety Systems are in place and functioning, that all other systems are functioning properly and usable, the areas can be occupied, and all construction debris, dust, materials and tools are removed.
 - 4. Cooperate and coordinate night shift activities with the Owner's maintenance/custodian staff that is on duty.

1.3 WORK ON SUNDAYS OR HOLIDAYS

- A. No Contractor shall work on Sundays, or locally recognized legal Holidays, except in an emergency, and then shall confine its operations to only the work considered necessary to be performed at such time. In the event of an emergency, Contractor shall notify the Construction Manager the same day or as soon as possible.

1.4 LABOR REQUIREMENTS

- A. With all of the above items, each Contractor shall secure the necessary or required paperwork and approval of the NYS Department of Labor and applicable Trade Unions prior to commencing work under these conditions.

1.5 WORK IN STORMS

- A. If required by the Construction Manager, masonry work, and the mixing and placing of concrete shall be halted during rainstorms, and all fresh work shall be immediately protected with suitable coverings. The Contractor shall keep a sufficient quantity of such coverings at the site at all times.
- B. No paving, exterior painting, fine grading, seeding or roofing shall be done during rain or snowstorms.
- C. All roof deck shall be watertight at the end of each day. Contractor shall only remove what they can replace that same day.
- D. Because this project exists where snow storms can occur, the Construction Manager along with the Owner will work out a system where construction personnel will be notified if the contractors and their personnel are not to report for work because the construction site is closed, the roads to the building are closed, or if it is just too dangerous for construction personnel to report for work. As part of this notification system it will also advise construction personnel when they need to leave the project because of an impending snowstorm. The Contractors and their personnel are to abide by the notifications for their own safety and the safety of others. The contractors will not be due any additional compensation if it is deemed the project is closed due to weather or if they are sent home because of impending weather.

1.6 WORK IN COLD WEATHER

- A. Certain Specifications contain provisions prohibiting the performance of certain work in cold weather or outlining the conditions under which such work may be so performed. In the absence of specifics mentioned elsewhere in the Contract Documents, the judgment of the Construction Manager shall govern in any case where temperature may adversely affect or prevent the performance of quality work. Contractor(s) will not be due any additional compensation if the work is stopped due to weather.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section defines the responsibilities of testing and laboratory services.

1.3 DESCRIPTION

- A. Each Contractor shall perform all testing and prepare all test reports and/or certifications required by the Contract Documents and shall fully cooperate with any testing and/or inspection agencies retained by the Contractor, Owner, Construction Manager, or the Architect and their consultants, including implementation of any remedial work recommended as a result of such inspections.

1.4 QUALITY ASSURANCE

- A. Laboratory services are solely an assurance that contract provisions are being met.
- B. Forward copies of results of tests by Contractor to the Architect, Construction Manager, and relevant parties within 24 hours.
- C. Required testing and test procedures are indicated under each Division of the Technical Specifications and all federal, state, and local requirements.
- D. The Contractor shall provide all testing services not specified to be the owner's responsibility.
- E. The Architect shall reserve the right to require additional information as is deemed necessary to fully evaluate testing results.

1.5 SCOPE OF WORK

- A. Owner Responsibility: Where testing requirements are indicated in the Technical Specification section as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged. The description of the types of testing and inspecting they are engaged to perform is as outlined in the technical specifications.
 - 2. Testing laboratory services provided by the Owner:
 - a. Field density tests of soils in place for all fills and backfills, including structural fills.
 - b. Sieve analysis of proposed backfill material.
 - c. Tests for suitability of footing subgrade.
 - d. Compressive and bearing tests of undisturbed soils.
 - e. Compressive strength tests for concrete placed on site.
 - i. One set of 3 cylinders for each 50 cubic yards, or fraction thereof, placed in one day. One specimen tested at 7 days and 2 specimens tested at 28 days.
 - f. Compressive strength tests for mortar placed on site.
 - g. Tests for tightness of bolts and quality of welds for structural steel.
 - h. Field and/or shop inspection of structural steel, deck, and miscellaneous metals.
 - i. Field inspection of fireproofing required thickness and/or pull test.
 - j. Thickness of field applied paint/stain.
 - k. Asbestos Abatement project and air monitoring.
 - l. Testing related to remedial operations or possible deficiencies.
- B. Contractor Responsibility: Unless otherwise indicated, provide all testing services specified.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality control services. A qualified testing agency is an agency with experience and capability to conduct testing and inspection indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.
2. Tests shall be scheduled by the appropriate Contractor requiring the testing and provide notification to the Construction Manager to meet with the construction schedule milestones.
3. Submit a copy of certified written testing report to the Construction Manager, Architect, and relevant parties.
4. Testing and inspecting requested / required by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Costs for re-testing and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
6. The Contractor shall complete all test report forms, including signature of the Construction Manager representative witnessing the test performed. Provide a copy of the completed test report to the Construction Manager for record.

1.6 LIMITS OF AUTHORITY

- A. The Special Inspectors or Testing Laboratories will not have control over the Contractor's means and methods of construction.
- B. The Special Inspectors or Testing Laboratories have no authority to stop the work.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 RESPONSIBILITIES AND DUTIES OF CONTRACTOR

- A. To facilitate testing services, the Contractor shall:
 1. Furnish to the Laboratory such samples of materials as may be necessary for testing purposes.
 2. Furnish such casual labor, equipment and facilities as is necessary to obtain and handle samples at the project.
 3. Schedule the Testing Agency sufficiently in advance of operations to allow for completion of tests and for the assignment of personnel.
 4. Provide and maintain, for the sole use of the Testing Agency, adequate facilities for safe storage and proper curing of concrete test cylinders on the project site for the first 24 hours as required by ASTM C31-69.
 5. Maintain records at the project site showing the date and extent of each concrete placement.
 6. Provide safe access to items to be tested. This includes sheeting and ladders for deep excavation; scaffolding and ladders for inspection and testing of superstructure.
 7. Full cooperation with all firms performing testing and inspection work is expected from all Contractor personnel.
- B. If any portion of the work shows low test results, evidence of detrimental placing or curing conditions, the Owner may require additional testing, compaction, cored samples or re-welding at the Contractor's expense. In no case shall the inspector prescribe the method of repair of the defect. Repair recommendations will be provided by the Architect/Engineer.

END OF SECTION

SECTION 014533 – SPECIAL INSPECTIONS AND TESTING

1.0 PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including, General and Supplementary Conditions and other Divisions 01 Specification Sections, apply to this Section.
- B. Statement of Special Inspections and Testing (attached).
 - 1. The Statement of Special Inspection and Testing was prepared by the Structural Engineer of Record (SER) – the RDPIRC for the structural work scope of the project.

1.2 SUMMARY

- A. This section specifies special inspection services and materials testing activities required during project construction to be provided by Special Inspectors and Testing Laboratory retained by the Owner.
 - 1. See technical specification sections for other testing services to be provided by the Contractor.
- B. Owner Responsibility: Where special inspections and testing requirements are indicated in this specification section as Owner's responsibility, Owner will engage qualified special inspectors and testing agencies to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of special inspectors and testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.

1.3 GENERAL

- A. Special Inspection and Testing shall be in accordance with Chapter 17 of the Uniform Building Code of New York State (BCNYS).
- B. The program of Special Inspection and Testing is a quality assurance program intended to ensure that the work is performed in accordance with the Contract Documents.
- C. This specification section is intended to inform the Contractor of the Owner's quality assurance program and the extent of the Contractor's responsibilities. This specification section is also intended to notify the Approved Special Inspection Agency, hereinafter referred to as the Special Inspector (SI), and other Agents of the Special Inspector, of their requirements and responsibilities.
- D. The Special Inspector shall be the individual in charge of the Special Inspection and Testing program. The SI shall supervise and review the work of the Inspection and Testing Agents for each inspection or test. As explained in BCNYS Section 1704.2.1, the SI, and all its Agents, shall demonstrate competence to the satisfaction of the Registered Design

Professional in Responsible Charge (RDPIRC) and the Building Official (BO) for inspection or testing of the particular type of construction or operation requiring special inspection and testing. Unless otherwise noted or agreed upon the RDPIRC and the BO, the minimum qualifications are as follows:

1. Structural Steel Construction and Steel Construction other than Structural Steel (as defined by AISC 303-2010):
 - a. Inspection (excluding welded connections): ICC Structural Steel and Bolting Special Inspector, EIT with relevant experience, or PE with relevant experience.
 - b. Inspection of Welded Connections: ICC Structural Welding Special Inspector, AWS Welding Inspector (WI) or Senior Welding Inspector (SWI). An AWS Associate Welding Inspector (AWI) is permitted to be used if under the direct supervision of WI, who is on the premises and available when weld inspection is being conducted.
 - c. Non-Destructive Testing (NDT) of Welded Connections: ASNT NDT Level II.
- E. Frequency of Special Inspection or Testing: The individual special inspections and tests shall be performed either continuously or on a periodic basis, as defined below, in accordance with the Statement of Special Inspection and Testing:
 1. Inspection, Continuous: The full-time observation of work requiring special inspection by an approved Special Inspector, or Agent, who is continuously present in the work area where the work is being performed.
 2. Inspection, Periodic: The intermittent observation of work requiring special inspection by an approved Special Inspector, or Agent, who is present in the work area where the work has been or is being performed, and at the completion of the work.

1.4 CONTRACTOR'S RESPONSIBILITIES

- A. The Contractor shall cooperate with the Special Inspector, and its Agents, so the special inspections and testing can be performed with hinderance.
- B. The Contractor shall provide adequate OSHA-compliant access for the Special Inspector and its Agents to perform their work. This includes access to pipe scaffolds, swing-stage scaffolds, and any other method of accessing the work areas that the Contractor or its agents use to perform the work of the Contract.
- C. The Contractor shall review the Statement of Special Inspection and Testing and shall be responsible for coordinating and scheduling inspections and tests. The Contractor shall notify the Special Inspector (or Inspection and Testing Agents) at least 24 hours in advance of a required test or inspection. Uninspected work requiring inspection may be rejected solely on that basis.
 1. All tests shall be scheduled and witnessed by the Construction Manager

- D. The Contractor shall provide incidental labor and facilities to:
 - 1. Provide access to the work to be inspected or tested.
 - 2. Obtain and handle samples at the site or at the source of products to be tested.
 - 3. Facilitate tests and inspections.
- E. The Contractor shall keep at the project site, the latest set of construction drawings, field sketches, approved shop drawings, and specifications for use by the Special Inspector and its Agents.
- F. The Special Inspection and Testing program shall in no way relieve the Contractor of his obligation to perform work in accordance with the requirements of the Contract Documents or form implementing an effective Quality Control program. All work subjected to special inspection and testing shall first be reviewed by the Contractor's Quality Control personnel.
- G. The Contractor shall acknowledge each item listed as a discrepancy by the Special Inspection and Testing program in writing to the RDPIRC and Owner. The acknowledgement shall identify whether or not the discrepancy has been corrected, is in compliance with the contract documents, and is ready for re-inspection.
 - 1. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor and the Contract Sum will be adjusted by Change Order.
- H. The Contractor shall submit a Statement of Responsibility in accordance with BCNYS Section 1706.1 for the construction of the main lateral force-resisting system.
- I. The Contractor shall ensure all products, materials or assemblies are properly labeled so the Special Inspector or its Agents can easily observe the label to confirm compliance with the approved construction documents.
- J. The Contractor shall prepare samples for testing by the Owner's testing agency where indicated and as directed by the Owner's Special Inspector.
- K. The Contractor shall provide all testing services not specified to be the Owner's responsibility.
 - 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality control services. A qualified testing agency is an agency with experience and capability to conduct testing and inspection indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.
 - 2. Notify the Construction Manager and Testing Agency at least 72 hours in advance of time when work that requires testing or inspection will be performed.
 - 3. Submit copies of certified written testing report to the Construction Manager and Architect.

4. Testing and inspecting requested / required by Contractor and not required by the Contract Documents are Contractor's responsibility.

1.5 LIMITS ON SPECIAL INSPECTOR AND TESTING AGENT AUTHORITY

- A. Neither the Special Inspector nor its Agents may release, revoke alter, or expand on the requirements of the Contract Documents.
- B. The Special Inspector and its Agents will not have control over the Contractor's means and methods of construction.
- C. Neither the Special Inspector nor its Agents shall be responsible for construction site safety.
- D. Neither the Special Inspector nor its Agents shall have the authority to stop the work.

1.6 RESPONSIBILITIES OF SPECIAL INSPECTION AND INSPECTION AND TESTING AGENTS

- A. The Special Inspector shall submit to the RDPIRC for review and approval a copy of their qualifications and qualifications of all Agents, which shall include the names and qualifications of each of the individual inspectors and technicians who will be performing inspections or tests.
- B. The Special Inspector, and all Agents, shall disclose any past or present business relationship or potential conflict of interest with the Contractor or an of the Subcontractors whose work will be inspected or tested.
- C. The Special Inspector and its Agents shall have adequate equipment to perform the required tasks. The equipment shall be periodically calibrated in accordance with equipment manufacturer's recommendations.
- D. The Special Inspector and its Agents shall notify the Contractor of their presence on the job site at the start of any required inspection or test.
- E. The Special Inspector and its Agents shall notify the Contractor of the results of any inspection or test upon completion of the inspection or testing task, including any discrepancies noted. The Special Inspector shall report any discrepancies from the Contract Documents found during an inspection. If the discrepancies are not corrected during the inspection, the Special Inspector shall notify the RDPIRC prior to the completion of that phase of work. Reports shall document all discrepancies identified and the corrective action taken.
- F. The Special Inspector and its Agents shall prepare detailed reports of each inspection or test and submit the reports within three days of the inspection or test. Reports shall be in electronic format (legible handwritten reports may be submitted if final typed copies are not available) and include:
 1. Date of test or inspection.
 2. Name of inspector or technician and name of inspection or testing firm representing.

3. Location of specific areas tested or inspected.
 4. Description of test or inspection and results.
 5. Identification of discrepancies.
 6. Indication that contractor was made aware of discrepancies.
 7. Whether or not the discrepancies were corrected.
 8. Applicable ASTM standard.
 9. Weather conditions (temperature, wind speed, humidity, cloud cover, etc.).
 10. Signature of inspector, or of the individual overseeing the inspection of testing.
- G. Inspection and testing reports shall be submitted to the RDPIRC, or as agreed upon at the time Special Inspection and Testing pre-construction meeting.
- H. A Special Inspection and Testing pre-construction meeting shall be held by the Special Inspector. The meeting shall include any Inspection and Testing Agents, the Contractor, any applicable subcontractors and RDPIRC. The purpose of the meeting shall be to identify the specifics of the Special Inspection and Testing program, including, but not limited to, the following:
1. Identify the Special Inspector and Testing Agents
 2. Review this specification section and Statement of Special Inspection and Testing.
 3. Determine the distribution list for inspection and testing reports.
 4. Provide contact information.
 5. Determine which party shall schedule inspections and testing.
- I. The Special Inspector and its Agents shall notify the RDPIRC by telephone or email of any test results which fail to comply with the requirements of the Contract Documents.
- J. At the completion of the work requiring special inspections or testing, each Inspection and Testing Agent, shall provide a statement to the Special Inspector that all work was completed in substantial conformance with the Contract Documents and that all appropriate inspections and tests were performed.

1.7 FINAL REPORT OF SPECIAL INSPECTION AND TESTING

- A. The Final Report of Special Inspection and Testing shall be completed by the Special Inspector and submitted to the RDPIRC prior to the issuance of a Certificate of Use and Occupancy.

- B. The Final Report of Special Inspections and Testing will document that all required inspections have been performed and that all discrepancies have been resolved. Any unresolved discrepancies shall be clearly noted.

1. Documentation shall be in accordance with BCNYS 1704.2.

2.0 PART 2 – PRODUCTS (NOT USED)

3.0 PART 3 – EXECUTION (NOT USED)

END OF SECTION 014533



STATEMENT OF SPECIAL INSPECTIONS

Project: TIOGA CSD 2025 CAPITAL PROJECT – PHASE 1

Location: 27 FIFTH AVENUE, TIOGA CENTER, NY 13845

Owner: TIOGA CSD

Owner's Address: 27 FIFTH AVENUE, TIOGA CENTER, NY 13845

Architect of Record: KING + KING ARCHITECTS

Structural Engineer of Record: ST. GERMAIN & AUPPERLE CONSULTING ENGINEERS, PLLC

This *Statement of Special Inspections* is submitted as a condition for permit issuance in accordance with the Special Inspection requirements of the Building Code. It includes a Schedule of Special Inspection Services applicable to this project as well as the name of the special inspector and the identity of other approved agencies intended to be retained for conducting these inspections.

The Special Inspector shall keep records of all inspections and shall furnish inspection reports to the Building Official, Structural Engineer and Architect of Record. Discovered discrepancies shall be brought to the immediate attention of the contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official, Structural Engineer and Architect of Record. The Special Inspection program does not relieve the Contractor of his or her responsibilities.

Interim reports shall be submitted to the Building Official, Structural Engineer and Architect of Record.

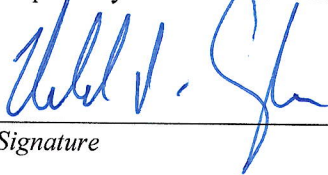
A *Final Report of Special Inspections* documenting completion of all Special Inspections and correction of any discrepancies noted in the inspections shall be submitted prior to the issuance of a Certificate of Use and Occupancy.

Job site safety and means and methods of construction are solely the responsibility of the Contractor.

Interim report frequency:

☒ Per attached schedule.

Prepared by: Richard P. Aupperle III, PE



Signature

04/06/2026
Date



Design Professional Seal

Owner's Authorization:

Building Official's Acceptance:

Signature

Date

Signature

Date



Schedule of Special Inspection Services

Project: TIOGA CSD 2025 CAPITAL PROJECT – PHASE 1

The following sheets comprise the required schedule of special inspections for this project. The construction divisions which require special inspections are as follows:

☐ Soils and Foundations	☐ Spray Fire Resistant Material
☒ Cast-in-Place Concrete	☐ Wood Construction
☐ Precast Concrete	☐ Exterior Insulation and Finish System
☐ Masonry	☐ Mechanical & Electrical Systems
☒ Structural Steel	☐ Architectural Systems
☐ Cold-Formed Steel Framing	☐ Wood Truss Construction

Inspection Agents	Firm	Address
1. Engineer of Record Richard P. Aupperle III, PE	St. Germain & Aupperle Consulting Engineers, PLLC	5711 W. Genesee St. Camillus, NY 13031 (315) 488-3550
2. Geotechnical Engineer/ Special Inspector/Testing Laboratory:	Kenney Geotechnical Engineering Services, PLLC	6901 Herman Road Syracuse, NY 13209 (315) 638-2706
3. Geotechnical Engineer/ Special Inspector/Testing Laboratory:	CME Associates	6035 Corporate Drive East Syracuse, NY 13057 (315) 701-0522
4. Geotechnical Engineer/ Special Inspector/Testing Laboratory:	Atlantic Testing	6085 Court Street Road Syracuse, NY 13206 (315) 699-5281

Note: The inspection and Testing agent shall be engaged by the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the building official, prior to commencing work.

Seismic Design Category: **A**

Ultimate Design Wind Speed: **111 mph**

Wind Exposure Category: **B**



Qualifications of Inspectors and Testing Technicians

Project: TIOGA CSD 2025 CAPITAL PROJECT – PHASE 1

The qualifications of all personnel performing Special Inspection activities are subject to the approval of the Building Official. The credentials of all Inspectors and Testing Technicians shall be provided if requested. It is recommended that the person administering the Special Inspection program be a Structural Engineer or a Professional Engineer experienced in the design of buildings.

Key for Minimum Qualifications of Inspection Agents:

When the Structural Engineer of Record deems it appropriate that the individual performing a stipulated test or inspection have a specific certification or license as indicated below, such designation shall appear below the *Agent Number* on the *Schedule of Special Inspections*.

- PSE Structural Engineer** – a licensed SE or PE specializing in the design of building structures. This may be required for the inspection of critical structural elements.
- GE Geotechnical Engineer** – a licensed PE specializing in soil mechanics and foundations. This may be required for the inspection of difficult soil conditions or deep foundations.
- EIT Engineer-In-Training** – a graduate engineer who has passed the Fundamentals of Engineering examination. This may be required for the inspection of elements that require some engineering training to properly evaluate.
- ACI American Concrete Institute - Level 1 Certified Concrete Field Testing Technician.** This certification is appropriate for individuals performing concrete sampling, slump tests, air-content tests, temperature tests, unit weight tests, and casting compression test cylinders.
- AWS American Welding Society – Certified Welding Inspector (CWI).** This certification is appropriate for individuals performing visual inspection of welds
- ASNT American Society of Non-Destructive Testing** – Level II or Level III. This certification is appropriate for individuals performing ultra-sonic testing of welds.
- SMSI Structural Masonry Special Inspector** – Certification by ICC.
- SWSI Structural Steel and Welding Inspector** - Certification by ICC.
- SFSI Spray-Applied Fireproofing Special Inspector** - Certification by ICC.
- PCSI Prestressed Concrete Special Inspector** - Certification jointly sponsored by ICC, BOCA and SBCCI with participation from PCI and PTI.
- RCSI Reinforced Concrete Special Inspector** - Certification jointly sponsored by ACI, ICC, BOCA and SBCCI.
- MSI Master Special Inspector** - Certification by ICC.



Schedule of Special Inspection Services

Project: TIOGA CSD 2025 CAPITAL PROJECT – PHASE 1

Cast-in-Place Concrete: NYSBC Table 1705.3

Item	Agent No. (Qualif.)	Scope
1.Mix Design	1, PSE	a) Verify use of required design mix. (Periodic) Provide submittals as indicated in project specifications.
2.Material Certification	1, PSE	a) Verify material components of required design mix. (Periodic) Provide submittals as indicated in project specifications.
3.Reinforcement Installation	2, 3, or 4, ACI	a) Inspection of reinforcing steel installation prior to the placement of concrete as indicated in project specifications. (Continuous)
4.Formwork Geometry	2, 3, or 4, ACI	a) Inspection of concrete formwork prior to the placement of concrete as indicated in project specifications. (Periodic)
5.Concrete Placement	2, 3, or 4, ACI 2, 3, or 4, ACI	a) Inspection of concrete placement. (Periodic) b) Sampling fresh concrete and performing slump, air content, and determining the temperature of fresh concrete at the time of making specimens for strength tests as indicated in project specifications. (Continuous)
6.Evaluation of Concrete Strength	2, 3, or 4, ACI	a) Provide concrete strength tests at 7- and 28-day intervals as indicated in concrete specification section. (Continuous)
7.Curing and Protection	2, 3, or 4, ACI	a) Inspect concrete curing and heat/cold protection techniques (Periodic)



Schedule of Special Inspection Services

Project: TIOGA CSD 2025 CAPITAL PROJECT – PHASE 1

Structural Steel: NYSBC 1705.2

Item	Agent No. (Qualif.)	Scope
1.Fabrication Certification/ Quality Control Procedures	1, 2, 3, or 4, PSE or SWSI	a) Shop fabrication to be AISC Certified OR fabrication shop to be inspected and provide written quality control procedures. Provide documentation.
2.Material Certification	2, 3, or 4, SWSI 2, 3, or 4, SWSI	a) Material verification of high strength bolts, nuts, and washers, and screws: Identification markings to conform to ASTM standards specified in the approved Construction Documents. Manufacturer certificate of compliance required. (Periodic) b) Material verification of structural steel and metal roof deck: Identification markings to conform to ASTM standards specified in the approved Construction Documents. Manufacturers certified mill test reports required. (Periodic)
3.Bolting	2, 3, or 4, SWSI 2, 3, or 4, SWSI	a) Inspection of high strength bolting: bearing type connections. (Periodic) 25% of Connections b) Slip-critical connections: (continuous and periodic)
4.Welding	2, 3, or 4, SWSI 2, 3, or 4, AWS 2, 3, or 4, AWS 2, 3, or 4, AWS 2, 3, or 4, AWS 2, 3, or 4, AWS	a) Provide verification of weld filler material: Identification markings to conform to AWS specified in the approved Construction Documents. Manufacturer certificate of compliance required. (Periodic). b) Inspection of Structural Steel Welding: All field welds (Periodic). c) Inspection of Structural Steel Welding: All Full penetration field welds (Continuous). d) Shear Studs: Hammer test 25% for weld e) Multi-pass fillet welds (continuous). Single-pass fillet welds great than 5/16 inch (continuous). f) Reinforcing steel-resisting flexural and axial forces in intermediate and special moment frames, and boundary

	2, 3, or 4, AWS	elements of special reinforced concrete shear walls and shear reinforcement (continuous).
	2, 3, or 4, AWS	g) Shear reinforcement (continuous).
		h) Other reinforcing steel (periodic).
5.Structural Details	2, 3, or 4, SWSI	a) Inspection of conformance to construction documents (Periodic).
	2, 3, or 4, AWS	b) Inspection of steel frame joint details for compliance with approved construction documents (periodic).
6. Metal Roof Deck and Comp Metal Floor Deck	2, 3, or 4, SWSI	a) Inspection of details and 25% of connections for conformance to construction documents (Periodic)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Supplemental General Conditions and other Division 1 Specification Sections, apply to this section.
- B. Section 01 10 00 – Summary of Work

1.2 SUMMARY

- A. This Section includes detailed requirements for temporary facilities and controls, including temporary utilities, support facilities, security and protection.

1.3 QUALITY ASSURANCE

- A. Regulation: Each Prime Contractor / Subcontractor shall comply with industry standards and with applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
 - 1. Building code requirements
 - 2. Health and safety regulations
 - 3. Utility company regulations
 - 4. Police, fire department and rescue squad rules
 - 5. Environmental protection regulations
 - 6. Health Department regulations
 - 7. New York State Education Department requirements
- B. Standards: Each Prime Contractor shall comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations", ANSI-A10 series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities".
 - 1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with the normal application of trade regulations and union jurisdictions.
 - 2. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.4 PROJECT CONDITIONS

- A. Temporary Utilities: Each Prime Contractor shall prepare a schedule indicating dates for implementation and termination of each temporary utility for which the Prime Contractor is responsible. At the earliest feasible time or unless otherwise noted, when acceptable to the Owner, change over from use of temporary service to use of permanent service.

1.5 DESCRIPTION

- A. Description: Each contractor shall provide its own temporary facilities unless noted otherwise. Including storage and office trailers, power, telephone, and all costs associated thereof.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Each Prime Contractor shall provide new materials. If acceptable to the Architect, undamaged, previously used materials in serviceable condition may be used. Provide materials suitable for use intended.
- B. Temporary Containment Partitions
 - 1. Nominal 3-5/8" – 25 gage metal stud.
 - 2. Batt insulation.
 - 3. Type X 5/8" fire rated gypsum wallboard with taped joints on both sides.
 - 4. 1/2" fire rated plywood liner on the demolition side.
 - 5. In lieu of 5/8" GWBX and 1/2" FRT plywood, Contractor may substitute one layer of 5/8" U.S. Gypsum Fiber rock abuse-resistant type X gypsum wallboard on demolition side.
 - 6. Containment partitions are to have a 6-mil flame retardant polyethylene liner.
 - 7. Paint occupied side of partition: 1 coat primer, 1 coat paint.
- C. Lumber and Plywood: Comply with requirements as outlined in the Specifications.
 - 1. For fences and vision barriers, provide minimum 3/8 inch (9.5 mm) thick exterior plywood.
 - 2. For safety barriers, temporary exit ramps, temporary entrances, and similar uses, provide minimum 5/8 inch (16 mm) thick exterior plywood.
- D. Paint: Comply with requirements as outlined in the Specifications.
 - 1. For job-built sheds, fences, and other exposed lumber and plywood, provide exterior-grade acrylic-latex emulsion over exterior prime.
 - 2. For sign panels and applied graphics, provide exterior-grade alkyd gloss enamel over exterior primer.
 - 3. For interior walls of temporary offices, provide two (2) coats interior latex-flat wall paint.
- E. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.
- F. Water: Provide potable water approved by local health authorities.

2.2 EQUIPMENT

- A. Water Hoses: Provide 3/4 inch (19 mm) heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet (30 m) long, with a pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles a hose discharge.
- B. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
- C. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.

- D. Lamps and Light Fixtures: Provide general service 26-watt compact fluorescent lamps required for adequate illumination. Provide guard cages or tempered-glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.
- E. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized Trade association related to the type of fuel being consumed.
- F. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.
 - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
 - 2. U.L. Labeled with current inspection tags affixed.

PART 3 - FACILITIES

3.1 TEMPORARY SANITARY FACILITIES / BREAK FACILITIES

- A. The General Construction Contractor will provide portable toilets as noted below:
 - 1. Furnish chemical toilets per OSHA 1926.51.C with hand washing facilities at the site for ALL Contractors, Subcontractors, etc. working at the site for the duration of the project. Maintain in a sanitary and clean condition at all times.
 - 2. Toilets shall be maintained, located and removed as directed. Contents shall be removed and disposed of in a manner and at such intervals as necessary to maintain sanitary conditions, at minimum, weekly.
 - 3. Construction Manager's daily report will be used to determine number of Toilets should there be a disagreement among the trades
 - 4. Contractor's personnel will not be permitted to use the Owners toilets
- B. Each Prime Contractor shall provide appropriate break facilities for the workers in their employ. Facilities shall be provided where PPE does not need to be worn. These break facilities shall include appropriate changing facilities. These areas shall be heated or cooled as necessary, include an appropriate number of lockers, tables and chairs and be separated from work or storage areas. The cleaning of these facilities shall be the responsibility of the contractor.

3.2 TEMPORARY WATER

- A. Drinking Water: Each Contractor will provide potable water for drinking purposes for its own personnel on the site. Furnish disposable drinking cups and receptacles to collect used drinking cups within the general location of the portable water container.
- B. Construction Water: Until such time, the Plumbing Contractor makes temporary construction water available, each Contractor needs to bring in water from an offsite source to support their construction operations at no additional cost to the Owner. This would include all concrete and masonry operations, all paving operations, the testing of sanitary and storm water piping systems, and the irrigation of grass areas. In no way shall the limitations stated above be construed to negate the Contractors responsibility to provide the water required for various construction operations. It is the intent to use water from the Owner's domestic water system to test and fill any potable water system or to test and fill any mechanical hot water heating system, if the water is available from the Owner's domestic water system.
- C. The Plumbing Contractor shall provide and maintain temporary water service for the construction sites. A frost-free hose bibs is required. At these locations the Plumbing

Contractor shall provide a "Back Flow Prevention Device" to prevent contaminated water from backing up into the Owner's domestic water system. Locations of these outlets to be coordinated with other trades. Each Contractor is responsible for providing hoses for their own use. The Plumbing Contractor shall remove the temporary connections.

3.3 SNOW AND ICE REMOVAL

- A. The General Construction Contractor shall provide snow and ice removal of project road and work areas, parking areas, and maintain safe access to the construction site including all emergency egress pathways. Any snow accumulation of 3" or more shall be removed. Any ice conditions shall be sanded or removed to maintain safe passage into the construction areas.
- B. The General Construction Contractor shall provide all snow and ice removal off roof areas for installation of roofing work.

3.4 SITE LOGISTICS

- A. The General Contractor shall provide and maintain the following in accordance with the Site Logistics and Phasing plan:
 - 1. Temporary Construction Fencing
 - 2. Temporary Concrete Barrier with Fence.
 - 3. Construction lay down area and parking area
 - 4. Temporary access roadways and construction entrances
 - 5. Protection of existing trees, bushes, and site amenities
- B. Each Contractor must plan, provide and maintain his own access, ramping, and egress as required into and out of the site, staging of trailer(s), materials, machinery, and equipment in agreement with the Construction Manager. Contractors shall maintain free and safe access on the jobsite for other related project personnel.
- C. The General Construction Contractor shall maintain all temporary construction parking areas, temporary access roads and fences for the duration of the project. At the end of construction, the General Construction Contractor shall remove temporary fencing, temporary access roads, and stone and be responsible to repave, re-grade and seed existing areas disturbed as required to return the area to its original or specified condition.
- D. GC to provide temporary fencing for laydown areas at each school per Logistics plan.

3.5 DUMPSTERS AND RUBBISH CONTAINERS

- A. All dumpsters are to be tarped or covered and protected from wind and weather.
- B. The General Construction Contractor shall provide multiple dumpsters for all MEP trades, for the duration of the project.
 - 1. All Contractors are to participate in placing recyclable items in the correct dumpsters as directed by the dumpster's suppliers' guidelines and any local or state laws which govern recycling. The General Construction Contractor shall clearly indicate to other trades what materials are to be placed in which dumpster to conform with recycling requirements. The other trades that are to use the dumpsters provided by the General Construction Contractor shall comply with the directions of the General Construction Contractor as to "crush" and condense debris placed in these dumpsters. This includes, but is not limited to, ductwork removed by the HVAC Contractor and empty boxes of any trades. Nothing in this specs shall relieve each Contractor from cleaning up their own debris and delivering debris to the proper dumpster.

2. The placement of any dumpster on the project sites shall be coordinated with other trades. The General Construction Contractor shall be responsible for the emptying and removal of the dumpsters they are providing, including all tipping fees.
 3. Reference Specification Section 01 74 19.
- C. The General Construction Contractor's Asbestos Abatement subcontractor shall provide the required dumpsters relative to their scope of work.
- D. The General Construction Contractor shall provide all required dumpsters relative to their scope of work for excess roofing materials. Include emptying, removal and all tipping fees.
- E. The General Construction Contractor shall provide site and interior trash receptacles for daily clean up and collection of trash and debris. Provide separate receptacles for rubbish and recyclables. All trades are responsible for emptying these containers, daily into dumpsters with the labor supplied for daily clean up requirements.

3.6 DEWATERING

- A. The General Construction Contractor shall provide temporary dewatering sump pits for the removal of water from the project site to facilitate the removal and discharge of sediment-laden water from an excavated area, construction site or sediment basin.
- B. Dewatering sump pits shall properly remove suspended sediments and water from excavated areas through filtration and/or settlement prior to discharging water to a receiving water course or body. Dewatering operations performed by the General Construction Contractor shall comply with New York State Department of Conservation requirements.
- C. Dewatering sump pits shall consist of the following:
1. Removable Pumping Stations
 2. Suction hoses
 3. 12" – 36" Perforated Corrugated Metal or PVC standpipe wrapped in geotextile filtration fabric. Depth of standpipe will vary due to water level and will need to extend 12" to 18" above the top of the pit. Standpipe shall be fitted with a watertight cap or plate at the bottom of the standpipe.
 4. 12" base of clean stone beneath standpipe. Fill standpipe with NYS DOT Item 304-2.02, Type for per Specification Section 32 23 23.
 5. Pit dimensions are variable, with the minimum diameter being 2 times the standpipe diameter.
 6. Sediment Tank / Silt Control Bags.
 7. Maintenance of the system.

3.7 TEMPORARY BUILDING ENCLOSURES

- D. The General Construction Contractor shall provide insulated temporary weather / airtight / dust / Acoustic enclosures at all openings through the building envelop and shall maintain these enclosures until the opening is used for its intended function. In all cases where temporary enclosures are required the following shall apply:
1. The Contractor who is responsible to provide the temporary enclosure as stated above, shall submit to the Architect an outline how this temporary enclosure is going to evolve. This submission should be detailed, including the materials that are going to be used in the temporary enclosure. These materials shall be of the type that does not promote the

spread of flames and smoke in the case of a fire. Only materials approved by the Architect shall be used. All temporary enclosures are required to be insulated to conserve energy to temporarily heat the temporary enclosure.

2. The Contractor responsible for the temporary enclosure shall provide temporary doors in the exterior building enclosure as required. Install approved material to act as framing at all four sides of each door. Provide hardware for the doors as required. Provide automatic door closers on all such doors. Door hardware should include the hinges and a panic type latching device which will allow emergency exiting from the structure but would limit entry to the structure from the outside without a key to gain entry. Provide keys to the Owner and to other Contractors. Single doors shall be a minimum of 36" wide and double doors are to be a minimum of 44" wide. Coordinate with other trades on the size of the door required. Weather strips all openings and provide door sweeps on all doors.
- E. The General Construction Contractor shall by August 1st, prior to each heating season, provide a temporary enclosure plan in writing, along with any sketches that will accurately describe their proposal of how they are going to enclose renovation areas in order to maintain weather tightness and minimize heat loss. This plan shall be submitted to review it with the Owner, Architect, and Engineer. Approval of this plan does not relieve the General Construction Contractor from providing and maintaining the temporary enclosures as indicated in this section.
- F. The General Contractor is responsible to provide a fully secured insulated weathertight temporary plywood protection for all openings created by the respective Contractor creating the penetration for installation of their work. All Prime Contractors to coordinate with GC on anticipated size and locations prior to demo/install.

3.7 TEMPORARY CONTAINMENT PARTITIONS

- A. The General Construction Contractor shall provide all temporary containment partitions if needed.
1. Provide 50 LF of Temporary drywall partitions for location determined by the Construction Manager. Partition shall be double sided ½" drywall, steelstuds, tape and paint finish. Provide (2) solid core doors with hardware. Remove all partitions and doors and restore space to original condition as directed by Construction Manager.
- B. Seal all joints, door penetrations and the perimeter of the temporary containment partition.

3.8 TEMPORARY FIRE PROTECTION

- A. The General Construction Contractor shall provide and maintain portable fire extinguishers on each floor level and building area in accordance with OSHA requirements (1926-150).
- B. Each contractor performing "Hot Work" is required to provide their own fire extinguishers and fire watchman.
- C. Each contractor shall provide fire extinguishers at their jobsite trailer / equipment, toolbox locations, and stairways.

3.9 TEMPORARY FENCING, BARRICADING

- A. Each Contractor shall provide and maintain temporary fencing, covers and barricading as required to keep unauthorized persons away from excavations and hazardous areas for which the contractor is responsible. The Contractor(s) shall provide protection, which is acceptable to Construction Manager, and/or as specified in the Specifications and which meet or exceed current OSHA Requirements. Relocate all items as needed.

- B. Any contractor that creates or contributes to an unsafe condition, such as, but not limited to, a fall hazard shall correct the hazard immediately.
- C. Each Contractor who requires temporary or permanent removal of perimeter and opening protection to perform their own work, shall remove and replace such protection promptly prior to leaving the area. Protection permanently removed shall be returned to the Contractor who provided the protection. Contractor shall not allow openings or edges to be unguarded or unprotected at any time, i.e. slab openings, trenches, elevator shafts, duct chases, stairwells, slab edges, etc.
- D. All other fencing shall be plastic orange construction fence.
- E. When required for safety, each Contractor shall provide and maintain fences at its own expense, along the roadways and around the grounds for the protection of adjoining property and all persons lawfully using same.

3.10 CONSTRUCTION SIGNS

- A. Each Contractor is required to provide all required construction site signage for traffic, safety and directions as it pertains to their scope of work. Provide all required temporary traffic controls as required to facilitate the project. This includes warning signs, traffic signs, barriers, warning lights, etc.
- B. The General Construction Contractor is required to provide all dual language safety signage with pictorial and verbal identification. Signage should include but is not limited to Caution, Danger and Warning signs for entry, hardhat requirements, interior emergency egress signage, visitors must report to the office trailer prior to entrance, etc. This signage excludes the main project sign.
- C. Contractor shall provide, move, remove, and maintain all signs.

3.11 MAINTENANCE AND PROTECTION OF VEHICULAR AND PEDESTRIAN TRAFFIC

- A. Each Contractor shall provide and maintain adequate traffic controls in areas impacting routine vehicular and pedestrian traffic patterns, including temporary lane closures, for the duration of the project. Each Contractor is responsible to ensure the safe and convenient passage of Owner's staff, motorists, pedestrians, adjacent property Owners', and Contractor's employees.
 - 1. Construction traffic shall not be permitted on Owner driveways or staff/patron parking areas unless authorized by the Construction Manager and Owner.
 - 2. Traffic shall be maintained over a reasonably smooth traveled surface which shall be so marked by signs, delineators, guide devices, barriers, pavement markings and other methods that a person who has no knowledge of conditions may safely and with a minimum of discomfort and inconvenience ride, drive, or walk, day or night, over all or any portion of the work under construction where traffic is to be maintained. Installation, moving, and removing of any such delineators or guiding devices shall be included.
 - a. All reflective delineators, markers, or barriers shall be provided as specified in the New York State Manual of Uniform Traffic Control Devices.
 - 3. Schedule and coordinate work to minimize the impact that removal of existing concrete, pavements and / or facilities shall have on Owner and public.

- B. Each Contractor shall repair any damage to concrete, and pavements caused by construction operations and the installation of temporary signs, railings, etc. necessary for the maintenance and protection of traffic.
- C. Each Contractor shall employ a sufficient number of competent flagmen and/or temporary traffic lights to ensure safe passage of vehicular, equipment, and pedestrian traffic. Flagmen shall wear approved safety equipment and vests in conformance with the New York State Manual of Uniform Traffic Control Devices.
- D. The General Construction Contractor shall provide temporary markings approved in the event that permanent markings may not be installed. In order not to inhibit bonding of permanent pavement markings, said locations shall be offset an appropriate distance from the location of permanent pavement markings.
- E. Existing signs, markers, and delineators lost or damaged because of negligence on the part of the Contractor shall be replaced at the Contractor's expense.
- F. The General Construction Contractor shall provide all street sweeping and / or clean up as required of roads, parking lots, and entrances to remove construction related dirt and debris on a daily basis.
- G. Any vehicle leaving the jobsite that provides materials or manpower, shall be water washed or shall utilize a "vehicle tracking Pad" prior to entry on access roads or public streets to remove mud and concrete from wheels and undercarriages. The General Construction Contractor to provide garden hose and nozzle at location. Washing waste must not be directed to storm drains. All surface water outside the jobsite affected by contractors' activities must be filtered using sediment control fabric to prevent the streets from being muddy. A "vehicle tracking Pad" is an option at the water wash station. The contractor providing vehicle tracking pad shall provide, complete, all maintenance and removal of vehicle tracking pad.

3.12 DUST AND EROSION PROTECTION

- A. All Contractors are required to erect and maintain dust and erosion protection whenever operations will produce unreasonable amounts of dust, dirt, or erosion.
- B. Dusty conditions resulting from Contractor's operations shall be corrected by the use of water, or other methods approved by Architect. Water used as a dust palliative shall be distributed uniformly over a minimum width of eight feet by the use of suitable spray heads or spray bar.
- C. Contractor shall devote particular attention to all new and existing drainage facilities, keeping them fully operative at all times. Ditches shall be provided at all times, even during grading operations, to adequately drain the traveled way and the remainder of the right-of-way areas.

3.13 TEMPORARY STORAGE

- A. Storage space is limited and will be permitted only in areas designated in advance.
- B. Each Contractor is responsible for the protection of their own stored materials, both interior and exterior. This includes removal and / or protection from snow, ice, rain, dirt, or other damage. All construction materials shall be stored in a safe and secure manner. Contractor shall assume full responsibility for the protection and safekeeping of products under this Contract stored on the site and shall cooperate with all trades to ensure security for the Owner's property. Fences around construction supplies or debris shall be maintained. Gates shall always be locked unless a worker is in attendance to prevent unauthorized entry.

- C. Each Contractor shall obtain and pay for the use of additional storage or work areas needed for their operations.

3.14 TEMPORARY CLIMATE CONTROL

- A. Within 45 days of the Contract award, the General Contractor shall submit to the Construction Manager for approval a plan describing proposed system including distribution for construction areas and/or occupied areas. Plan shall include sketches and proposed equipment for the following:
 - 1. Temporary heating
 - 2. Temporary ventilation and exhaust
 - 3. Temporary humidity control
- B. All equipment (existing, temporary, or new) shall be protected from construction dust by means of a filtration media with a Minimum Efficiency Reporting Value (MERV) of eight (8). These filters shall be changed at a minimum of once a month. Provide one (1) set of clean filters just prior to final occupancy.
- C. All Contractors are responsible to provide any additional temporary construction heat required for construction operations related to their scope of work. This would include but not limited to additional temporary heat to supplement the temporary heat described below. The General Construction Contractor shall provide temporary heat and enclosures for all concrete work, masonry work, all exterior wall construction systems and finishes at their own expense.
- D. New Construction
 - 1. Temporary Heat:
 - a. The General Contractor shall provide temporary heat from: 11/1/25 – 3/25/26
 - i. Provide gas / propane fired heaters, inline blowers as required, including hoses and/or temporary piping, hook-ups, maintenance, service, removal and cost of fuel. Units are to be sized to maintain the temperature within the temporary enclosure between 55 and 60 degrees Fahrenheit.
 - ii. Create and maintain a temporary heat and humidity log in a format acceptable for all trades. Temperatures and humidity levels shall be taken at a minimum of twice daily; in the early morning and late afternoon. These reports shall be submitted with the Contractor's daily work reports.
 - 2. Temporary Ventilation and Exhaust:
 - a. The General Contractor shall provide portable high-performance fans for work areas.
 - b. Size temporary air systems to supply a minimum of one complete air change every 120 minutes.
 - 3. Temporary Humidity Control
 - a. The General Contractor shall provide all necessary equipment to maintain an interior relative humidity level of not greater than 60%.

3.15 TEMPORARY COVERED WALKWAYS

- A. The General Construction Contractor shall provide, maintain, repair, relocate, and remove temporary non-tubular scaffold type covered walkways at points of entry and egress as directed. Roof shall be covered with waterproof material where exposed to weather. Enclose sides of walkways with adequate materials where exposed to construction activities. Coordinate locations of walkways with all other trades and relocate as required.

3.16 TEMPORARY POWER AND LIGHTING

- A. The Electrical Contractor shall provide and maintain up to two (2) 200A (120/208V) temporary electrical service throughout all areas of the project during the entire construction phase for use by all Trade Contractors. All costs associated with utility usage shall be the responsibility of the Electrical Contractor. Provide temporary construction power for building areas utilizing temporary power distribution panels centrally located for all Trade Contractors use.
1. Provide all conduit, wire, transformers, panelboards, circuit breakers, etc. necessary to establish and maintain temporary electrical services. Coordinate the locations to minimize the need to relocate temporary panels. All costs associated with relocation are included in the base bid.
 2. All temporary power distribution equipment shall utilize lockable covers, handles, or branch devices.
 3. Include temporary power connections for mason's wet saw(s), temporary sump pumps, and fire proofing equipment, as required.
 4. No connections of electric welders to any building services shall be permitted.
 5. Each Contractor must supply drop cords, extensions and ground fault interrupters for their own work.
- B. The Electrical Contractor shall provide, maintain, and remove all temporary lighting throughout all areas of the project during the entire construction phase for use by all Trade Contractors.
1. Lighting should be in accordance with OSHA minimum requirements.
 2. Temporary light bulbs and any damaged temporary lights shall be replaced on a daily basis.
 3. Install temporary site security related lighting at the enclosed construction laydown, perimeter building lighting, and office trailer area. Maintain existing building mounted, exterior lighting that may be disrupted during the course of the project.
 4. Provide illuminated "Exit" signs and emergency lighting at all exits and stairways to maintain identification of exit routes within, around, and / or through the work area.
 5. Provide temporary lighting for all stairways and covered walkways, as required.
 6. Special temporary lighting such as for painting or other operations, which require more than the standard temporary overhead lighting, shall be the responsibility of the Contractor requiring the same.
 7. Provide temporary pole mounted security lighting at construction field offices and remove at end of project.
- C. The Electrical Contractor shall provide all temporary electrical connections to all existing, temporary and new heating units that the Contractor will be using to provide temporary heat and to any temporary or permanently installed equipment or systems installed by other Prime Contractors.
- D. The Electrical Contractor shall provide self-regulating heat trace on a dedicated circuit to protect the temporary water system, as required.
- E. Overhead wires shall be a minimum height of 18 feet above the finish grade at their lowest point with shielding over areas of vehicular access or provide underground conduit and wiring.

- F. The Electrical Contractor shall remove all temporary electrical services, materials, equipment, poles, etc. at the end of the project or as and when directed by the Construction Manager. Return all circuitry and other conditions to their original conditions and location prior to the start of the project.
- G. Comply with the National Electrical Code, OSHA and applicable local codes and utility regulations.
- H. Do not overload circuits. Verify capacity of circuit prior to use. All receptacles to be GFCI protected.
- I. No temporary power will be supplied for construction trailers or other temporary structures that the contractor(s) require at any of the project sites unless specifically indicated.
- J. Each Contractor shall provide their own temporary power and lighting prior to the installation of the temporary electrical service and / or to areas of the site that electrical power does not exist.

PART 4 - EXECUTION

4.1 GENERAL

- A. Temporary facilities shall be installed in accordance with applicable codes.
- B. Maintain temporary facilities throughout the construction period.
- C. Contractor installing temporary facilities shall be responsible to remove them when they are no longer required.
- D. Repair damage to the project site caused by the installation of temporary facilities.
- E. Any temporary protection that is removed by a Trade Contractor in order to undertake and / or complete their work shall be reinstalled in its original form following the completion of the Work.

4.2 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Each Prime Contractor shall provide facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. All Contractors shall control erosion and sediment caused by their scope of work construction activities through the use of scheduling, phased construction and restoration, berms, dikes, dams, sediment basins, hay bale strainers, fiber mats, netting, gravel, mulches, grasses, slope drains and other erosion control devices or methods.
- B. In the event of conflict between these specification requirements and pollution control laws, rules or regulations of other Federal, State or Local agencies, the more restrictive laws, rules or regulations shall apply.
- C. All Contractors performing work that requires erosion, sediment and pollution control must comply with the New York State Department of Environmental Conservation's "SPEDES General Permit for stormwater Discharge from Construction Activity Permit (No. GP-02-01).

1.3 CONTROL SCHEDULE

- A. At the pre-construction conference, or prior to the start of the applicable construction, the Contractor shall be required to submit, for acceptance, its schedules for the accomplishment of erosion and sediment control. They shall also submit, for acceptance, proposed methods of erosion and sediment control on haul roads and borrow pits and plan for disposal of waste materials or control details for other potential sources of pollution.
- B. Each Contractor shall schedule and conduct operations to minimize erosion of soils and to minimize silting and muddying of streams, rivers, irrigation systems, impoundments (lakes, reservoirs, etc.) and lands adjacent to, or affected by, the work. Construction of drainage facilities and performance of other contract work which will contribute to the control of erosion and sedimentation shall be carried out in conjunction with earthwork operations or as soon thereafter as practicable. The area of bare soil exposed at any one time by construction operations shall be kept to a minimum.

1.4 CONTROL MEASURES

- A. In carrying out erosion control measures, each Contractor will be guided by, but not limited to, the following controls:
 - 1. When borrow material is obtained from other than commercially operated sources, erosion of the borrow site shall be so controlled, both during and after completion of the work, so that erosion will be minimized and minimal sediment will enter streams or other bodies of water. Waste or disposal areas and construction roads shall be located and constructed in a manner that will minimize sediment entering streams.
 - 2. Frequent forging of live streams will not be permitted; therefore, temporary bridges, or other structures, shall be used wherever an appreciable number of stream crossings are necessary. Unless otherwise approved in writing by the Construction Manager, mechanized equipment shall not be operated in live stream.
 - 3. When work areas or gravel pits are located in, or adjacent to, live streams, such areas shall be separated from the main stream by a dike, or other barrier, to minimize sediment entering a flowing stream. Care shall be taken during the construction and removal of such barriers to minimize the muddying of a stream.
 - 4. All waterways shall be cleared as soon as practicable of false work, piling, debris or other obstructions placed during construction operations and not a part of the finished work.

5. Ditches, which are filled, or partly inoperative, shall be cleaned and made operative before the Contractor stops work for any day, and shall be maintained in a condition satisfactory to the Construction Manager for the duration of the Contract.
 6. Water from aggregate washing, dewatering or other operations containing sediment, shall be treated by filtration, settling basin or other means sufficient to reduce the turbidity, so as not to cause a substantial visible contrast to natural conditions.
 7. Pollutants such as fuels, lubricants, bitumen, raw sewage and other harmful materials shall not be discharged into or near rivers, streams, and impoundment's or into natural or man-made channels leading thereto. Wash water or waste from concrete mixing operations shall not be allowed to enter live streams.
 8. All applicable regulations of fish and wildlife agencies and statutes relating to the prevention and abatement of pollution shall be complied with in the performance of the Contract.
 9. Slopes exceeding 15 percent require special treatment such as water diversion berms, straw bale sediment barriers, sodding or the use of an approved mulch tracking agent over straw or hay mulch applied over seeded areas.
- B. The erosion and sediment control features installed by each Contractor shall be acceptably maintained by the Contractor throughout the Contract period. When it becomes necessary, the Construction Manager will inform the Contractor of unsatisfactory construction procedures and operation insofar as erosion control and water and air pollution are concerned. If the unsatisfactory construction procedures and operations are not corrected promptly, the Construction Manager may suspend the performance of any or all other construction until the unsatisfactory condition has been corrected.

1.5 PAYMENT

- A. Unless a specific payment item is included in the Bid, payment for erosion and sediment control shall be included in the price, or total of prices, given in the Bid on which this Agreement is based, and no separate payment will be made.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes procedural requirements for selective demolition.
- B. Refer to other Sections for specific requirements and limitations applicable to selective demolition pertaining to individual parts of the Work.
 - 1. Requirements of this Section apply to all Prime Contracts; refer to appropriate divisions for other requirements.

1.3 DEFINITIONS

- A. Cutting: Physical modification of construction work, both new and existing, or removal of existing or installed materials necessary to permit installation or performance of other Work, including but not limited to; cutting, drilling, chopping, excavating, saw-cutting, trenching, backfill and compaction and other similar operations.
- B. Patching: Restoration, replacement and installation of construction material, both new and existing, required to restore surfaces to original conditions and maintain fire rated assemblies after installation of other Work.
- C. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain. Owner reserves the right to claim any or all salvaged material.
- D. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.
- E. New to remain: Protect all new construction indicated to remain against damage and soiling during selective demolition. When permitted by the Architect, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.

1.4 SUBMITTALS

- A. Selective Demolition Plan: Submit a plan describing procedures at least 10 days before the time selective demolition will be performed for review and coordination. Include the following information:
 - 1. Dates: Indicate when selective demolition will be performed.
 - 2. Utilities: List utilities that selective demolition procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
 - 3. Structural Elements: Where selective demolition involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
 - 4. Proposed Dust-Control and Noise-Control Measures: Submit statement or drawing to Construction Manager that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.
 - 5. Schedule of selective demolition activities indicating the following:
 - a. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
 - b. Interruption of utility services.
 - c. Coordination for shutoff, capping, and continuation of utility services.
 - d. Use of stairs and means of egress.

- e. Detailed sequence of selective demolition and removal work to ensure uninterrupted progress of other work.
- 6. Pre-demolition Photographs or Video recording: Show conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations. Submit to Construction Manager before Work begins.
- 7. Record drawings at Project closeout.
 - a. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

1.5 QUALITY ASSURANCE

- A. Perform removal work in careful workmanship manner with skilled labor protecting existing adjacent surfaces to remain.
- B. Notify affected utility companies before starting work and comply with their requirements.
- C. Pre-demolition Conference: If needed, conduct conference on site to review methods and procedures related to selective demolition including, but not limited to, the following:
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
- D. Requirements for Structural Work: Do not selectively demolish structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- E. Operational and Safety Limitations: Do not selectively demolish operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.
- F. Visual Requirements: Do not selectively demolish construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been selectively demolished in a visually unsatisfactory manner.
- G. Costs caused by out of sequence work prematurely installed, defective work, or work not conforming to the Contract Documents, including costs for additional services of the Construction Manager and Architect/Engineer, will be paid for by the party responsible for out of sequence, rejected or non-conforming work.
- H. Miscellaneous Elements: Do not selectively demolish the following elements or related components in a manner that could change their load-carrying capacity that results in reducing their capacity to perform as intended, or that result in increased maintenance or decreased operational life or safety.
 - 1. Water, moisture, or vapor barriers.
 - 2. Membranes and flashings.
 - 3. Exterior curtain-wall construction.
 - 4. Equipment supports.
 - 5. Piping, ductwork, vessels, and equipment.
 - 6. Noise and vibration-control elements and systems.

1.6 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition operations, by methods and with materials so as not to void existing warranties.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.
 - 2. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.
 - 3. Carefully remove and salvage each item or object in a manner to prevent damage of new construction.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be selectively demolished and conditions under which selective demolition are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.
- B. Verify that utilities have been disconnected and capped.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- E. When unanticipated mechanical, electrical, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly notify the Construction Manager and Architect for direction.
- F. Survey the condition of the building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during selective demolition.

3.2 UTILITY SERVICES

- A. If needed, maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
- B. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services serving building to be selectively demolished.
 - 1. Where utility services are required to be removed, relocated, or abandoned, provide bypass connections to maintain continuity of service to other parts of the building before proceeding with selective demolition

2. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit after bypassing.
- C. Utility Requirements: Refer to Mechanical and Electrical Specification Sections for shutting off, disconnecting, removing, and sealing or capping utility services. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

- A. Temporary Support: Provide temporary support of work to be cut.
- B. Protection: Protect existing construction during selective demolition to prevent damage. Provide protection from adverse weather conditions for areas that might be exposed during selective demolition operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to minimize interruption of services to occupied areas.
- E. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.
- F. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
- G. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- H. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective demolition area.
 1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
 2. Protect existing site improvements, appurtenances, and landscaping to remain.
 3. Provide temporary weather protection, during interval between demolition and installation of new construction, to ensure that no water leakage or damage occurs to structure or interior areas.
 4. Protect walls, ceilings, floors, and other existing finish work that are to remain and are exposed during selective demolition operations.
- I. Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of building to be selectively demolished.
 1. Strengthen or add new supports when required during progress of selective demolition.

3.4 POLLUTION CONTROLS

- A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.
 1. Do not use water when it may damage new construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- B. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain, using power-driven masonry saw or hand tools; do not use power-driven impact tools.

3.5 PERFORMANCE

- A. General: Employ skilled workers to perform selective demolition. Proceed with selective demolition at the earliest feasible time and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by selective demolition operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - 4. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 - 5. Ceilings: Patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
 - 6. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

3.7 CLEANING

- A. Sweep the building broom clean upon completion of selective demolition operation.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.
- B. Refer to Mechanical and Electrical Specification Sections for additional requirements and limitations on cutting and patching of mechanical and electrical work.
- C. Each Prime Contractor shall refer to Specification Section 01 12 00 Multiple Contract Summary for additional Cutting and Patching requirements.

1.2 SUMMARY

- A. This Section specifies the requirements for cutting, patching, demolition and alteration work without limiting the generality implied by the Specifications and Drawings. Refer to Section 011200-MULTIPLE CONTRACT SUMMARY.
- B. Work of this Section applies to Each Prime Contractor and its Subcontractors. Prime Contractor and their Subcontractors shall provide required labor, materials, equipment, layouts, and other information for the cutting, patching, and alteration work shown, specified, or as implied to complete the work as described in this Specification Section or as indicated on the Contract Documents.

1.3 DEFINITIONS

- A. Cutting and Patching covers adjustments to, and necessary reworking of, elements of construction in both new and existing work. The following definitions for cutting and patching apply to all Contracts.
 - 1. **Cutting:** Physical modification of construction work, both new and existing, or removal of existing or installed materials necessary to permit installation or performance of other Work, including but not limited to; cutting, drilling, core-drilling, chopping, excavating, saw-cutting, trenching, backfill and compaction and other similar operations.
 - 2. **Patching:** Restoration, replacement and installation of construction material, both new and existing, required to restore surfaces to original conditions and maintain fire rated assemblies after installation of other Work.

1.4 DESCRIPTION

- B. Unless otherwise noted, each Prime Contractor shall be responsible for all cutting and patching, required in conjunction with the work of their contract and to:
 - 1. Be familiar with all the Contract Documents, including other trades, to determine the extent of the cutting and patching requirements to be performed.
 - 2. Ensure all components fit properly.
 - 3. Remove out of sequence work installed prematurely.
 - 4. Remove and correct defective work and work not conforming to requirements of Contract Documents.
 - 5. Provide equipment, labor, materials, and incidentals necessary for cutting and patching as required for the installation of new work.
- C. Coordination:
 - 1. Coordinate the installation of work with the work of other Contractors to minimize cutting and patching.
- D. In addition to contract requirements, upon written instructions of the Construction Manager:

1. All new work must be inspected prior to enclosing. If inspection has not been conducted, Contractor shall uncover newly installed work to provide for Construction Manager and Architect/Engineer's observation.
- E. All Contractors shall bare the responsibility not to cut or otherwise alter the Owner's property or any separate Contractors' work except with the written consent of the Owner and of such separate Contractor. The Contractor shall not un-reasonably withhold from the Owner or any separate Contractor, consent to cutting or otherwise altering the work.
- A. Each Contractor shall perform the cutting and patching required for the installation of the work of their contract except where specifications or drawings specifically indicate otherwise. Each Contractor shall be responsible for reviewing all the Contract Drawings for all trades to determine the extent of the cutting and patching that is required to install the work of their contract.
1. Demolition, Cutting and Patching as indicated and as necessary to install new work in reconstruction areas of the existing building as indicated and in the new additions to the building as indicated.
 2. Salvage of Materials for reuse in the project, or where directed by the Construction Manager, salvage and delivery of specific items to Owner for its use where indicated or for use by Prime Contractor and Subcontractor for work of their trades as directed. The materials which are in good condition and which are specifically noted on the drawings for reuse in the project, shall be carefully removed and delivered to the Owner's Representative on the premises where directed, except for such items as the Owner may declare to be the Contractor's property to be legally disposed of offsite by the Contractor.
 3. Each Prime Contractor shall bear the cost of all cutting and patching required by and for the installation of their work unless otherwise indicated on the drawings or in the specifications. This shall include but not limited to the following:
 - a. Cut existing architectural / structural components of the existing building as required for the installation of new work.
 - b. Patch to match existing architectural / structural features after the new work has been installed by the contractor's work forces or work performed by other contractors.
 - c. Any modification to structural components required for pipes or conduits to pass through will require approval by the Architect and Structural Engineer.
 - d. Each Prime Contractor or their Subcontractor is responsible for the actual cutting, capping, removing, relocating or otherwise making safe equipment, systems, or components of the systems that relate to their Scope of Work.
 - e. Drilling or core drilling shall be performed by the respective trade requiring it for the installation of their equipment, systems or components of their systems.
 - f. Review existing building conditions and access to install equipment in the required locations. Systems to be installed in any areas with difficult access may need to be provided in sections. If it is deemed necessary to perform cutting and patching to facilitate access to certain areas to systems, then the responsibility of cutting and patching shall be by the contractor responsible for that system.
 - g. Furnish and set all sleeves for penetration in new and existing construction. Contractors shall provide the sleeves as specified, along with an accurate layout of the location of where these sleeves are to be placed. These sleeves shall be numbered, and that number shall correspond to the location of the sleeve shown on the layout drawing.

- a. Fire safe all penetrations through fire rated construction created due to the work of their contract. All penetrations through rated construction shall be sealed fire safe by a UL listed approved method. Patching of fire rated assemblies shall be made using new materials equal to the fire rating of the new or existing assembly.

1.5 SUBMITTALS

- A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.
- B. Any modification to structural components will require approval by the Architect and Structural Engineer.

1.6 QUALITY ASSURANCE

- A. **General:** Structural and other conditions shall be verified with the Architect before proceeding with cutting, demolition and alterations work. Inspect structures prior to start of Work and notify the Architect in writing of any conditions detrimental to the execution of the Work.
- B. **Requirements for Structural Work:** Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
- C. **Operational and Safety Limitations:** Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.
- D. **Visual Requirements:** Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.
- E. Costs caused by out of sequence work prematurely installed, defective work, or work not conforming to the Contract Documents, including costs for additional services of the Construction Manager and Architect/Engineer, will be paid for by the party responsible for out of sequence, rejected or non-conforming work.
- F. **Miscellaneous Elements:** Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 - 1. Water, moisture, or vapor barriers.
 - 2. Membrane and flashings.
 - 3. Exterior curtain-wall construction.
 - 4. Equipment supports.
 - 5. Piping, ductwork, vessels, and equipment.
 - 6. Noise and vibration-control elements and systems.

1.7 WARRANTY

- A. **Existing Warranties:** Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

PART 2 - PRODUCTS

2.1 MATERIALS FOR REPLACEMENT OF WORK REMOVED

- A. Materials for each trade or specialty involved in alterations, cutting, and patching shall be furnished and installed as specified in the respective specification sections or as specifically indicated on the drawings.
- B. Where materials and installation are required but not specified, use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials. Samples of material finish or color are required for Architect's approval.
- C. Supplement relocated materials where required to complete work of the project with similar materials.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect existing condition of work, including elements subject to movement or damage during removal of adjacent materials.
 - 1. Photograph existing damage, which could be misconstrued as damage resulting from the Work of this Contract. State location and date of photograph and file with the Architect prior to starting work.
- B. After uncovering work, inspect conditions affecting installation of new products.

3.2 PREPARATION: PRIOR TO CUTTING

- A. Provide shoring, bracing and support as required to maintain structural integrity of project.
- B. Provide protection for materials on adjacent surfaces.
- C. Provide protection when work will be exposed to the elements.
- D. **Protection:** Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the project that might be exposed during cutting and patching operation. Each Prime Contractor is responsible to cover and protect furniture, equipment, etc. not being used in rooms where furniture and equipment will remain during Contractor working hours.
- E. Take all precautions necessary to avoid cutting existing pipe, conduit, or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

- A. Remove and store in protected location, material, which is to be reused and relocated.
- B. Cutting shall be done in a manner that will not adversely affect the strength of the building. Holes and openings shall be neatly cut so as to provide a finished appearance and shall be patched around the edge where required for a finished appearance.
- C. Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances and finishes.
- D. Restore work, which has been cut or removed. Provide new products to complete work in accordance with the requirements of Contract Documents.

- E. Refinish entire surfaces as necessary to provide an even finish:
 - 1. Continuous Surfaces: to nearest intersections.
 - 2. Assembly: entire refinishing.
- F. Fill and patch openings and holes in existing construction when bolts, piping, ducts, conduit and other penetrating items are removed.
- G. **Visual requirements:** Do no cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities or result in visual evidence of cutting and patching. Remove and replace work cut and patched in a visually unsatisfactory manner.
- H. **Fire resistive integrity:** Where holes or gaps remain from removed elements, fill void using solid fire resistive materials full depth of structure; terminate below finishes to allow new finish to be installed (see patching). Maintain the fire resistive and structural integrity of the structures.
- I. **Firestopping:** All products used for through-penetration firestop systems shall be tested and meet all federal, state, and local codes.
- J. **Cutting:** cut existing construction use methods least likely to damage elements to be retained or adjoining construction. Where possible, review proposed procedures with the original installer; comply with the original installer's recommendations.
 - 1. In general, where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. To avoid marring existing surfaces, cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Cut through concrete and masonry using a cutting machine such as a Carborundum saw or diamond core drill.
- K. **Patching:** Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
 - 1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
 - 2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - 3. Where removal of walls or partitions extends from one finished area to another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new.
 - 4. Patching around piping and penetrations: Provide firestopping at perimeter of penetrations for smoke-tight seal to maintain integrity of fire resistive and smoke barrier qualities.
 - 5. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch, after the patched area has received primer and second coat.
 - 6. Patch, repair, or rehang existing ceiling as necessary to provide an even plane surface of uniform appearance.

3.4 CLEANING

- A. Daily cleaning of alteration areas of the building shall be the responsibility of each Prime Contractor.
- B. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely, paint, mortar, oils, putty, and items of similar nature. Thoroughly clean piping, conduit, and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.
- C. Dust generated by cutting and patching shall be controlled in a manner so as to prevent infiltration into occupied spaces. Contractor(s) responsible for dust infiltrating the existing duct systems shall bear the cost of cleaning these systems.

- D. Demolished Materials shall be removed from the project site at frequent intervals. Piles of demolished materials will not be allowed to accumulate.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DCOUMENTS

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

1.2 SUMMARY

- A. This section includes the requirements for cleanup requirements.

1.3 DESCRIPTION

- A. Maintain premises and public properties free from accumulations of waste, debris, and rubbish caused by operations.
- B. All occupied portions of the facility affected by the construction activity shall be cleaned at the close of each workday.
- C. Upon Substantial Completion of Work, remove balance of waste materials, rubbish, tools, equipment, machinery, and surplus materials, and clean all exposed surfaces; leave project clean and ready for occupancy.

1.4 SAFETY REQUIREMENTS

- A. Standards: Maintain project in accord with safety and insurance standards.
- B. Hazards Control
 - 1. Store volatile wastes in covered metal containers and remove from premises daily.
 - 2. Prevent accumulation of wastes that create hazardous conditions.
 - 3. Provide adequate ventilation during use of volatile or noxious substances.
- C. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - 1. Do not burn or bury rubbish and waste materials on project site.
 - 2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
 - 3. Do not dispose of wastes into streams or waterways.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.1 DURING CONSTRUCTION

- A. Execute cleaning to ensure that buildings, grounds and public properties are maintained free from accumulations of waste materials and rubbish.
- B. Wet down dry materials and rubbish to lay dust and prevent blowing dust. Erect dustproof barriers to keep dust from drifting through the building.
- C. Each day Contractor shall affect the following:

1. Areas of intense activity, such as cutting and sawing must be swept clean and reorganized at the end of each day.
 2. Areas of moderate activity such as installation of plumbing, ductwork, electrical work must be returned to good order at the end of each day.
 3. Debris below scaffolds (and shoring/reshoring) must at all times, be kept sufficiently consolidated to keep walkways free of tripping hazards. These work areas must also be swept clean immediately upon removal of scaffolds.
 4. All swept up debris, waste materials, and packing must be removed and/or placed in the dumpster by noon of the following workday.
 5. All stored material must be kept in good order.
 6. As portions of the work are completed, all used and excess materials must be removed promptly.
 7. Daily clean-up and good housekeeping is the responsibility of each Contractor individually and will be monitored by the Construction Manager.
 8. Contractors shall promptly comply with requests to organize scattered materials.
 9. Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. There shall be no movement of debris through occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.
- D. Separate and recycle as required by local authorities and regulations.
- E. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights. The General Construction Contractor shall provide and maintain a trash chute at the existing buildings for use by all trades.
- F. Schedule cleaning operations so that dust and other contaminants resulting from the cleaning process will not fall on wet, newly painted surfaces.
- G. Excess concrete, block, terrazzo mix, mortar or grout is the responsibility of the Contractor to remove from the site.
- H. Each Contractor working on site shall provide the Construction Manager with one worker as required by the Construction Manager to perform clean up at the site.

3.2 FINAL CLEANING

- A. Each Contractor shall provide complete the final cleaning of all work installed under this Scope of Work, prior to acceptance by the Construction Manager and the Architect, and prior to the Owners occupancy.
- B. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight exposed interior and exterior finished surfaces; polish surface so designated to shine finish.
- C. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces
- D. In preparation for substantial completion or occupancy, the Owner and Construction Manager will conduct an inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
- E. Maintain cleaning until project, or portion thereof, is occupied by Owner.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section includes the process and requirements for project closeout procedures for all Contractors.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor:
 - 1. Submit written notice through Construction Manager that Project, or designated portion of Project, is substantially complete.
 - 2. Submit a list of major items to be completed or corrected and a list of all material to be turned over to the Owner.
- B. The architect/Engineer in conjunction with Construction Manager will inspect within a reasonable time after receipt of notice.
- C. Should Architect/Engineer consider that work is substantially complete:
 - 1. Architect/Engineer shall prepare and issue a Certificate of Substantial Completion, AIA G704, complete with signatures of Owner and Contractor, accompanied by Contractor's list of items to be completed or corrected, as verified, and amended by Architect/Engineer.
 - 2. Owner occupancy of Project or designated portion of Project:
 - a. Contractor shall:
 - i. Cooperate with Construction Manager to obtain permanent/temporary certificate of occupancy.
 - ii. Perform final cleaning.
 - b. Owner will occupy Project, under provisions stated in Certificate of substantial Completion.
 - 3. Contractor shall complete work listed for completion or corrections prior to Owner occupancy.
- D. Should Architect/Engineer consider that work is not substantially complete:
 - 1. Architect/Engineer shall immediately notify Construction Manager and Contractor, in writing, stating reasons.
 - 2. Contractor shall complete work and send second written notice to Architect/Engineer through Construction Manager, certifying that Project, or designated portion of Project, is substantially complete.
 - 3. Architect/Engineer will reinspect work.

1.4 FINAL INSPECTION PROCEDURES

- A. Contractor shall submit written certification that:
 - 1. Contract Documents have been reviewed.
 - 2. Project has been inspected for compliance with Contract Documents.
 - 3. Work has been completed in accordance with Contract Documents.
 - 4. Equipment and systems have been tested in presence of Owner's Representative and are operational.
 - 5. Project is completed and ready for final inspection.
 - 6. Owner's designated staff have been instructed on all equipment and systems and an Owner signed receipt furnished to the Construction Manager
 - 7. All project record documents "As-Builts" have been submitted to the Architect/Engineer.
 - 8. Operational and Maintenance Manuals have been submitted to the Architect/Engineer.
 - 9. Owner has received the specified spare parts and maintenance items. A signed receipt by the Owner representative shall be provided to the Architect/Engineer and/or Construction Manager.
 - 10. All warranties and guarantees have been submitted to the Architect/Engineer.

- B. Architect/Engineer will make final inspection within a reasonable time after receipt of certifications.
- C. Should Architect/Engineer consider that work is not finally complete:
 - 1. Architect/Engineer shall notify Construction Manager and contractor, in writing, stating reasons.
 - 2. Contractor shall take immediate steps to remedy the stated deficiencies and send second written notice to Architect/Engineer through construction manager certifying that work is complete.
 - 3. Architect/Engineer will re-inspect work.

1.5 REINSPECTION COSTS

- A. Should Architect/Engineer be required to perform second inspections because of failure of work to comply with original certifications of Contractor, Owner will compensate Architect/Engineer for additional services and deduct amount paid from final payment to Contractor.
- B. All Contractors are required to complete all "punch list" items and all "close out" requirements within 30 (thirty) calendar days after substantial completion. If the Architect and Construction Manager are required to provide additional services, extend the duration of services to the Owner and/or perform additional inspections because the Contractor fails to comply with the requirements of the Contract, or the Contractor did not complete the work in accordance with the construction schedule, the amount of compensation paid to the Architect/Engineer and Construction Manager by the Owner for additional services shall be deducted from the final payment to the Contractor. If the Contractor does not complete the punch list work within 30 (thirty) calendar days after substantial completion, the Owner and Construction Manager retain the right to hire another Contractor to complete the punch list on a time and material bases and deduct the cost of completing this work and any and all other remaining punch list work items and deduct such cost from the Contractor's application for payment.

1.6 CLOSEOUT SUBMITTALS

- A. Project Records Documents: Section 01 7800.
Operating and Maintenance Data / Demonstration and Training: Section 01 78 10.
Warranties and Guarantees: Section 01 78 20
- B. Spare Parts and Maintenance Materials: Conform to requirements of individual technical sections.
- C. Deliver evidence of compliance with requirements of governing authorities.
 - 1. Certificates of Inspection
 - a. Elevators.
 - b. Plumbing
 - c. HVAC
 - d. Electrical
 - i. NYBFU
 - e. Others if required
- D. Deliver Certificate of Insurance covering the warranty period as specified in the Contract Documents.
- E. The Asbestos Abatement Contractor shall supply the following in addition to all other items listed herein:
 - 1. Physical/Exams and Worker Acknowledgment.
 - 2. All testing and lab results.
 - 3. Transportation and disposal records.

1.7 FINAL APPLICATION FOR PAYMENT

- A. Refer to Specification 01 29 00 for final application for payment requirements.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section includes the requirements for project record documents.

1.3 MAINTENANCE OF DOCUMENTS

- A. Maintain, at job site, one copy:
 - 1. Contract Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Approved Shop Drawings
 - 5. Supplemental Instructions
 - 6. Change Orders
 - 7. Other Modifications to Contract
 - 8. Project Record Drawings / As-Built Drawings
 - 9. Field Test Records
 - 10. Correspondence File
 - 11. Material Safety Data Sheets
 - 12. All documentation required by OSHA, State, Federal and Local Authorities.
- B. Store documents in approved locations, apart from documents used for construction.
- C. Provide files and racks for storage of documents.
- D. Maintain documents in clean, dry, legible condition.
- E. Do not use record documents for construction purposes.
- F. Make documents available at all times for inspection by Construction Manager, Architect/Engineer and Owner.
- G. File documents in accordance with Project Filing Format of Uniform Construction Index.

1.4 MARKING DEVICES

- A. Provide felt marking pen for marking, conforming to following color code:
 - 1. Red for general construction work.
 - 2. Blue for plumbing work.
 - 3. Green for heating, ventilating work.
 - 4. Brown for electrical work.
 - 5. Black for other written notations.

1.5 RECORDING

- A. Label each document "PROJECT RECORD" in two inch high printed letters.
- B. Keep record documents current.
- C. Do not permanently conceal any work until required information has been recorded.

D. Contract Drawings

1. Legibly mark to record actual construction:
 - a. All items from Addendums
 - b. Depths of various elements of foundation in relation to the finish floor.
 - c. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
 - d. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
 - e. Field changes of dimension and detail.
 - f. Changes made by Supplemental Instructions of Change Order.
 - g. Details not on original Contract Drawings.

E. Specifications and Addenda

1. Legibly mark-up each section to record:
 - a. All items from Addendums
 - b. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.
 - c. Changes made by Supplemental Instructions of Change Order.
 - d. Other matters not originally specified.

F. Shop Drawings: Maintain as record documents. Legibly mark-up approved shop drawings to show changes made after review.

G. Upon completion of the project, the Contractor shall transfer all "As Built" information to one (1) set of reproducible drawings and shall provide one (1) copy in electronic format. These accurate "As Built" must be submitted and reviewed by Architect/Engineer prior to the release of retainage. "As Built documents shall not bear the seal or signature of the Architect/Engineer".

1.6 CONTRACTOR'S DAILY REPORT

A. Form: Provided by Construction Manager, Each Prime Contractor will be required to input Daily Report information into Procore Website – Contractor to supply site superintendent with tablet sufficient to handle Procore .

B. Information Required:

1. Day, Date.
2. Name of Contractor/Subcontractors.
3. Manpower breakdown by Contractor/Subcontractor with hours worked.
4. Description of where working and operations.
5. Description of work being performed – Base Contract, Change Order, or Disputed Work
6. General description of material delivered.
7. List of visitors.
8. Remarks on accidents, progress of work
9. List of equipment.
10. Listing of Manpower trades and classifications to be used.
11. Temperature and weather conditions.

1.7 CONCRETE POUR CARDS

A. Contractors pouring concrete shall fill out the card and procure the required signatures prior to the pouring. All applicable trades shall coordinate in facilitating this procedure. Refer to Section 00 85 20.

1.8 SUBMISSION REQUIREMENTS

- A. Each Prime Contractor will be required to input Daily Report information into Procore Website on a daily basis.
- B. At completion of project, deliver record documents to Construction Manager.
- C. Accompany submittal with transmittal letter, in duplicate containing:
 - 1. Date
 - 2. Project title and number
 - 3. Contractor's name and address
 - 4. Title and number of each record document
 - 5. Certification that each document as submitted is complete and accurate.
 - 6. Signature of Contractor, or authorized representative.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals.

1.3 DESCRIPTION

- A. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under the Contract.
- B. Prepare operating and maintenance data as specified in this Section and as referenced in other sections of Specifications.
- C. Instruct Owner's personnel in the maintenance of products and in the operation of equipment and systems.

1.4 QUALITY ASSURANCE

- A. Preparation of data shall be done by personnel:
 - 1. Skilled as a technical writer to the extent required to communicate essential data.
 - 2. Skilled as a draftsman competent to prepare required drawings.

1.5 FORM OF SUBMISSION

- A. Prepare data in the form of an instructional manual for use by Owner's personnel. Additionally, provide all submitted information in an electronic PDF format on disk.
- B. Format:
 - 1. Size: 8 1/2-inch X 11 inch.
 - 2. Paper: 10 pound minimum, white, for typed pages.
 - 3. Text: Manufacturer's printed data, or neatly typewritten.
 - 4. Drawings:
 - a. Reinforced punched binder tab, bind in with text.
 - b. Fold larger drawings to size of text pages.
 - 5. Provide tabbed indexed dividers for each separate product, piece of operating equipment, or system.
 - a. Divide information by specification section, major equipment, or systems.
 - b. Provide typed description of product and major component parts of equipment or system.
 - 6. Cover: Identify each volume (front and spine) with typed or printed title "OPERATION AND MAINTENANCE INSTRUCTIONS". List:
 - a. Title of Project
 - b. Identity of separate structures as applicable.
 - c. Identity of general subject matter covered in the manual.
 - 7. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software.
- C. Binders:
 - 1. Commercial quality three D-ring binders with durable and cleanable plastic covers.
 - 2. Minimum ring size: 1 inch. Size 1/4" thicker than material for future inserts.

3. When multiple binders are used, correlate the data into related consistent groupings.

1.6 CONTENT OF MANUAL

- A. Title page with project title, Architect, Engineer, Construction Manager, Contractor, and Subcontractors with addresses, telephone numbers, and contacts.
- B. Neatly typewritten table of contents for each volume, arranged in systematic order describing all index tabs.
 1. List of each product required to be included, indexed to the content of the volume.
 2. List with each product, the name, address, telephone number, and contacts of:
 - a. Subcontractors and major equipmentsuppliers.
 - b. Local source of supply for parts and replacement.
 3. Identify each product by product name and other identifying symbols as described in Contract Documents.
- C. Product Data:
 1. Include only those sheets that are pertinent to the specific product.
 2. Mark each sheetto:
 - a. Clearly identify the specific product or part installed.
 - b. Clearly identify the data applicable to the installation.
 - i. Delete references to inapplicableinformation.
- D. Drawings:
 1. Supplement product data with drawings as necessary to clearly illustrate:
 - a. Relations of component parts of equipmentand systems.
 - b. Control and flowdiagrams.
 2. Coordinate drawings with Project Record Documents to assure correct illustration of complete installation.
 - a. Do not use Project Record Documents as maintenance drawings.
- E. Start-Up Reports:
 1. Copies of factory inspections and / or equipment start-up reports.
- F. Written text, as required to supplement product data for the particular installation:
 1. Organize in consistent format under separate headings for different procedures.
 2. Provide a logical sequence of instructions for each procedure.
- G. Copy of each warranty, guarantee and servicecontract issued.
 1. Provide information sheet for Owner's personnel, give:
 - a. Proper procedures in the event of failure.
 - b. Instances that might affect the validity of warranties or guarantees.

1.7 MANUAL FOR MATERIALS AND FINISHES

- A. Submit three (3) copies of complete manual in final form.
- B. Content, for moisture-protection and weather-exposed products:
 1. Manufacturer's data, giving full information on products.
 - a. Catalog number, size, composition.
 - b. Cautions against cleaning agents and methods that are detrimental to the product.
 - c. Recommended schedule for cleaning and maintenance.
- C. Content, for moisture-protection and weather-exposed products:
 1. Manufacturer's data, giving full information on products.
 - a. Applicable standards
 - b. Chemical composition
 - c. Details of installation

- 2. Instructions for inspection, maintenance and repair.
- D. Additional requirements for maintenance data: The respective sections of Specifications.
- E. Provide complete information for all products specified.

1.8 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Submit three (3) copies of complete manual in final form.
- B. Content, for each unit of equipment and system, as appropriate:
 - 1. Description of unit and component parts:
 - a. Function, normal operating characteristics and limiting conditions.
 - b. Performance curves, engineering data and tests.
 - c. Complete nomenclature and commercial number of all replaceable parts.
 - 2. Operating procedures:
 - a. Start-up, break-in, routine and normal operating instructions.
 - b. Regulation, control, stopping, shut-down and emergency instructions.
 - c. Summer and winter operating instructions.
 - d. Special operating instructions.
 - 3. Maintenance Schedule and Procedures:
 - a. Chart listing routine maintenance requirements and frequency.
 - b. Guide to "trouble-shooting"
 - c. Disassembly, repair and reassembly instructions.
 - d. Alignment, adjusting and checking.
 - 4. Servicing and lubrication schedule:
 - a. List of lubricants in all equipment and recommended frequency of lubrication.
 - 5. Manufacturer's printed operating and maintenance instructions.
 - 6. Description of sequence of operation control manufacturer.
 - 7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
 - a. Predicted life of parts subject to wear.
 - b. Items recommended to be stocked as spare parts.
 - 8. Copies of factory inspections and / or equipment start-up reports.
 - 9. Schematic wiring diagrams of the equipment that have been updated for field conditions.
 - 10. As-installed control diagrams by controls manufacturer.
 - 11. Each Contractor's coordination drawings.
 - a. As-installed color-coded piping diagrams.
 - 12. Charts of valve tag numbers, with the location and function of each valve.
 - 13. List of original manufacturer's spare parts, suppliers, and recommended quantities to be maintained in storage.
 - 14. Instruction books, cards, and manuals furnished with the equipment and / or system.
 - 15. Other data as required under pertinent sections of specifications.
- C. Content, for each electric and electronic system, as appropriate:
 - 1. Description of system and component parts:
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
 - 2. Circuit directories of panel boards:
 - a. Electrical service
 - b. Controls
 - c. Communications
 - 3. As-installed color-coded wiring diagrams.
 - 4. Operating procedures:
 - a. Routine and normal operating instructions.

- b. Sequences required.
 - c. Special operating instructions.
 - 5. Maintenance Schedule and Procedures:
 - a. Chart listing routine maintenance requirements and frequency.
 - b. Guide to "trouble-shooting"
 - c. Disassembly, repair and reassembly instructions.
 - d. Adjustment and checking.
 - 6. Manufacturer's printed operating and maintenance instructions.
 - 7. Schematic wiring diagrams of the equipment that have been updated for field conditions.
 - 8. Copies of factory inspections and / or equipment start-up reports.
 - 9. List of original manufacturer's spare parts, suppliers, and recommended quantities to be maintained in storage.
 - 10. Instruction books, cards, and manuals furnished with the equipment and / or system.
 - 11. Other data as required under pertinent sections of specifications.
- D. Prepare and include additional data when the need for such data becomes apparent during instruction of Owner's personnel.
- E. Additional requirements for operating and maintenance data: The respective sections of Specifications.

1.9 SUBMISSION SCHEDULE

- A. Submission of Operation & Maintenance Manuals will take place at a minimum, when the approved payment application reaches 70% of the contract value. Upon approval of the Operation & Maintenance Manuals, a maximum of 75% of the scheduled value for the Operation & Maintenance manuals will be approved in a subsequent payment application. Exclusions for the 75% complete Operation & Maintenance Manuals include: Final testing reports (Not Balancing), Final proof of Owner Instructions and Final Warranties.
- 1. Copy will be returned after final inspection or acceptance, with comments.
- B. Submit specified number of copies of approved data in final form ten (10) days after final inspection or acceptance.

1.10 DEMONSTRATING AND TRAINING

- A. Prior to final inspection or acceptance, fully demonstrate and train Owner's designated personnel in the operation, adjustment and maintenance of products, equipment and systems.
- B. Demonstration and training shall be structured and include the following:
- 1. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
 - a. Equipment, including food-service equipment, clock system, and communications system.
 - b. Fire-protection systems, including fire alarm.
 - c. Heat generation, including boilers, feedwater equipment, and pumps.
 - d. HVAC systems, including air-handling equipment and terminal equipment and devices.
 - e. HVAC instrumentation and controls.
 - f. Electrical service and distribution, including uninterruptible power supplies and motor controls.
 - g. Conveying systems including elevators.
 - 2. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
 - a. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - i. System, subsystem, and equipment descriptions.

- ii. Performance and design criteria if Contractor is delegated design responsibility.
 - iii. Operating standards.
 - iv. Equipment function.
 - v. Operating characteristics.
 - vi. Limiting conditions.
- b. Documentation: Review the following items in detail:
 - i. Operations manuals.
 - ii. Maintenance manuals.
 - iii. Identification systems.
 - iv. Maintenance service agreements and similar continuing commitments.
- c. Emergencies: Include the following, as applicable:
 - i. Instructions on meaning of warnings, trouble indications, and error messages.
 - ii. Instructions on stopping.
 - iii. Shutdown instructions for each type of emergency.
 - iv. Operating instructions for conditions outside of normal operating limits.
 - v. Sequences for electric or electronic systems.
 - vi. Special operating instructions and procedures.
- d. Operations: Include the following, as applicable:
 - i. Startup procedures.
 - ii. Equipment or system break-in procedures.
 - iii. Routine and normal operating instructions.
 - iv. Regulation and control procedures.
 - v. Control sequences.
 - vi. Normal shutdown instructions.
 - vii. Operating procedures for system, subsystem, or equipment failure.
 - viii. Seasonal and weekend operating instructions.
 - ix. Required sequences for electric or electronic systems.
- e. Adjustments: Include the following:
 - i. Alignments.
 - ii. Checking adjustments.
 - iii. Noise and vibration adjustments.
 - iv. Economy and efficiency adjustments.
- f. Troubleshooting: Include the following:
 - i. Diagnostic instructions.
 - ii. Test and inspection procedures.
- g. Maintenance: Include the following:
 - i. Inspection procedures.
 - ii. Types of cleaning agents to be used and methods of cleaning.
 - iii. List of cleaning agents and methods of cleaning detrimental to product.
 - iv. Procedures for routine cleaning.
 - v. Procedures for preventive maintenance.
 - vi. Procedures for routine maintenance.
 - vii. Instruction on use of special tools.
- h. Repairs: Include the following:
 - i. Diagnosis instructions.
 - ii. Repair instructions.
 - iii. Instructions for identifying parts and components.
 - iv. Review of spare parts needed for operation and maintenance.

1.11 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory authorized service representative, experienced in operation and maintenance procedures and training.

PART 2 – PRODCUTS (NOT APPLICABLE)

PART 3 – EXECUTION

3.1 PREPARATION

- A. Prepare and submit an outline of instructional program content for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Submit a minimum of three (3) weeks prior to proposed training dates.
- B. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate with Owner for number of participants, instruction times, and location.
- B. Provide verbal and written instructions to the Owner's representatives by FACTORY PERSONNEL to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Owner will furnish Prime Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner through Construction Manager, with at least seven (7) days advance notice.
- D. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 VIDEO RECORDING

- A. Demonstration and Training Recording: Record instruction of Owner's representatives in the operation and maintenance of equipment and systems. Select vantage points to best show equipment, systems and procedures demonstrated. These recordings are to be labeled as to what subject the recording contains and turned over to the Construction Manager. Required media is Flash drive.

3.4 DOCUMENTATION

- A. Fully execute a Training Receipt form and submit to the Construction Manager upon completion.
- B. Render additional instructions necessary for the operation of heating, ventilating and air conditioning systems during the first heating and cooling season after acceptance.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies general administrative and procedural requirements for warranties and guarantees required by the Contract Documents, including manufacturers' standard warranties on products and special warranties.
- B. Disclaimers and Limitations:
 - 1. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 DEFINITIONS

- A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.4 WARRANTY REQUIREMENTS

- A. All warranties issued to the Construction Manager shall be transferable to the Owner upon successful and final completion of contract work performed by the Contractor.
- B. Related Damages and Losses:
 - 1. When correcting warranted work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- C. Reinstatement of Warranty:
 - 1. When work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- D. Replacement Cost:
 - 1. Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the Owner has benefited from use of the work through a portion of its anticipated useful service life.
- E. Owner's Recourse:
 - 1. Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 - a. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with the requirements of the Contract Documents.

- F. The Owner reserves the right to refuse to accept work for the project where a special warranty, certification, or similar commitment is required on such Work or part of the work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.5 SUBMISSION REQUIREMENTS

- A. Submit written warranties prior to the date certified for Substantial Completion. If the Architect/Engineer's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the work, or a designated portion of the work, submit written warranties upon request of the Architect/Engineer.
 - 1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties within fifteen (15) days of completion of that designated portion of the Work.
- B. When a special warranty is required to be executed by the Contractor, or the Contractor and a Subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties.
- C. Prepare a written document utilizing the appropriate form, ready for execution by the Contractor, or the Contractor and Subcontractor, supplier or manufacturer.
- D. Form of Submittal: At Final Completion compile two (2) copies of each required warranty and guarantee properly executed by the Contractor, or by the Contractor, Subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- E. Bind warranties and guarantees in heavy-duty, commercial quality, durable three D-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.
 - 1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a type description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.
 - 2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES", the Project title or name, and the name of the Contractor.
- F. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

END OF SECTION

SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 OVERVIEW

- A. This section of the specification describes the process for commissioning and defines the responsibilities of the commissioning agent, the contractors, and outlines the duties of other members of the commissioning team.
- B. The commissioning process shall be applied to all equipment, components, and systems as listed in this section, including specific interfaces to and from equipment and systems provided under separate contracts.
- C. Building Commissioning work is a joint team effort to ensure that all systems function together properly to meet the design intent, and to document system performance parameters for fine-tuning of control sequences and operations procedures. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment start-up, control system calibration, testing and balancing, training, and performance testing. This section does not supersede other requirements of the specifications. It may, though, expand on some of them.

1.2 COMMISSIONING AGENT

A.	OFFICE LOCATION	FIRM CONTACTS
	Salas O'Brien Consulting And Engineering Group Of New York, Inc. (FKA M/E Engineering) 300 Trolley Boulevard Rochester, NY 14606	Steven C. Hollis Office Phone: 585.288.5590 x 1312 Cell Phone: 585.354.0660 steven.hollis@salasobrien.com

1.3 STANDARD AND CODE COMPLIANCE

- A. Commissioning will be accomplished to comply with, and in accordance with the requirements of the following:
 - 1. 2025 Energy Conservation Construction Code of New York State, Section C408 System Commissioning.

1.4 THE COMMISSIONING TEAM

- A. The commissioning team shall consist of:
 - 1. Commissioning Agent (CA).
 - 2. HVAC Contractor (HC).
 - 3. General Contractor (GC).

4. All appropriate Contractors and Sub-Contractors including but not limited to; temperature controls, sheet metal, testing and balancing, fire alarm fire protection and elevator installer.
5. Approved Representatives of Mechanical, Electrical and Equipment Manufacturers.
6. Design Engineers (DE).
7. Design Architect (ARCH).
8. Facility Staff (FS).
9. Owner's Representative (OR).

1.5 COORDINATION

- A. Project Commissioning Team - The members of the Project Commissioning Team shall consist of the Commissioning Authority and any support personnel, the Owner's facility staff (FS) or designee, the HVAC Contractor, Electrical Contractor, Plumbing Contractor, Fire Alarm Contractor, Fire Protection Contractor, General Contractor, Elevator Vendor, or additional vendors as required, the Architect/Engineer (A/E) and Owner's Representative (OR).
- B. Management - The CA coordinates the commissioning activities through the Owner's Representative (OR). All members shall work together to fulfill their contracted responsibilities and meet the objectives of the contract documents. Refer to Paragraph 1.6 for additional management details.
- C. Scheduling - The CA, through the OR, will provide sufficient notice to the Contractors for scheduling commissioning activities with respect to the Owner's participation. The Contractors will integrate all commissioning activities into the overall project schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

1.6 COMMISSIONING PLAN

- A. The CA will develop the Commissioning Plan which shall be included in the project schedule when approved by the Owner.
- B. The Commissioning Plan shall contain the information necessary to document the commissioning process as it progresses from pre-start checks, to start-up and initial operation, and finally to functional performance verification of all systems.
- C. The Commissioning Plan shall also contain a schedule of commissioning work, integrated with the overall project schedule. This schedule shall show:
 1. Completion dates for each system or systems in each area of the building.
 2. Dates for controls installation completion and point checkout.

3. Dates for carrying out Steps 1 and 2 commissioning work for each system or group of systems.
 4. Submission dates for the documentation required by the Engineer prior to Step 3 verification.
 5. Dates for carrying out Step 3 commissioning work.
- D. The following narrative provides a brief overview of the commissioning tasks that shall be performed during construction and the general order in which they occur.
1. Commissioning during construction begins with an initial commissioning meeting conducted by the CA where the commissioning process is reviewed with the project commissioning team members.
 2. Additional meetings will be required throughout construction, scheduled by the CA, through the Owner or OR, with necessary parties attending to plan, scope, coordinate, schedule future activities and address issues.
 3. Equipment documentation is submitted to the CA, through the Owner, OR, Architect, during normal submittals, including detailed startup procedures.
 4. The prefunctional checklists, developed by the CA are to be completed by the Contractor (or its Subcontractors), before and during the startup process.
 5. Prefunctional checklists, TAB and startup must be completed before performance functional testing.
 6. Items of non-compliance in material, installation, or setup shall be corrected at no expense to the Owner.
 7. The Contractor ensures that the Subcontractors' prefunctional checklists are executed and documented and that startup and initial checkout are performed. The CA verifies that the TAB, prefunctional checklists and startup were completed according to the approved plans. This includes the CA approving TAB, checklists and startup plans. This also includes witnessing startup of selected equipment. Any testing failure is to be corrected at no additional cost to the Owner, and a re-test is to be performed, observed, and documented.
 8. The CA develops and implements equipment and system functional test procedures. The forms and procedures are approved by the Owner and A/E.
 9. The performance tests are executed by the Contractor under the direction of the CA with the assistance of the facility staff. All documentation is by the CA.
 10. The CA provides the Commissioning Record.
 11. Deferred testing and/or seasonal verifications are to be conducted as specified or required.

1.7 COMMISSIONING RESPONSIBILITIES

A. Commissioning Agent:

1. Plan, organize, direct and implement the Commissioning Process as specified herein.
2. Prepare the Commissioning Plan and submit for review by the Owner and Architect.
3. Revise the Commissioning Plan as required during construction.
4. Chair commissioning meetings, prepare and distribute schedules and agendas for the meetings, and prepare and distribute minutes to all Commissioning Team members, whether or not they attended the meeting.
5. Write the prefunctional checklists, initial operation and functional test procedures and submit for review by the Owner. The test procedures and checklists should be designed to verify detailed aspects of the proper operation of all equipment items and overall system performance in accordance with the design intent of the systems.
6. Coordinate commissioning activities among all Contractors, sub-trades, and suppliers, and all related commissioning requirements in the various specifications for all contracts.
7. Carry out all required system readiness checks and document the results as the checks are done.
8. In cooperation with the Controls Subcontractor, ensure all control point checkouts are carried out and the results documented as the checks are done.
9. Observe or verify all start-ups and initial system operations tests and checks, which shall encompass all specified functional performance tests, ensuring the results are documented as the tests and checks are done.
10. Provide periodic site visits as required to observe system installation.
11. Maintain Master Issues log. Resolution to issues found shall be documented by installing contractor and submitted to CA.
12. At the direction of the Engineer, ensure equipment and systems are operated for functional performance verification purposes.
13. Ensure all required training and demonstrations are provided to the Owner's designated operating staff and that all Operations and Maintenance manuals are submitted, approved and provided to the Owner.
14. Develop a Final Commissioning Record.
15. Coordinate deferred/seasonal commissioning required.

B. Contractors:

1. Within four (4) weeks of the award of the contract, the HC, PC, GC, EC, FPC Contractors and relevant subcontractors shall submit the names of the Project Manager who will be the Commissioning Coordinator for this project, as well as the names, addresses, phone numbers and qualifications of Subcontractors' Representatives and factory trained Manufacturer's Representatives for all equipment and systems required to participate in the Commissioning Process as specified in this Section.
2. Each Contractor and all his sub-trades and suppliers, shall cooperate with the Commissioning Agent in carrying out the Commissioning Process. In this context, each Contractor shall:
 - a. Provide equipment and systems start-up as specified.
 - b. Operate equipment and systems as required for initial systems operations, and witness final functional performance tests as they are performed by the Commissioning Agent, including the on-site participation of approved factory trained Manufacturer's Representatives for equipment.
 - c. Attend commissioning meetings and attend to action items arising from them, as required to allow the Commissioning Process to proceed on schedule.
 - d. Provide instruction and demonstrations for the Owner's designated operating staff, in conjunction with the Commissioning Agent, in order to meet all specified training requirements in this regard.
 - e. The Contractors shall make any and all necessary corrections to systems, equipment, O & M manuals, as built drawings, and procedures as necessary to meet the design intent, contract documents, manufacturer's recommendations or performance requirements if errors are discovered during the Commissioning Process.
 - f. The Contractors shall supply all necessary documentation, such as shop drawings, submittal data, maintenance manuals, etc. required for equipment and systems, to the Commissioning Agent for preparation of the commissioning plan, checklists, and functional performance plans.
 - g. The Contractors shall provide the required names, addresses and qualifications of all specified Manufacturer's Representatives to participate in the Commissioning Process prior to the initial commissioning meeting.
 - h. Subsequent installation and performance verifications, made necessary due to required corrections after initial verification, shall be at the respective Contractor's expense.
 - i. Carry all commissioning related costs in contract bid price.

- j. Review all documentation provided by CA and provide comments, if required prior to on site commissioning activities.
- k. Engage, at Contractor's cost, any Manufacturer's Representatives required to complete start-up and commissioning activities.
- l. Include cost of all devices and special tools to complete commissioning activities.

C. Manufacturer's Representatives:

- 1. The factory trained and authorized Manufacturer's Representatives shall participate in the commissioning process as specified in this section and as indicated in the technical section of the specifications.
- 2. Each Manufacturer's Representative shall cooperate with the commissioning agent in carrying out the commissioning process. In this context, each Manufacturer's Representative shall:
 - a. Provide equipment start-up as specified.
 - b. On-site participation as required for initial equipment operations and witness final functional performance tests as they are performed by the commissioning agent.
 - c. Attend commissioning meetings, as applicable and attend to action items arising from them, as required to allow the commissioning process to proceed on schedule.
 - d. Provide instruction and demonstrations for the Owner's designated operating staff, as specified in conjunction with the commissioning agent, in order to meet all specified training requirements in this regard.
 - e. Make any and all necessary corrections to equipment, O&M manuals, as-built drawings and procedures as necessary to meet the design intent, contract documents or performance requirements if errors are discovered during the commissioning process.
 - f. Subsequent installation and performance verifications, made necessary due to required corrections after initial verification, shall be at the respective manufacturer's expense.

D. Design Engineers and Architects:

- 1. Provide "Basis of Design" documentation inclusive of design criteria for CA review.
- 2. The Design Engineers and Architect shall review the Commissioning Plan, commissioning checklists and functional performance test plans. They shall also participate, as appropriate, in on-site commissioning meetings.

3. During the functional performance phase of the Commissioning Process, the Design Engineers and Architects may be on site to review commissioning documentation, witness functional performance tests, and verify acceptable performance or to declare performance unacceptable, as required.
 4. Provide design narrative information to CA as required.
 5. Participate in deficiency resolution process of items identified during Commissioning Process.
- E. Owner's Representative (User):
1. Provide "Owner's Project Requirements" documentation for CA review.
 2. The Owner shall ensure the availability of operating staff for all scheduled training and demonstration sessions. This staff shall possess sufficient skills and knowledge to operate and maintain the installation following attendance at these sessions.
 3. Attend commissioning meetings.
 4. Sign off of all accepted functional test procedures.
 5. Participate in seasonal/deferred testing.

1.8 DESCRIPTION OF WORK

- A. The "Systems and Equipment" as referred to in this section of the specifications shall include, but not be limited to, subsystems and components of subsystems; as provided by various contracts as follows:
1. Building HVAC Systems
 2. Building Temperature Control System

1.9 COMMISSIONING PROCESS

- A. The on-site commissioning process shall be organized and carried out in four (4) steps as follows:
1. Step 1 - System readiness and start-up.
 2. Step 2 - Initial operation.
 3. Step 3 - Functional performance verification.
 4. Step 4 - Demonstration and instruction.
- B. Each step is applicable to each separate system and its components, as listed in Part 3, including all related controls and specified interfaces to other divisions and contracts.
- C. The Contractors shall review and verify the commissioning schedule and requirements for the interface between all trades in order to prevent delays in the Commissioning Process.

- D. In some systems, improper adjustments, misapplied equipment, and/or deficient performance under varying loads may result in additional work being required to commission the systems. This work shall be completed under the direction of the General Contractor with input from the Contractors, Equipment Supplier, and Commissioning Agent. Whereas all members shall have input and the opportunity to discuss, debate, and work out problems, the Design Architect or Engineer shall have final jurisdiction over any additional work done to achieve performance.
- E. Corrective work shall be completed in a timely fashion to permit the completion of the commissioning process. Experimentation to demonstrate system performance may be permitted. If the Commissioning Agent deems the experimentation work to be ineffective or untimely as it relates to the Commissioning Process, the Commissioning Agent shall notify the Owner, indicating the nature of the problem, expected steps to be taken, and suggestions for completion of activities. Costs incurred to solve the problems in an expeditious manner shall be the Contractor's responsibility.
- F. Seasonal commissioning is required under full load conditions during peak heating and peak cooling seasons, as well as part load conditions in the spring and fall. Simulations of peak load conditions may be implemented to allow for complete commissioning of the work.
- G. Systems that are not weather dependent shall be tested under full and partial load to the fullest extent possible.

1.10 STEP 1 - SYSTEMS READINESS AND START-UP

- A. Before starting any equipment or systems, the Contractors shall complete the system readiness or pre-start checks in the commissioning plan and the Commissioning Agent shall document the results. The following conditions and items shall be completed as applicable:
 - 1. Piping systems have been pressure tested as specified, found to be tight, with reports submitted.
 - 2. Piping systems have been flushed and cleaned as specified, any required reports submitted, and then filled or charged as applicable.
 - 3. Equipment has been lubricated to specification.
 - 4. Air system cleaning is complete, and particulate filters have been installed.
 - 5. Vibration isolation has been installed to specification and adjusted.
 - 6. Equipment drives have been aligned.
 - 7. Electrical, water and fuel services have been installed and checked.
 - 8. Control point checkouts have been completed.
 - 9. Safety controls have been installed and operation checked.

10. Major equipment start-up has been carried out by Manufacturer's Representative when specified and required startup reports completed and submitted.
- B. All checks shall be documented on the relevant checklists as they are carried out. Deficiencies or incomplete work shall be corrected and the checks repeated until the installation is ready for operation before proceeding to Step 2 of the process.

1.11 STEP 2 - INITIAL OPERATION

- A. In Step 2 of the Commissioning Process, the Contractors, with the Commissioning Agent verifying, complete the testing, balancing, and calibration of all components and systems. They also operate all systems through all specified modes of operation and test system responses to specified abnormal or emergency conditions.
- B. Work carried out during this step of commissioning shall include but not be limited to, the following:
 1. Air systems balancing, including positioning of all balance dampers, adjustments to diffusers, registers and grilles.
 2. Hydronic systems balancing, including positioning of all balance valves.
 3. Correction of problems revealed during balancing, including changes to fan speeds or blade pitch as necessary.
 4. Setting up and calibrating all automatic temperature controls devices, including adjustments to control valves and damper actuators.
 5. Setting up or programming controls for accurate response and precise sequencing to meet specified performance.
 6. With Commissioning Agent verifying, the Balancing Contractor and Controls Contractor working together setting up airflows and controls calibrations for terminal units and airflow stations.
 7. Ensuring final adjustments to vibration isolation are carried out as necessary.
- C. As was done in Step 1, all checks and tests shall be documented on the relevant checklists as they are carried out. Deficiencies or incomplete work shall be corrected, and the checks or tests repeated until correct installation and function has been confirmed and the installation is ready for engineering verification.

1.12 STEP 3 - FUNCTIONAL PERFORMANCE TEST AND VERIFICATION

- A. All equipment and systems shall be operated through the entire specified sequence of operations for witness and verifying acceptable operation, by the Commissioning Agent.
- B. During this step of commissioning, the following checks and test shall be required:
 1. Check the location and accessibility of all access panels.
 2. Operation of all control system devices, both sensors and actuators.

3. Proper physical response of all controlled devices and components to setpoint changes or other relevant adjustments.
4. Operation of randomly selected motorized dampers.
5. Demonstration of acceptable noise and vibration levels from major equipment, under its full range of operational conditions.
6. Operation of equipment and systems under every specified mode of operation and sequence of control.
7. Once acceptable performance of systems has been verified, then verification of specified interfaces to/from equipment and systems provided under other divisions and contracts shall be performed.

1.13 STEP 4 - DEMONSTRATION AND INSTRUCTION

- A. The formal demonstration and instruction for operating staff shall commence once the Step 3 commissioning is complete and substantial completion achieved.
- B. Demonstration and instruction in accordance with the "Design Intent" shall cover all equipment and systems and their controls.

1.14 COMMISSIONING START-UP AND COMPLETION

- A. Commissioning of certain systems may be required to be performed during both heating and cooling seasons. Commissioning shall be performed at the earliest such time as possible after substantial completion of each system.

1.15 REFERENCES

- A. Systems commissioning shall be accomplished as specified and in accordance with the latest version of commissioning publications from one the following industry associations:
 1. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Guideline 1.1-2007 HVAC&R Technical Requirements for the Commissioning Process.
 2. Associated Air Balancing Council, Commissioning Reference Manual.
 3. Building Commissioning Association - The Building Commissioning Handbook.

1.16 DOCUMENTATION

- A. Each Contractor shall provide to the Commissioning Agent three (3) copies of the following items as soon as they become available:
 1. Certified and approved start-up and testing report forms for all subsystem equipment that comprise the System. Commissioning documentation shall include control schematics of the total system and all subsystems.

2. Records of required inspections for code compliance, and documentation of approved permits and licenses to operate components of the System.
3. Operating data which shall include all necessary instructions to the Owner's operating staff in order to operate the system to specified performance standards.
4. Maintenance data which shall include all necessary information required to maintain all equipment in continuous operating condition, such as the testing, balancing and adjusting report and the as-built drawings.
5. Written notice that building equipment and systems have been completed, tested and are fully operational.
6. Checklist of all submitted contract deliverables such as; operation and maintenance manuals, spare parts, warranties, training, documentation, etc.

PART 2 - PRODUCTS

2.1 TESTING

- A. The Contractor shall provide any equipment or device required for access such as platforms, scaffolds, and spare filters as may be necessary for all verification and testing.
- B. All standard testing equipment required to perform startup and initial checkout and required performance testing shall be provided by the Contractor for the equipment being tested. This includes, but is not limited to, two-way radios, meters, and data recorders.
- C. Special equipment, tools, and instruments required for testing equipment according to these contract documents shall be included in the Contractor's base bid price and shall be turned over to the Owner at project close-out.
- D. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance within the tolerances specified in the specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration to NIST traceable standards within the past year to an accuracy of 0.5°F and a resolution of $\pm 0.1^\circ\text{F}$. Pressure sensors shall have an accuracy of $\pm 2.0\%$ of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

PART 3 - EXECUTION

3.1 GENERAL

- A. Each Contractor shall coordinate with the Commissioning Team in the construction phase of the project to assure compliance with all system commissioning requirements.

3.2 DESIGN CRITERIA AND INTENT

- A. Design criteria and intent shall be as described in the technical specification sections and contract drawings. The basis of design developed by the Architect and Engineer will be also referenced.

3.3 MEETINGS

- A. Initial Meeting:
 - 1. The CA, through the OR, will schedule, plan and conduct an initial commissioning meeting. The Contractors and their responsible parties are required to attend.
- B. Miscellaneous Meetings:
 - 1. Other meetings will be planned and conducted by the CA as construction progresses. These meetings will cover coordination, deficiency resolution, and planning issues. These meetings will be held to the extent possible following construction meetings to minimize additional travel for all parties.

3.4 STARTUP, CONSTRUCTION CHECKLISTS AND INITIAL CHECKOUT

- A. The following procedures apply to all equipment/systems to be commissioned.
- B. General: Prefunctional checklists are required to verify that the equipment and systems are fully connected and operational. It ensures that performance testing (in-depth system checkout) may proceed without unnecessary delays. The prefunctional checklists for a given system must be successfully completed and approved prior to startup and formal performance testing of equipment or subsystems of the given system.
- C. Startup and Checkout Plan: The CA will assist the Project Commissioning Team members responsible for startup of any equipment. The primary role of the CA in this process is to ensure that there is written documentation that each of the manufacturer recommended procedures has been completed. The CA shall provide prefunctional checklists and startup shall be identified in the commissioning scoping meeting and on the checklist forms.
 - 1. The prefunctional checklists will be developed by the CA and provided to the Contractors. These checklists indicate required procedures to be executed as part of startup and initial checkout of the systems and the party responsible for their execution.
 - 2. The Contractor shall determine which trade is responsible for executing and documenting each of the line item tasks and transmit the checklists to the responsible subcontractors. Each form may have more than one trade responsible for its execution.
 - 3. The Contractor/Subcontractor responsible for the purchase of the equipment shall develop the full startup plan by combining the manufacturer's detailed startup and checkout procedures and the prefunctional checklists.

4. The Contractor/Subcontractor shall submit the full startup plan to the CA for review and approval.
 5. The CA will review and approve the procedures and the documentation format for reporting. The CA will return the procedures and the documentation format to the Contractor.
 6. The Contractor will transmit the full startup plan to the Subcontractors for their review and use.
- D. Sensor and Actuator Calibration: All field-installed temperature, relative humidity, CO, CO₂, refrigerant, O₂, and/or pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated. Verify that all locations are appropriate and away from causes of erratic operation. Submit to the CA the calibration methods and results. All test instruments shall have had a certified calibration within the last six (6) months to NIST traceable standards, and comply with all local, state and/or federal requirements/certifications, as required. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated. Provide bench testing as required at the direction of the CA.
1. Sensor Calibration Methods:
 - a. All Sensors - Verify that all sensor locations are appropriate and away from causes of erratic operation. Verify that sensors with shielded cable, are grounded only at one end. For sensor pairs that are used to determine a temperature or pressure difference, make sure they are reading within 0.2°F of each other for temperature and within a tolerance equal to 2% of the reading, of each other, for pressure. Tolerances for critical applications may be tighter.
 - b. Sensors without Transmitters - Standard Application. Make a reading with a calibrated test instrument within 6 in. of the site sensor. Verify that the sensor reading (via the permanent thermostat, gauge or building automation system (BAS)) is within the tolerances in the table below of the instrument-measured value. If not, install offset in BAS, calibrate or replace sensor.
 - c. Sensors with Transmitters - Standard Application. Disconnect sensor. Connect a signal generator in place of sensor. Connect ammeter in series between transmitter and BAS control panel. Using manufacturer's resistance-temperature data, simulate minimum desired temperature. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the BAS. Record all values and recalibrate controller as necessary to conform with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction. Reconnect sensor. Make a reading with a calibrated test instrument within 6 in. of the site sensor. Verify that the sensor reading (via the permanent thermostat, gauge or building automation system (BAS)) is within the tolerances in the table below of the instrument-measured value. If not, replace sensor and repeat.

For pressure sensors, perform a similar process with a suitable signal generator.

Tolerances, Standard Applications

Sensor	Required Tolerance (+/-)		Sensor	Required Tolerance (+/-)
Outside air, space air, duct air temps	0.4F		Flow rates, air	10% of design
Watthour, voltage & amperage	1% of design		Flow rates, water	4% of design
			Relative humidity	4% of design
			Oxygen or CO ₂ monitor	0.1% pts
			CO monitor	0.01 % pts
Pressures, air, water and gas	3% of design		Barometric pressure	0.1 in. of Hg

- d. Valve and Damper Stroke Setup and Check EMS Readout: For all valve and damper actuator positions checked, verify the actual position against the BAS readout. Set pumps or fans to normal operating mode. Command valve or damper closed, visually verify that valve or damper is closed and adjust output zero signal as required. Command valve or damper open, verify position is full open and adjust output signal as required. Command valve or damper to a few intermediate positions. If actual valve or damper position doesn't reasonably correspond, replace actuator or add pilot positioner (for pneumatics).

E. Execution of Construction Checklists and Startup:

- Two (2) weeks prior to the scheduled start up, the Contractor shall coordinate startup and checkout with the Owner, A/E, OR, and CA. The execution and approval of the construction checklists, startup, and checkout shall be directed and performed by the Contractor, Subcontractor or Vendor. Signatures are required of the applicable Subcontractors for verification of completion of their work.
- The Owner and facility personnel as necessary, shall observe, at minimum, the procedures for each piece of primary equipment, unless there are multiple units, in which case a sampling strategy may be used.
- For lower-level components of equipment, (e.g., sensors, controllers), the CA shall observe a sampling of the startup procedures.
- The Contractors, Subcontractors and Vendors shall execute startup and provide the CA with a signed and dated copy of the completed startup and construction checklists.
- Only individuals employed by the Contractor (Technicians, Engineers, Tradesmen, Vendors, etc.) who have direct knowledge and witnessed that a line item task on the construction checklist was actually performed shall check off that item. It is not acceptable for non-witnessing onsite supervisors to fill out these forms.

F. Deficiencies, Non-Conformance, and Approval of Checklists and Startup (Master Issues Log):

1. The Contractor shall ensure that the Subcontractors clearly list any outstanding items of the initial startup and construction checklist procedures that were not completed successfully, on an attached sheet. The form and any outstanding deficiencies shall be provided, to the CA within two (2) days of test completion.
2. The CA will review the report and issue either a non-compliance report or an approval form, to the Contractor. The installing Contractors or Vendors shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner, shall notify the CA as soon as outstanding items have been corrected, and resubmit an updated startup report with a Statement of Correction on the original non-compliance report. When satisfactorily completed, the CA will recommend approval of the execution of the checklists and startup of each system.
3. Items left incomplete, which later cause deficiencies or delays during performance may result in backcharges to the Contractor.

3.5 FUNCTIONAL PERFORMANCE TESTING

- A. Requirements: The functional performance testing shall demonstrate that each system is operating according to the documented design intent and contract documents. Functional performance testing facilitates bringing the systems from a state of individual substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.
- B. Coordination and Scheduling: The Contractor shall provide sufficient notice, regarding their completion schedule for the construction checklists and startup of all equipment and systems to allow the performance testing to be scheduled. The CA shall oversee, witness, and document the performance all equipment and systems. The CA, in association with the Contractor/Subcontractors and Facility Staff, shall execute the tests. Performance testing shall be conducted after the construction checklists, and startup has been satisfactorily completed. The control system shall be sufficiently tested and approved by the CA before it is used to verify performance of other components or systems. The air balancing and water balancing shall be completed and approved before performance testing of air or water-related equipment or systems. Testing proceeds from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems shall be checked.
- C. Development of Test Procedures: Before test procedures are finalized, the Contractor shall provide to the A/E and the CA all requested documentation and a current list of changes affecting equipment or systems, including an updated points list, program code, control sequences, testing parameters, supplemental instructions, and addenda. Using the testing parameters and requirements in the technical specifications, the CA shall update/develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system.

Each Contractor/Subcontractor or vendor, as appropriate, shall provide assistance to the CA in developing the final procedures. Prior to finalization, the A/E shall review and concur with the test procedure.

D. Test Methods:

1. Performance testing and verification may be achieved by manual testing or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by stand-alone data loggers. The CA may substitute specified methods or require an additional method to be executed other than what was specified, with the approval of the A/E. The CA will determine which method is most appropriate for tests that do not have a specified method.
2. Simulated Conditions. Simulating conditions shall be allowed, though timing the testing to experience actual conditions is encouraged wherever practical.
3. Overridden Values. Overriding sensor values to simulate a condition, such as overriding the outside air temperature reading in a control system to be something other than ambient is acceptable.
4. Simulated Signals. Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overridden values.
5. Altering Sensors. Overriding sensor values and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable.
6. Indirect Indicators. Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the test parameters, that the indirect readings through the control system represent actual conditions and responses.
7. Setup. Each functional performance test shall be performed under conditions that simulate actual conditions as closely as is practically possible. The Contractor/Subcontractor(s) assisting the CA in executing the test shall provide all necessary materials, system modifications, etc., to produce the necessary flows, pressures, temperatures, etc., necessary to execute the test according to the specified conditions. At completion of the test, the Contractor/ Subcontractor(s) shall return all affected equipment and systems to their approved operating settings.

- E. Problem Solving: The burden of responsibility to solve, correct, and retest malfunctions/failures is with the Contractor, with the CA providing suggestions.

3.6 DOCUMENTATION, NON-CONFORMANCE, AND APPROVAL OF TESTS

- A. Documentation: The CA shall witness and verify/pre-approve the documentation of the results of all performance tests. The CA shall complete all documentation for performance testing.

B. Non-Conformance:

1. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CA. In such cases the deficiency and resolution will be documented on the procedure form or on an attached sheet. If the correction is made immediately, the item does not need to be added to the issues log.
2. As tests progress and a deficiency is identified, the CA shall discuss the issue with the Commissioning Team and the Contractor.
 - a. When there is no dispute regarding the deficiency and the Contractor accepts responsibility to correct it:
 - 1) The CA will document the deficiency and the Contractor's response and intentions. After the day's work, the CA will enter the item into the issues log. The Contractor corrects the deficiency, signs the statement of correction at the bottom of the non-compliance form certifying that the equipment is ready to be retested and sends it back to the CA.
 - 2) The Contractor shall reschedule the test; and the test is repeated. The issues log is amended by the CA.
 - b. If there is a dispute about a deficiency, regarding whether or not it is a deficiency:
 - 1) The dispute shall be documented on the non-compliance form with the Contractor's response.
 - 2) Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the A/E.
 - 3) The CA documents the resolution process in the issues log.
 - 4) Once the interpretation and resolution have been decided, the contractor corrects the deficiency, signs the statement of correction on the non-compliance form and provides it to the CA. The contractor shall reschedule the test and the test is repeated until satisfactory performance is achieved.
3. Cost for the CA to retest a functional performance test is borne by Contractor's.
4. The Contractor shall submit in writing to the CA at least as often as commissioning meetings are being scheduled, the status of each outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreement and proposed resolutions.
 - a. The CA retains the original non-conformance forms until the end of the project.

- b. Retesting shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.
- C. Failure Due to Manufacturer Defect: If 10% (or three (3), whichever is greater) of identical pieces of equipment fail to perform to the contract documents (mechanically or substantively) due to a manufacturing defect, not allowing it to meet its submitted performance specification, all identical units may be considered unacceptable. In such case, the Contractor shall provide the Owner with the following:
 - 1. Within one (1) week of notification from the Owner, the Contractor or Manufacturer's Representative shall examine all other identical units making a record of the findings. The findings shall be provided to the CA within two (2) weeks of the original notice.
 - 2. Within two (2) weeks of the original notification, the Contractor or Manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc., and all proposed solutions. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
 - 3. The A/E will determine whether a replacement of all identical units or a repair is acceptable.
 - 4. Two (2) examples, where applicable, of the proposed solution shall be installed by the Contractor and the A/E shall be allowed to test the installations for up to one (1) week, upon which the A/E will decide whether to accept the solution.
 - 5. Upon acceptance, the Contractor and/or Manufacturer shall replace or repair all identical items, at their expense. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts or material can be obtained.
- D. Approval: The CA notes each satisfactorily demonstrated function on the test form. Final acceptance of the functional performance test by the Owner is made after review by the CA, following recommendations by the A/E.

3.7 DEFERRED TESTING

- A. Unforeseen Deferred Tests: If any check or test cannot be completed due to the project completion level, weather conditions, or time of season, execution of checklists and functional performance testing may be delayed upon approval of the CA. These tests will be conducted in the same manner as the seasonal tests as soon as possible. Contractors will not be due any additional compensation.
- B. Seasonal Testing: During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design) shall be completed as part of this contract. The CA shall coordinate this activity through the Owner. Tests will be executed, documented by the CA and deficiencies should be corrected by the appropriate Contractor/Subcontractors with the CA witnessing. Any final adjustments to the O&M manuals and as-built's due to the testing shall be made by the Contractor.

3.8 COMMISSIONING RECORD

- A. The CA is responsible to compile, organize and index the following commissioning data, for all commissioned equipment into labeled, indexed and tabbed, three-ring binders and deliver it to the Owner.
 - 1. Commissioning Plan.
 - 2. System reports including available design narratives and criteria including sequences. Each system shall contain the startup plan and report, approvals, corrections, construction checklists, completed performance tests, trending and analysis, training plan and recommended recommissioning schedule.
 - 3. Complete issues log inclusive of all items and resolutions.
 - 4. Final Commissioning Report including an executive summary, list of participants and roles, brief building description, overview of commissioning and testing scope and a general description of testing and verification methods. For each piece of commissioned equipment, the report should contain the disposition of the Commissioning Authority regarding the adequacy of the equipment, documentation and training meeting the contract documents in the following areas:
 - a. Equipment meeting the equipment specifications.
 - b. Equipment installation.
 - c. Performance and efficiency.
 - d. Equipment documentation and design intent.
 - e. Operator training.
 - 5. All outstanding non-compliance items shall be specifically listed. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc. shall also be listed. Each non-compliance issue shall be referenced to the specific performance test, inspection, trend log, etc. where the deficiency is documented. The performance and efficiency section for each piece of equipment shall include a brief description of the verification method used (manual testing, BAS trend logs, data loggers, etc.) and include observations and conclusions from the testing.

END OF SECTION 019113

SECTION 02 8312 – ASBESTOS ABATEMENT1.0 PART 1 - GENERAL1.1 SCOPE OF WORK

- A. The extent of asbestos-containing material (ACM) to be removed and disposed under this project is indicated on the Asbestos Removal Plans and in this Section. The work shall be conducted in accordance with all applicable codes, rules, and regulations including, but not limited to, New York State Industrial Code Rule 56 (Cited as 12 NYCRR Part 56).
1. The abatement work areas are located in the Tiogaa Central School District for the 2025 Capital Project, Phase 1. The Abatement Contractor shall refer to, at a minimum, the Prime Contractors', Construction Manager's and Architect's Renovation Drawings as well as the Hazardous Materials Surveys for a representation of the general layout of the anticipated work areas and the scope of asbestos removal and disposal specified at each work area.
 2. The work consists of the removal and disposal of asbestos containing: Exterior Roof Flashing Systems. Dispose of all removed ACM material and debris as asbestos-contaminated debris in accordance with applicable regulations.
- B. Asbestos analysis results of the ACMs identified for this project are summarized below:

Table 1 – J. W. Leary Junior High School

LOCATION	ACM MATERIAL	APPROXIMATE QUANTITY
Maintenance Building Roof	Perimeter and Penetration Flashing Systems	1,200 Square Feet

Note:

1. The quantities indicated above are estimates. Accordingly, variations ($\pm 20\%$) in quantities of ACM within the limits of containment are to be expected and shall be considered as having no impact on contract price or schedule. *The Abatement Contractor must satisfy themselves as to the quantities and conditions of all asbestos-containing materials required to be removed and disposed and base his contract bid accordingly. All asbestos-containing materials slated for removal shall be removed in their entirety down to a clean substrate. Any and all underlying materials such as underlayment, vapor barriers and other materials and/or debris shall be removed completely and disposed of.*

2. For the purpose of bidding, the abatement contractor shall provide a bid that includes all labor, expenses, fees, insurance, bonding, disposal, overhead and profit to complete the removal and disposal of materials specified herein.
3. Any discrepancies in quantities or locations noted by the contractor in excess of the above percentage must be noted in writing and given to the building owner before materials are removed so quantities can be independently verified.

C. General Conditions

1. The Owner will make necessary arrangements prior to the start of asbestos abatement work to remove uncontaminated moveable objects (i.e., equipment, appliances, desks, chairs, casework, etc.) from proposed work areas, hallways, offices, foyers, and other areas where ACM is scheduled to be removed, as necessary, to provide the Abatement Contractor with sufficient access to specified work areas to construct required critical barriers which adjoin the work areas.
2. The asbestos abatement work shall be conducted by a New York State licensed asbestos abatement contractor in accordance with all applicable codes, rules, and regulations including, but not limited to, New York State Industrial Code Rule 56 that apply to the work. In lieu of strict compliance with Industrial Code Rule 56, the Abatement Contractor may, at his own expense, obtain and use a site-specific variance to conduct the asbestos abatement work. *The site-specific variance shall be prepared by a NYSDOL certified Project Designer and will be subject to prior review and approval by the Owner or designated representative, and provided that the site-specific variance petition process does not delay the start or finish of the asbestos abatement work as scheduled. The approval or denial of any aspect of the site-specific variance shall have no affect on the Contractors bid, pricing, Contract value or other financial concern.*
3. The Abatement Contractor shall employ only New York State Department of Labor (NYSDOL) certified Asbestos Supervisors and Handlers. The Contractor shall provide the appropriate quantity of certified personnel to work as many shifts and as many hours as needed to complete the work within the specified time period as scheduled.
4. The Contract Drawings indicate the extent of the removal and disposal and is to be used as a guideline. *The Abatement Contractor shall field verify to his satisfaction all quantities, locations, and conditions of ACMs to be removed and disposed under this project.* The Abatement Contractor shall review all architectural drawings as to the extent, location and configuration of the abatement work areas. Such as, but not limited to, a detailed representation of the general layout of the site buildings, building access, the extent of asbestos removal specified per work area, and ancillary machinery or equipment (i.e., mechanical, electrical, landscaping, etc.) located within each specific work area.
5. The Abatement Contractor shall conduct or otherwise provide for personal air sampling of abatement personnel employed on the project, including daily 8-hour Time-Weighted Average (TWA) and 30-minute Short Term Excursion Limit (STEL) air sampling, as

required by OSHA 29 CFR Part 1926.1101. *Personnel 8-hr. TWA and 30-min. STEL samples shall be analyzed for asbestos fibers by Phase Contrast Microscopy (PCM) and the results shall be conspicuously posted at the project site within 72-hours of collection.*

6. The Abatement Contractor shall protect architectural finishes, landscaping, and equipment outside the abatement work area and all adjacent non-work areas from damage and, if any damage occurs, the Contractor shall be held liable for all costs related to the repair, restoration, or replacement of the damaged fixtures or structures at no cost to the Owner.

D. Asbestos abatement activities shall include:

1. Removal and disposal of ACM roof flashing systems. Dispose of all removed ACM material and associated debris as asbestos-contaminated debris.
2. Furnish all labor, materials, licenses/permits, facilities, equipment, services, employee training and testing necessary to perform the work required in accordance with these specifications, the latest regulations from the U.S. Environmental Protection Agency (USEPA), the Occupational Safety and Health Administration (OSHA), the State of New York, the recommendations of the National Institute of Occupational Safety and Health (NIOSH), Standard 241 of the National Fire Protection Association (NFPA) and any other applicable federal, state, and local government regulations that apply to this project.
3. The work specified herein shall be performed by competent persons trained, knowledgeable and qualified in state-of-the-art technologies of asbestos abatement, handling, and the subsequent cleaning and disposal of contaminated areas. An accredited asbestos abatement supervisor and OSHA *Competent Person* shall be on-site during all phases of asbestos abatement activities.

1.2 SUBMITTALS

- A. Approval by the Owner is required of the experience of the Abatement Contractor PRIOR TO CONTRACT AWARD and will be based upon submission by Contractor evidence of the following. These items shall be submitted to the Owner with the Bid Documents at the time of bid receipt.
 1. The Contractor shall submit a listing of projects indicating skills and experience with all phases of abatement work as evidenced through participation in at least five asbestos abatement projects of comparable complexity with this project. Include a list of project/location names, project-monitoring firm and phone numbers of references.
 2. The Contractor shall submit a *notarized statement*, signed by an officer or owner of the company, containing the following information:
 - a. A record of any citations, penalties, orders to comply, notices of deficiency, or notices of violations issued by Federal, State, or local regulatory agencies related to asbestos abatement activities. Include projects, dates and resolutions.

- b. A list of penalties incurred through non-compliance with asbestos project specifications including liquidated damages, overruns in scheduled time limitations and resolutions.
- c. Situations in which asbestos related contracts have been terminated including projects, dates and reasons for terminations.
- d. A listing of any asbestos-related legal proceedings/claims in which the Abatement Contractor (or employees scheduled to participate in this project) has participated or are currently involved. Include descriptions of role, issue and resolution to date.

If no such citations, penalties, terminations or legal proceedings apply or exist, Contractor shall provide a written statement to that effect.

- B. Prior to the start of the asbestos abatement work, the Abatement Contractor shall submit the following Pre-Abatement Submittals at least 10 days prior to the pre-construction meeting. The Owner or Owner's representative will review, for approval, the Contractors submittal package prior to the Abatement Contractor commencing asbestos abatement work. *Asbestos abatement work shall not commence until approval of the Pre-Abatement Submittal package has been obtained.*

1. Contractor's NYSDOL Asbestos License.

2. Asbestos Abatement Work Plan:

- a. Submit a detailed plan of the work procedures and materials to be used in the removal and disposal of ACM and asbestos-contaminated debris. The work plan shall include location of control and staging areas, layout of decontamination units, sequencing of asbestos abatement work, electrical supply tie-in locations, negative air pressure filtration system plan, water supply and disposal locations, waste disposal location plan, personal air monitoring program description, and a detailed description of the method to be employed in order to control pollution, including but not limited to emergency procedures for fire and medical emergencies. The plan shall also include the means and methods, including identification of materials to be used to accomplish floor tile mastic removals in accordance with this section. This plan must be accepted by the Owner or their representative prior to the start of any asbestos work.
- b. Submit a negative air pressure filtration system plan, *if applicable to the project*, which includes method of providing air into the work area, the anticipated location of the high efficiency purified air (HEPA) filtration system, anticipated HEPA filtration exhaust location(s), negative air pressure to be maintained in the work area, the method to control this pressure, and provision for maintaining effectiveness of the pre-filters. Provide mathematical equations providing negative air requirement computations for each negative pressure abatement enclosure.

3. Waste Transporter Permit:

- a. Submit a Waste Transporter Permit issued by the New York State Department of Environmental Conservation (NYSDEC) pursuant to 6 NYCRR Part 364 specifically for transporting asbestos waste and debris to an approved treatment, storage, or disposal facility. *The permit shall include the name and location of each treatment, storage, or disposal facility, and a list of vehicles permitted to haul/transport asbestos waste in New York State.*
4. Work Schedule:
 - a. The Abatement Contractor shall submit written notification to the Owner (Building Occupant Notification) of his intent to start work at least 10 days in advance of each phase of work for the Project. *The Contractor shall not start work or post a notification until authorization to proceed is received from the Owner.*
 - b. The Abatement Contractor shall submit a bar-chart schedule, or similar, indicating each significant asbestos abatement phase and associated activity.
 - c. The submitted schedule will be used by the Owner to budget for Project Monitoring and Air Sampling costs. Should the schedule be extended from that submitted and accepted, the Owner reserves the right to back-charge the Abatement Contractor for Project Monitoring, Air Sampling & Analysis costs for those days/samples/expenditures required beyond that which was established for the submitted and accepted schedule.
6. Emergency Telephone Numbers:
 - a. Submit the names and telephone numbers of personnel (i.e., Supervisor, Project Manager, etc.) to contact in the event of an emergency. A representative of the Contractor shall be available at all times during the course of the project.
7. Asbestos Project Notifications. Copies of the following Notifications shall be submitted as applicable to the Project:
 - a. The Abatement Contractor shall submit, *if applicable to the project*, notification to:

U.S. Environmental Protection Agency - Region II
Air & Hazardous Material Division
Room 1011
26 Federal Plaza
New York, New York 10278
 - b. The Abatement Contractor shall submit, *if applicable to the project*, notification to:

NYS Department of Labor
Division of Safety & Health

Asbestos Control Bureau
State Office Building Campus
Building 12 - Room 454
Albany, New York 12240

- c. The Abatement Contractor shall prepare, submit and post a written notification to occupants of the site buildings for the asbestos abatement work, and post such notifications where the work will be performed in accordance with Industrial Code Rule 56.
 - d. The Abatement Contractor shall prepare a written notification to the local fire/rescue department for the asbestos abatement work.
 - 8. Legible copy (front and back) of each asbestos abatement supervisor's Asbestos Handling Certificate anticipated to be working at the project. *An asbestos abatement supervisor shall be on site during all abatement activities.*
 - 9. Legible copy (front and back) of each asbestos abatement project personnel's Asbestos Handling Certificate who is anticipated to be working on the project.
 - 10. Legible copy of each asbestos abatement project personnel anticipated to be working at the project of having been trained in an EPA approved Supervisor or Handler course within the past 12 months (DOSHS 2832).
 - 11. Legible copy of each asbestos abatement project personnel anticipated to be working at the project of having been fit-tested within the past 12 months for using a negative-pressure air purifying respirator equipped with a high efficiency particulate air (HEPA) filter cartridge.
 - 12. Legible copy of each asbestos abatement project personnel anticipated to be working on the project of having been examined by a qualified physician within the past 12 months, being capable of wearing respiratory protection and able to perform asbestos abatement work.
 - 13. The Abatement Contractor shall submit a site-specific variance petition, *if applicable to the project*, prepared by a NYSDOL certified Project Designer, and proof of approval issued by the NYSDOL.
- C. Upon completion of the asbestos abatement work and as a condition of acceptance, the Contractor shall submit the following Post-Abatement (Project Close-out) Submittals:
- 1. All waste manifests and landfill receipts detailing disposal of all asbestos waste generated by the work at the Project.
 - 2. All certified analytical results of all personal air samples collected as required by OSHA to document the 8-hour TWA and 30-minute STEL concentrations of asbestos fibers in the breathing zone of the asbestos abatement project personnel.

3. A legible copy of the Abatement Contractor's project logbook containing the day-to-day record of personnel entering the project site as well as the regulated asbestos work area(s), and any significant events occurring during the project.
4. Personnel Certifications, training certificates, fit tests and medical surveillance records for all personnel working on the project, not previously provided.

1.3 QUALITY ASSURANCE

- A. The Abatement Contractor shall assume full responsibility for compliance with all applicable codes, rules, regulations, and standards pertaining to asbestos work practices, transport and disposal of asbestos waste, and protection of workers, visitors, and public from the work site. The Abatement Contractor shall comply with all aspects of the Asbestos Hazard Emergency Response Act (AHERA) regulations as governed by the USEPA that are applicable to the project.
- B. Except to the extent that more stringent requirements are written directly into the Contract Documents, the following regulations shall have the same force and effect as if copied directly into the Contract Documents, or as if copies were bound herewith:
 1. OSHA 29 CFR Part 1910.134 - Respiratory Protection
 2. OSHA 29 CFR Part 1910.145 - Accident Prevention
 3. OSHA 29 CFR Part 1926.1101 – Asbestos
 4. OSHA 29 CFR Part 1910.1001 – Asbestos
 5. OSHA 29 CFR Part 1926.2 – Variances from Health and Safety Standards
 6. OSHA 29 CFR Part 1910.1200 - Hazard Communication
 7. OSHA 29 CFR 1926.1200 – Confined Spaces in Construction
 8. USEPA 40 CFR Part 61 - Asbestos National Emission Standards Hazardous Air Pollutants
 9. USEPA 40 CFR Part 763 – Asbestos including AHERA
- C. New York State regulations, which govern asbestos abatement, hauling, and disposal of asbestos waste materials include, but are not limited to, the following:
 1. Official Compilation of Codes, Rules and Regulations of the State of New York, cited as 12 NYCRR Part 56.
 2. NYSDOL Article 30 of the New York State Consolidated Laws, Asbestos or Products Containing Asbestos; Licensing, as amended and effective July 16, 1989.
 3. NYSDEC Title 6 Part 364 of the New York State Official Compilation of Codes, Rules and Regulations, cited as 6 NYCRR Part 364.

4. NYSDOH Title 10 of the New York State Official Compilation of Codes, Rules and Regulations, cited as 10 NYCRR Part 73, the Asbestos Safety Program Requirements.
- D. Consult with the local fire/rescue department in the preparation of the Emergency Procedures Plan for fire and medical emergencies. Notify the local fire/rescue department at least seven days prior to the start of abatement work. The Plan should, at a minimum, establish a system for alerting project personnel of fire or other hazards that require escape routes, negative air shut-off locations, development of an assigned meeting place, development of a building floor plan showing work areas and emergency exits, mark arrows on floor and/or walls in the work areas to show all emergency exits, provide an on-site telephone for emergency notification to authorities, provide a person who is trained in First Aid, and chemical fire extinguishers on site for emergencies. In case of emergency due to fire, shut off all negative air machines during the fire.
- E. The Project Monitor is authorized by the Owner to oversee all removal work, interpret all procedures and enforce all provisions of the Contract Documents pertaining to asbestos removal and disposal. The Project Monitor is authorized to stop work if, in their judgment, there is substantial non-compliance with Contract Documents, or there is a situation of serious health risk to workers or occupants due to the performance of work by the Contractor. Such stop work order shall be effective immediately and remain in effect until corrective measures have been taken and the situation has been remedied to the satisfaction of the Owner. *Standby time required to resolve such situations shall be at the Abatement Contractor's own expense.*
- F. Upon completion of asbestos abatement work, the Project Monitor shall submit to the Owner a full report of daily job events.
- G. Negative Air Pressure Filtration System Monitoring shall include the following:
 1. Continuous 24-hour per day monitoring of pressure differential relative to adjacent unsealed areas shall be performed by automatic recording instruments, *if applicable to the project.*
 2. Pressure differential recordings for each day the negative air pressure filtration system shall be reviewed by the Project Monitor, *if applicable to the project.* The Project Monitor shall immediately notify the Abatement Contractor and the Owner of any variance in the pressure differential, which could cause exposure of adjacent unsealed areas to asbestos fiber contamination.

1.4 PRE-BID MEETING

- A. Bidders are encouraged to attend a pre-bid meeting. Refer to Notice to Bidders for the designated time and location of the pre-bid meeting. Attendance at this meeting by the Bidder or their qualified representative will be recorded.
- B. At the time of bid opening, each bidder shall acknowledge that he has investigated and satisfied himself as to:

- 1) Conditions affecting scope of work, including but not limited to, physical condition of the site, handling and storage of tools and materials, access to utilities.
 - 2) Characteristics and quantity of all materials and obstacles encountered in so far as this information is reasonably ascertainable from an inspection of the site.
 - 3) Condition, location and extent of ACM to be removed and disposed. The Owner is not responsible for any conclusions or interpretations made by the Contractor.
- C. The asbestos abatement work shall be conducted by a NYS licensed asbestos abatement contractor employing trained and certified personnel as required by all applicable codes and regulations. After the Contract has been awarded, no subcontracting of the abatement work to another abatement contractor will be permitted.

1.5 PRE-CONSTRUCTION CONFERENCE

- A. Prior to mobilization or the start of any preparatory work under this Contract, the Abatement Contractor shall attend a pre-construction conference attended by Owner or designated representative, Environmental Consultant for the Owner, Project Architect/Engineer and Project Monitor.
- B. Agenda for this conference will include but not necessarily be limited to:
1. Abatement Contractor's scope of work, work plan, schedule and list of required submittals.
 2. Abatement Contractor's safety and health plan, PPE and decontamination procedures.
 3. Project Monitor's air monitoring plan, if applicable to the project.
 4. Abatement Contractor's work procedures including, job site preparation, decontamination chamber set-up, wetting agents, methods of handling removed ACM, disposal procedures; cleanup procedures and equipment; signs and labels; fire exits; and emergency procedures.
 5. Abatement Contractor's plan for 24-hour job security both for prevention of theft and for barring entry of curious, unprotected personnel or the public into work areas.
 6. Location of temporary utilities.
 7. Handling of mechanical, electrical, HVAC systems, and other moveable objects.
- C. Before any site work begins, the Contractor shall conduct a space-by-space inspection with a representative of the building owner, and prepare a written inventory of all existing damage in those spaces, which may be impacted by the contractors work. Document existing condition of the work areas, review overall work plan, water supply and temporary electric tie-in locations

1.6 DELIVERY AND STORAGE

- A. Store all materials at the job site in a suitable and designated area. Store materials subject to deterioration or damage away from wet or damp surfaces and under cover.

- B. Remove damaged or deteriorated materials from the job site. Materials contaminated with asbestos shall be disposed of as asbestos debris as herein specified.

1.7 TEMPORARY UTILITIES

A. Electric:

1. Provide required temporary electric service with Ground Fault Circuit Interrupters (GFCI) for all electric requirements within each asbestos abatement work area. Provide temporary wiring and receptacles in sufficient quantity to serve all negative air units, HEPA vacuums, tools and air monitoring equipment. Obtain electrical power from Owner's existing power distribution system providing: 1) Contractor provides moisture barriers around all electrical conduits and junction boxes that remain energized and pass through work areas and, 2) Contractor shall provide a back-up emergency generator for the duration of the abatement project to be used should failure of the primary power source occur.
2. Provide temporary lighting, *if required*, for all work areas. Lighting shall provide adequate intensity so the Project Monitor can perform daily monitoring procedures and abatement personnel can perform removal activities safely, efficiently and completely.
3. All temporary devices and wiring used in the work area shall be capable of decontamination procedures including HEPA vacuuming and wet-wiping.

B. Water:

1. Provide temporary source of water with separate valves for hot and cold water from Owner's existing system. *In the event of hot water shut off from Owner's system, the Abatement Contractor shall be prepared to provide hot water to meet all regulation requirements.* Hot and cold water service shall be provided to showers in the decontamination units.

1.8 ELECTRICAL CODES, STANDARDS, AND NOTIFICATIONS

- A. Perform all electrical installation and removal work, *if required*, in accordance with applicable requirements of:
 1. National Electrical Code (NEC)
 2. New York State Uniform Fire Prevention and Building Code
 3. NFPA 101, "Life Safety Code".
- B. All electrical devices, materials, and equipment shall meet the requirements of a recognized testing agency, such as the Underwriters' Laboratories, Incorporated, and shall bear its label.
- C. If requested by the Owner, where equipment other than that specified is proposed for use under this Contract, submit a list of installations within New York State where the proposed equipment has operated satisfactorily for a period of at least five years.

D. Notify and obtain permission from the Owner 48 hours in advance of interrupting any utilities.

1.9 DEFINITIONS

A. The following definitions apply throughout the Contract Documents:

1. Aggressive Air Sampling - Air sampling technique whereby air samples are collected while fans are operated in work area, and while floors, walls, and other structural surfaces are swept with constant air movement to entrain any particles that may be present. Aggressive air sampling shall be used at the completion of abatement to obtain clearance air data.
2. Airlock - a system (consisting of three curtained doorways) for permitting ingress or egress without permitting air movement between any two adjacent areas.
3. Air Monitoring - The process of measuring the fiber content of a specific volume of air in a stated period of time. Analysis of air samples shall be by Phase Contrast Microscopy (PLM) in accordance with NIOSH Method 7400, or Transmission Electron Microscopy (TEM) in accordance with EPA methodology.
4. Amended Water - Water to which a surfactant has been added at a ratio according to the manufacturer's directions.
5. Area Air Sampling - Any form of air sampling or monitoring where the sampling device is placed at a stationary location.
6. Asbestos Handler - An individual, who installs, removes, applies, encapsulates, or encloses asbestos or asbestos material or who disturbs friable asbestos.
7. Asbestos Handling Certificate - Certificate issued by the New York State Commissioner of Labor to a person who has satisfactorily completed an approved asbestos safety program.
8. Asbestos Handling License - A license issued by the New York State Commissioner of Labor pursuant to the provisions of Part 56, Title 12, NYCRR to a contractor engaged in the installation, removal, application, enclosure or encapsulation of asbestos or asbestos material or the disturbance of friable asbestos.
9. Asbestos Project - Work undertaken by a Contractor, which involves the installation, removal, encapsulation, enclosure of asbestos or asbestos material, or the disturbance of friable asbestos. At the time that such disturbance occurs, the project shall become an asbestos project and all further work on that portion of the project, which resulted in such disturbance, shall be conducted in accordance with the requirements of this specification. Where asbestos work is subcontracted to a Contractor with an asbestos handling license, only that part of work involving asbestos shall be deemed to be an asbestos project.
10. Asbestos Work Area - A work space as indicated in the contract drawings within which all exposed surfaces, except those covered with asbestos-containing materials being removed, or unless otherwise specified and fixed equipment have been sealed with intact layer(s) of

polyethylene sheeting. Any work resulting in the release of asbestos fibers must be performed in the asbestos work area.

11. Authorized Visitor - A representative of the building owner, or a representative of any regulatory or other agency having jurisdiction over the project.
12. Background Monitoring - Method used to determine airborne asbestos fiber concentrations inside and outside of an abatement work area prior to starting an asbestos project.
13. Building Owner - The person or agency in which legal title to the premises is vested unless the premises are held in a land trust, in which instance Building Owner means the person to whom beneficial title is vested.
14. Equipment Room - A room between the holding room and non-work area, which is part of the equipment/waste decontamination enclosure system. The clean equipment room comprises an airlock and must be maintained in uncontaminated condition at all times.
15. Clean Room - An uncontaminated room, which is part of the worker decontamination enclosures system, with provisions for storage of workers' street clothes and protective equipment.
16. Critical Barrier - A unit of temporary construction, which provides separation of an asbestos work area and an adjacent, potentially occupied space. The critical barrier will be composed of at least two independent and intact sheets of 6-mil fire-retardant polyethylene. All seams shall be sealed airtight. Where applicable, barriers shall be framed and sheathed as described by NYS ICR-56.
17. Curtained Doorway - A device, which is constructed, of three overlapping sheets of fire retardant 6-mil polyethylene sheeting over an existing or temporarily framed doorway.
18. Differential Air Pressure System - A portable, powered HEPA-filtered system used to exhaust air from the work area to outside the building. A differential pressure must be maintained at any point in the work areas no less than -0.025 inches water gauge relative to the pressure at any point outside the work area.
19. Encapsulant - A liquid material which can be applied to asbestos-containing material and which controls the release of asbestos fibers from the material by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant).
20. Encapsulation - all herein specified procedures necessary to coat asbestos-containing material or asbestos contaminated surfaces with an encapsulant to control the possible release of asbestos fibers into the ambient air.
21. Enclosure - The construction of airtight walls, ceiling and floors between the asbestos material and the facility environment, or around surfaces coated with asbestos materials, which prevents the release of asbestos materials.
22. Environmental Consultant – A technical representative of/for the Building Owner.

23. Equipment/Waste Decontamination Enclosure System - A decontamination system for materials and equipment consisting of a designated area of the work area for a washroom, and holding room separated from the work area and from each other by two airlocks.
24. Equipment Room - A room, which is part of the personal decontamination enclosure system, with, provisions for storage of contaminated clothing or equipment. The equipment room shall be HEPA vacuumed and/or wet cleaned at the end of each shift.
25. Final Clearance Level - Air samples for analysis using PCM and/or TEM collected under aggressive sampling conditions. The airborne asbestos level will be considered acceptable upon meeting the criteria specified.
26. Glove Bag Technique - A method for removing asbestos material from heating, ventilating, and air conditioning ducts, piping runs, valves, joints, elbows, and other non-planar surfaces in a non-contained work area. The glove bag assembly is a manufactured device consisting of a glove bag construction of at least 6-mil transparent plastic, two inward-projecting long sleeve gloves, which may contain an inward-projecting water-wand sleeve, internal tool pouch, and an attached, labeled receptacle or portion for asbestos waste. The glove bag is constructed and installed in such a manner that it surrounds the area to be contaminated and to contain all asbestos fibers released during the abatement process.
27. Grade D Air - Breathing air which has between 19.5% - 23% oxygen, no more than 5 mg/m³ of condensed hydrocarbons, no more than 20 ppm of carbon monoxide, no pronounced odor, and a maximum of 1000 ppm carbon dioxide.
28. Ground Fault Circuit Interrupter - A circuit breaker that is sensitive to very low levels of current leakage from a fault in an electrical system.
29. HEPA Filter - A high efficiency particulate air (HEPA) filter, which has a tested and documented efficiency for trapping and retaining a minimum of 99.97% of a 0.3-micrometer (aerodynamic diameter) dioctylphthalate (DOP) test aerosol.
30. HEPA Vacuum Equipment - vacuuming equipment with a HEPA filtration system capable of collecting and retaining asbestos fibers.
31. Holding Room - A room between the washroom and a non-contaminated work area.
32. Large Asbestos Project - An asbestos project involving the installation, removal, disturbance, enclosure, or encapsulation of 160 square feet or more of asbestos or asbestos material or 260 linear feet or more of asbestos or asbestos material as defined by the New York State Industrial Code Rule 56.
33. Minor Asbestos Project - An asbestos project involving the installation, removal, disturbance, repair, encapsulation or enclosure of 10 square feet or less of asbestos material or 25 linear feet or less of asbestos or asbestos material.

34. Negative Pressure - An atmosphere created in a work area enclosure such that airborne fibers tend to be drawn through a filtration system rather than leak out into the surrounding areas. Air pressure inside the work area is less than that outside the work area.
35. Personal Air Monitoring - A method used to determine an individual's exposure to airborne fibers. The sample is collected outside the respirator in the person's breathing zone and analyzed in accordance with the OSHA reference method.
36. Personal Decontamination Enclosure System - A decontamination system for workers consisting of a clean room, a shower room, an equipment room, separated from each other and from the work area by three air locks.
37. Plasticize - To cover floors, walls, ceilings and other surfaces with fire retardant 6-mil polyethylene sheeting as herein specified.
38. Pre-cleaning - The process of cleaning all non-contaminated objects, ceilings, wall and floors of a proposed work area using wet cleaning methods, HEPA vacuuming equipment, etc., before abatement work commences.
39. PCM-Clearance Level - A maximum total fiber concentration achieved under aggressive sampling conditions deemed acceptable in a work area at the completion of asbestos-related work. The PCM-clearance level criteria of less than 0.01 total fibers longer than or equal to 5 micrometers per cubic centimeter of air (f/cc) is required as determined by PCM in accordance with NIOSH Method 7400.
40. Shower Room - A room between the clean room and the equipment room in the worker decontamination enclosure system equipped with a shower with hot and cold or warm running water. The shower will be suitably arranged for complete showering during decontamination with a sufficient supply of soap at all times.
41. Small Asbestos Project - A project involving the installation, removal, disturbance, enclosure, or encapsulation of more than 10 and less than 160 square feet of asbestos or asbestos material or more than 25 and less than 260 linear feet of asbestos material.
42. Surfactant - Water used for wetting asbestos-containing materials and for wet wiping asbestos-contaminated material/debris during cleanup operations shall be amended with a commercially available wetting agent (surfactant) per the manufacturer's instructions. The surfactant used shall be non-carcinogenic and non-toxic under normal use.
43. Washroom - A room between the work area and holding area in the equipment/waste decontamination enclosure system. The washroom is separated from the work area and holding area by two air locks.
44. Wet Cleaning - The process of eliminating asbestos and particulate contamination from building surfaces and objects by using cloths, mops, or other cleaning tools, which have

been dampened with amended water, and by afterwards disposing of these cleaning tools as asbestos-contaminated waste.

45. Work Area - Designated room, space, or area of the project in which asbestos abatement actions are to be undertaken or which may become contaminated as a result of such abatement actions. A contained work area is a work area, which has been sealed, plasticized, and equipped with a decontamination enclosure system. A non-contained work area is an isolated or controlled-access work area which has not been plasticized nor equipped with a decontamination enclosure system.

1.10 AIR MONITORING

- A. Air monitoring, where applicable to the project, shall be completed by a NYSDOL licensed & certified Project Monitor and Air Sampling Technician retained by the Owner. The Air Monitoring Firm shall have a minimum of 5-years experience as a N.Y. State Department of Labor licensed firm and shall not be permitted to utilize subcontractors with less than 5 years experience as a N.Y. State Department of Labor licensed firm to conduct the work or work under a subcontractor's license.
- B. The air monitoring firm will collect air samples (i.e., background, work area preparation, asbestos handling, final cleaning & clearance) in accordance with Industrial Code Rule 56. Samples shall be analyzed using PCM methodology and/or TEM methodology, if required, by a New York State Department of Health accredited laboratory.
- C. When final visual inspections and/or clearance air monitoring is required, the Abatement Contractor shall notify the Air Monitoring Firm 48 hours, excluding weekends and holidays, in advance of the day and time when the Contractor will be ready for such visual inspections or air monitoring events to be performed.
- D. Air monitoring results generated by the air-monitoring firm shall not be used by the Contractor to represent compliance with regulatory agency requirements for monitoring of worker's exposure to airborne asbestos, nor shall any other activity on the part of the Air Monitoring Firm represent the Contractor's compliance with applicable health and safety regulations.

1.11 ENVIRONMENTAL CONSULTANT

- A. An Environmental Consultant will be employed to advise the Owner in matters pertaining to the progress and/or completion status of the abatement procedures and will act as the Building Owner's liaison in technical matters involving the asbestos-related work.
- B. The Environmental Consultant is authorized by the Owner to have unlimited access to all asbestos work areas while conducting visual inspections or other requirements of his duty.
- C. The Environmental Consultant may stop the Abatement Contractors work if in the course of performing their inspection duties, they observe an instance of substantial non-conformance with the contract documents and/or a situation presenting a health hazard to workers or Building Owner employees. Work shall not resume until corrective measures have been carried out.

- D. Any stop work orders issued by the owner or the Environmental Consultant pursuant to the above provisions will not be grounds for claims to be made by the Contractor for damages caused by the associated delay nor will it extend the contract completion date.
- E. When visual inspections are specified, the Contractor shall notify the Environmental Consultant 48 hours, excluding weekends and holidays, in advance of the day and time when the Contractor will be ready for such inspections. The Contractor's supervisor must conduct a thorough inspection of work area prior to requesting review by the Environmental Consultant.
- F. The Environmental Consultant's role in advising the Building Owner does not relieve the Contractor's obligation to comply with all applicable health and safety regulations promulgated by the federal, state, and local governments.

1.12 LICENSING AND CERTIFICATION – NYS DEPARTMENT OF LABOR REQUIREMENTS

- A. The Abatement Contractor must hold a current, valid asbestos-handling license issued by the New York State Commissioner of Labor.
- B. A copy of the Abatement Contractor's license shall be conspicuously displayed proximate to but outside the work area during the duration of the project.
- C. The Abatement Contractor shall permit only those persons who hold valid asbestos handling certificates to engage in work on this project.

2.0 PART 2 - PRODUCTS

2.1 RESPIRATORS

- A. Select respirators from those approved by Mine Safety and Health Administration (MSHA) or National Institute for Occupational Safety & Health (NIOSH) as required by 29 CFR 1926.1101. Abatement contractor shall comply with section 3.2 of this specification and shall produce historical data representative of employee exposure, and shall use historical data to determine requirements for initial respiratory protection. Provide replacement HEPA cartridges to assure a change of filters at each decontamination shower procedure. Single use, disposable-type respirators shall not be used.
- B. Whenever type "C" respirator protection is used, compressed air systems shall be designed to provide air volumes and pressures to accommodate respirator manufacturer's specifications. Compressors must meet the requirements of 29 CFR 1910.134(d) and must have an in-line carbon monoxide monitor equipped with an audible alarm.
- C. Whenever powered purifying respirator protection is used, a sufficient supply of replacement batteries and HEPA filter cartridges shall be provided to the workers.
- D. During encapsulation operations or use of organic based aerosols, if required, the Contractor shall provide workers with type GMB-H combination cartridges or equivalent respirator filters.

2.2 PROTECTIVE CLOTHING

- A. The Abatement Contractor shall provide a sufficient quantity of protective clothing to all authorized persons entering regulated work areas until the work has been completed.
- B. The Contractor shall provide fire retardant disposable whole body clothing, head coverings, gloves and foot coverings. Provide sufficient quantities to assure a minimum of four complete disposable outfits per day for each individual performing abatement related work, and sufficient supply for Project Monitor, Air Sampling Technician and any Authorized Visitors.
- C. Disposable protective clothing shall be opaque, and of material appropriate for the work, climate conditions and sufficient to withstand the rigors of the work of the Contract. Transparent protective clothing will not be permitted.

2.3 TOOLS AND EQUIPMENT

- A. Store materials subject to damage off the ground, away from wet or damp surfaces, and under cover to prevent damage or contamination. Materials not capable of being decontaminated shall be disposed of in accordance with applicable regulations.
- B. Provide suitable tools for removal of asbestos-containing materials. Damaged materials shall not be used and shall be removed from the work site. Wire brushes and pressure washers shall not be used as a means of removing or cleaning asbestos-containing materials.
- C. Airless sprayers capable of spraying amended water shall be provided in sufficient number to allow continuous uninterrupted work.
- D. Transportation equipment, as required, shall be suitable for loading, temporary storage, and unloading of contaminated waste without exposure to persons or property, and shall be quiet in motion if used within the building.
- E. Power tools used to drill, cut, saw or otherwise disturb asbestos material shall be equipped with HEPA filtered local exhaust ventilation.
- F. The Contractor shall make available to authorized visitors, ladders and/or scaffolds of sufficient dimension and quantity so that all work areas can be easily and safely reached. Scaffolds and ladders shall comply with all applicable codes.

2.4 PERSONAL DECONTAMINATION SYSTEM ENCLOSURE

- A. Personal decontamination enclosures shall be constructed and functional prior to commencing regulated abatement work area preparation activities. After installation of the personal decontamination system enclosure, all access to the regulated abatement work area shall be via the installed personal decontamination system enclosure.
- B. Attached - Large Project

1. General: A personal decontamination system enclosure shall be provided outside the regulated abatement work area and attached to all locations where personnel shall enter or exit the regulated abatement work area. *One personal decontamination enclosure system for each regulated abatement work area shall be required.* The personal decontamination system enclosure shall be sized to accommodate the number of workers and equipment required for the intended purpose. At least one layer of six-mil fire-retardant plastic sheeting shall be installed on the ceiling, and walls of the enclosure system. At least two layers of six-mil fire-retardant reinforced plastic sheeting shall be used for flooring protection of this area. This system must be kept clean, sanitary and climate controlled at all times. This system shall remain on-site, operational and be used until completion of the asbestos project.
2. Rooms and Configuration: The personal decontamination system enclosure shall consist of a clean room, a shower room and an equipment room connected in series but separated from each other by airlocks. There shall be a curtained doorway separation between the equipment room and the regulated abatement work area, and there shall be a lockable door to the outside.
3. Curtained Doorway: An assembly which consists of at least three overlapping sheets of six-mil fire retardant plastic over an existing or temporarily framed doorway. One sheet shall be secured at the top left side, the second sheet at the top right side, and the third sheet at the top left side. All sheets shall have weights attached to the bottom.
4. Framing: Enclosures systems accessible to the public shall be fully framed; hard-wall sheathed, such as plywood or oriented strand board (OSB) sheathing material of at least 3/8-inch thickness.
5. Plastic Sheeting: Enclosure systems constructed at the work site shall use at least one layer of six-mil fire-retardant plastic sheeting on walls and ceiling. At least two layers of six-mil fire-retardant reinforced plastic sheeting shall be used for floor protection.
6. Prefabricated or Trailer Units: A completely watertight prefabricated unit does not require plasticizing. All prefabricated or trailer decontamination units shall be kept in good condition, and shall be decontaminated after final cleaning and immediately prior to clearance air sampling. Upon receiving satisfactory clearance air results of the regulated abatement work area, the prefabricated units shall be sealed then separated from the regulated abatement work area.
7. Clean Room: The clean room shall be sized to accommodate a full work shift of asbestos abatement personnel, as well as the project monitor. The clean room shall be a minimum of six feet in height. A minimum of thirty-two square feet of floor space shall be provided for every six full shift abatement workers. If the largest work shift consists of three or less full shift abatement workers, the minimum clean room size requirement is reduced to twenty-four (24) square feet of floor space. Benches, lockers and hooks shall be provided for street clothes. Shelves for storing respirators shall be provided. *The clean room shall not be used for storage of tools, equipment or used for office space.* A

lockable door shall be provided to permit access to the clean room from outside the regulated abatement work area or enclosure and shall be used to secure the regulated abatement work area and decontamination enclosure during non-work hours.

8. Shower Room: The shower room shall contain one shower per every six full shift abatement worker, calculated on the basis of the largest work shift. Multiple showers shall be simultaneously accessible (installed in parallel) to certified personnel. Each showerhead shall be supplied with hot and cold water adjustable at the tap. The shower enclosure shall be constructed to ensure against leakage of any kind. Uncontaminated soap, shampoo and towels shall be available at all times. Shower water shall be drained, collected and filtered through a system with at least 5.0-micron particle size collection capability. Filtered wastewater shall be discharged in accordance with applicable codes. Contaminated filters shall be disposed of as asbestos contaminated waste.
9. Equipment Room: The equipment room shall be used for the storage of decontaminated equipment and tools. A one day supply of replacement filters for HEPA-vacuums and negative pressure ventilation equipment in sealed containers, and other materials that may be required during the abatement project may also be stored here. A container lined with a labeled, at least six-mil plastic bag for collection of clothing shall be located in this room. Contaminated footwear and work clothes shall be stored in this area.
10. Airlocks: Airlock construction shall consist of two curtained doorways with three alternating six-mil fire retardant polyethylene curtains per doorway, separated by a distance of at least three feet, such that one passes through one doorway into the airlock, allowing the doorway sheeting to overlap and close off the opening before proceeding through the next doorway.

C. Attached - Small Project

1. General: A personal decontamination system enclosure for a Small asbestos project shall consist of, at a minimum, an equipment room, a shower room and a clean room separated from each other and from the regulated abatement work area and other areas by curtained doorways as defined in Section 56-2.1. All other provisions for personal decontamination system for a Large asbestos project shall apply. Equipment storage, personal gross decontamination and removal of clothing shall occur in the equipment room just prior to entering the shower.

D. Remote

1. General: If a personal decontamination system cannot be attached to the regulated abatement work area, due to available space restrictions or other building and fire code restrictions, a remote personal decontamination system enclosure may be used for limited Special Projects as per subpart 56-11. If during abatement activities, non-friable ACM becomes friable during the removal process, and it is logistically possible to attach the decontamination system enclosure, abatement work must stop immediately while the

remote personal decontamination system is relocated to be attached and contiguous to the regulated abatement work area.

2. Protective Clothing: Workers shall don two (2) sets of disposable protective clothing. A supply of protective clothing shall be kept in the airlocks attached to the regulated abatement work area.
3. Location: The remote personal decontamination system shall be constructed as close to the regulated abatement work area as physically possible. If the remote personal decontamination system must be located at the exterior of the building due to space or code restrictions, it shall be constructed within fifty feet of the building exit used for access by the asbestos abatement personnel. The decontamination unit shall be cordoned off at a distance of twenty-five feet to separate it from public areas/access.
4. Airlocks: At a minimum, two extra airlocks as defined in Section 56-2.1 shall be constructed. One shall be constructed at the entrance to the equipment room or equipment/washroom. The other extra airlock shall be constructed at the entrance to the containment or regulated abatement work area(s). These airlocks shall have lockable doorways at the entrance to the airlock from uncontaminated areas. These airlocks shall be cordoned off at a distance of twenty-five feet and appropriately signed in accordance with Section 56-7.4(c). *Airlocks shall not be used as a waste decontamination area and shall be kept clean and free of asbestos containing material.*
5. Designated Pathway: The walkway from the regulated abatement work area to the personal decontamination system or next regulated abatement work area shall be cordoned off and signage installed as per Section 56-7.4(c).
6. Travel Through Uncontaminated Areas: If at any time a worker must travel through an uncontaminated area to access the personal decontamination area, the worker shall HEPA-vacuum and/or wet wipe his/her outer protective clothing while in the regulated abatement work area, then proceed into the airlock, which serves as a changing area, where he/she shall remove the outer clothing and don a clean set of protective clothing. The worker may then proceed to the personal decontamination system enclosure only along a designated pathway as described above.
7. Removal: The remote personal decontamination unit shall be removed only after satisfactory clearance air sampling results have been achieved.

2.5 WASTE DECONTAMINATION SYSTEM ENCLOSURE

- A. General: A waste decontamination system enclosure shall be provided outside the regulated abatement work area and shall be attached to the regulated abatement work area. *One waste decontamination enclosure for each regulated abatement work area shall be required.* The waste decontamination system enclosure shall be sized to accommodate the number of workers and equipment for the intended purpose. Such system may consist of existing attached rooms outside of the regulated abatement work area, if the layout is appropriate, that can be plasticized and are

accessible from the regulated abatement work area. This system must be kept clean, sanitary and climate controlled at all times.

B. Waste Decontamination System Enclosure - Large Asbestos Project

1. Rooms and Configuration: A waste decontamination system enclosure shall consist of a washroom and a holding area connected in series but separated from each other by an airlock. There shall be a lockable door to the outside, and there shall be a curtained doorway between the washroom and the regulated abatement work area.
2. Curtained Doorway: One sheet shall be secured at the top left side, the second sheet at the top right side, and the third sheet at the top left side. All sheets shall have weights attached to the bottom.
3. Washroom: A room/chamber between the regulated abatement work area and the holding area in the waste decontamination system enclosure, where equipment and waste containers are wet cleaned or HEPA vacuumed.
4. Equipment/Washroom Alternative: Where there is only one exit from the regulated abatement work area, the holding area of the waste decontamination system enclosure may branch off from the equipment room of the personal decontamination system enclosure. The equipment room will also be used as a waste washroom.
5. Plastic Sheeting: Waste decontamination system enclosures constructed at the work site shall use at least one layer of six-mil fire-retardant plastic sheeting on walls and ceiling. At least two layers of six-mil fire-retardant reinforced plastic sheeting shall be used for flooring protection of these areas.
6. Enclosure Security: The waste decontamination system enclosure and regulated abatement work area airlock(s) shall be constructed with lockable doors to prevent unauthorized entry. Enclosures systems located within twenty-five feet of an area of public access shall be fully framed and hard-wall sheathed for safety.
7. Drains: The waste washroom shall be equipped with a wash bin of sufficient size to perform waste container washing operations and shall have a submersible pump installed to collect waste water and deliver it to the shower wastewater filtration system where it shall be filtered in accordance with 56-7 (b)(9).

C. Waste Decontamination System Enclosure - Small Asbestos Project

1. For Small asbestos projects with only one exit from the regulated abatement work area, the shower room may be used as a waste washroom. The clean room shall not be used for waste storage, but shall be used for waste transfer to carts, which shall be immediately removed from the enclosure. Waste shall be transferred only during times when the showers are not in use.

- D. Waste Decontamination System Enclosure – With Remote Personal: When a remote personal decontamination system enclosure is allowed and utilized for a regulated abatement work area, the following requirements shall apply:
1. Minor Size Asbestos Project: No specific waste decontamination system enclosure is required for minor size regulated abatement work areas. The waste generated shall be immediately bagged or containerized within the regulated abatement work area.
 2. Small & Large Size Asbestos Project
 - (i) Washroom: An additional chamber shall be constructed within the regulated abatement work area, attached to the existing airlock used to access the work area. The washroom/airlock combination shall be utilized as the contiguous waste decontamination enclosure for waste bagging and transfer activities.
 - (ii) Removal: The washroom chamber shall be removed only after satisfactory clearance air sampling results have been achieved.

2.6 SIGNAGE AND LABELS

- A. Provide (bilingual) caution signs and barrier tapes at all approaches to regulated work areas. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide caution signs in vertical format conforming to 29 CFR 1910.145(d) (4), and 1926.1101, minimum 20" x 14" displaying the following:
- DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY
- B. Provide asbestos caution labels affixed to all disposable 6-mil plastic bags, drums or containers for waste containerization, asbestos scrap, waste, debris, and other products/materials contaminated with asbestos displaying the following:
- DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD
- C. The Abatement Contractor shall provide a daily entry/exit log, which shall be posted at the entrance to each regulated work area. All persons entering a regulated work area shall sign the entry/exit log upon every entry/exit. All persons, before entering a regulated work area, shall read and be familiar with all posted regulations and personal protection requirements. A copy

of a valid asbestos-handling license of the Abatement Contractor and all abatement personnel who are performing the work shall be conspicuously displayed at the work site.

2.7 TEMPORARY ENCLOSURES (CRITICAL BARRIERS)

- A. The framework and associated plywood sheeting (or similar) of the temporary enclosures shall be provided by the Abatement Contractor. The Contractor shall use these enclosures to completely isolate the asbestos work area from other non-work/unsealed parts of the building so as to prevent asbestos-containing dust or debris from passing beyond the isolated area.
- B. Enclosures and/or critical barriers shall consist of double layer minimum 6-mil fire retardant polyethylene sheeting for wall, floor and ceiling surfaces and reinforced 6-mil fire retardant polyethylene sheeting for application to temporary framing. Vertical sheeting shall be secured to walls and/or temporary framing with spray adhesive then sealed with duct tape. Provide sheeting of up to 20' widths for floor and wall surfaces to minimize the number of joints. Smoke test all sealed openings for airflow.
- C. Critical barriers shall be constructed by the Abatement Contractor at the interior side of all work areas and/or other required work areas such as but not limited to, classrooms, hallways, entrance/exit ways, and other rooms which adjoin specified work areas, and openings at windows, vents, ducts, near specified work areas in accordance with Industrial Code Rule 56.
- D. Access to enclosure shall be through the decontamination chamber only.
- E. Emergency fire exits shall be framed out and taped, and posted as emergency exits only. Use of emergency exits for other than fire emergencies shall constitute non-compliance with the Contract Documents resulting in a stop work order by the Project Monitor.

2.8 NEGATIVE AIR PRESSURE FILTRATION SYSTEM

- A. Negative Air Pressure Equipment: All OSHA Class I, Class III, and interior Class II asbestos abatement projects shall employ negative air pressure equipment ventilation.
 - 1. Operation: The negative air pressure equipment shall operate continuously from startup of negative pressure equipment until satisfactory clearance air sampling results are obtained.
 - 2. Timing of Installation: The negative air ventilation units shall be installed and made operational after the critical barriers and isolation barriers are installed.
 - 3. Negative Air Pressure: A negative air pressure, relative to areas outside of the enclosure, shall be maintained at all times in the regulated abatement work area to ensure that contaminated air does not escape back to an uncontaminated area.
 - 4. Manometer: A manometer shall be used to document the pressure differential for all OSHA Class I Large and Small size asbestos projects. A minimum of -0.02 column inches of water pressure differential, relative to pressure outside the regulated work area, shall be maintained within the regulated work area, as evidenced by manometric

measurements. The manometer shall be installed and made operational once the negative air has been established in the regulated abatement work area. *Once installed, at least twice per workshift, the Abatement Contractor shall document the manometer reading within the daily project log.*

5. Ventilation Units: If more than one primary HEPA-filtered ventilation unit is installed, the units shall be turned on one at a time and the integrity of temporary hardwall isolation barriers checked for secure attachment. A minimum of one additional unit having a capacity of at least equal to that of the primary unit shall be installed, as a backup unit to be used upon primary unit failure, or if necessary during primary unit filter changes. *Ventilation exhaust ducting shall not exceed twenty-five (25) feet in length.*
6. Power Failure: In the event of electric power supply failure, abatement shall stop immediately and not resume until power is restored and exhaust units are operational. In the event of extended power failure (longer than one hour), the decontamination system enclosure facilities shall be sealed airtight.
7. Air Changes: Negative air pressure ventilation equipment shall be installed and operated continuously to provide at least four air changes in the regulated abatement work area every hour including during clearance air sampling.
8. Openings in Enclosure: Openings made in the enclosure system to accommodate these units shall be made airtight with duct tape or caulking or both.
10. Installation and Care: Proper installation procedures, including use of appropriate filters and manufacturer's recommended operating procedures shall be followed as stated in Industrial Code Rule 56-7(10)(i-viii).
11. Exhaust Location: Each negative pressure ventilation unit exhaust duct shall not terminate less than fifteen feet from a receptor or adversely affect the air intake of any building or structure. If the exhaust duct termination location for this Section cannot be met due to allowable space restrictions or the regulated abatement work area being located above the ground floor, the exhaust shall terminate at the exterior of the building, and all receptors less than fifteen feet from the exterior exhaust duct termination location shall be plasticized with two layers of at least six-mil polyethylene. Exhaust tubes may be grouped together in banks of no more than five tubes, with each tube exhausting separately and the bank of tubes terminating together at the same controlled area.

2.9 ABATEMENT CONTRACTOR DAILY PROJECT LOG

- A. The Abatement Contractor shall maintain a daily project log of all pertinent events that occur throughout the asbestos project. This project log shall be updated daily by the on-site supervisor, and shall be kept on-site for the duration of the asbestos project. This log shall be made available upon verbal request of the Commissioner or his or her duly authorized representative.

- B. The following list summarizes various items that require entries into the daily project log by the asbestos abatement contractor supervisor:
1. High air result(s) shall be noted with the time of work cessation, results of barrier and negative air system inspection, summary of any necessary repairs and required cleaning.
 2. Manometer Readings which are to be documented twice per work shift.
 3. Daily inspection results of the negative air system (*even days without work shifts*) and any necessary repairs to be documented.
 4. Daily inspection results of HVAC System Positive Pressurization (*even days without work shifts*) and any necessary repairs to be documented.
 5. Daily inspection results of barrier inspections (*even days without work shifts*) and any necessary repairs to be documented. Inspections shall be conducted twice per work shift on days with scheduled work.
 6. Daily testing results of barriers and enclosures and any necessary repairs shall be documented.
 7. Documented daily cleaning of enclosures at the end of each work shift.
 8. Results of each visual inspection and time of each intermediate completion shall be documented by the supervisor in the daily project log.
 9. Visual inspections conducted by Project Monitor prior to Clearance Air Sampling.
 10. Visual inspection conducted by Project Monitor for regulated abatement work areas exempt from Clearance Air Sampling.
 11. Final Inspection, air sampling or visual, conducted by Project Monitor.

2.10 SCAFFOLDING

- A. Provide scaffolding, if required, and/or staging as necessary to accomplish the work. The type, erection and use of scaffolding shall comply with all applicable OSHA provisions.
- B. Scaffolding legs shall be provided with lockable rubber casters or equal means to protect plastic floor covering from damage. Scaffold joints and ends shall be sealed to prevent incursion of asbestos debris.

2.11 WETTING AGENT

- A. Sufficiently wet all ACMs prior to removal with a non-toxic, non-combustible chemical agent mixed and applied in accordance with manufacturer's printed instructions. Chlorinated removal agents shall not be used at this Project.

2.12 ENCAPSULANT

- A. After first cleaning and prior to first sheeting removal, and after the work area has been rendered free of visible residues, a thin coat of an encapsulating agent may be applied to surfaces in the work area that were not the subject of removal.
- B. Surfaces indicated on the Contract Drawings to be "encapsulated", *if any*, shall be sealed with a bridging encapsulant. The encapsulant shall be applied at an application rate recommended by the product manufacturer and in accordance with Industrial Code Rule 56. The bridging type encapsulant with the following characteristics:
 - 1. Shall not be solvent-based or utilize hydrocarbons in the liquid in which the solid parts of the encapsulant are suspended and be compatible with the anticipated replacement product.
 - 2. Shall be non-flammable, compatible with concrete, metals, wood, cable jacketing, etc. and shall prevent fire, smoke, water and toxic fumes from penetrating through sealants.
- C. Encapsulant shall be applied only after all specified asbestos materials have been removed and work area cleaned of all loose debris.
- D. Where encapsulation is used to supplement removal of ACM pipe/pipefitting, a non-hardening lagging sealer shall be used for sealing all raw exposed edges and surfaces.

2.13 DISPOSAL BAGS, DRUMS, AND PLASTIC SHEETING

- A. Provide, at a minimum, 6-mil polyethylene bags pre-printed with caution labels for asbestos debris. Provide, at minimum, 6-mil polyethylene plastic sheeting, affix asbestos caution labels accordingly. Provide clean 30 or 55-gallon fiber, plastic or metal drums capable of being sealed water tight for asbestos waste and debris. Affix asbestos caution labels accordingly.

2.14 HEPA VACUUM EQUIPMENT

- A. Vacuuming performed under this Contract shall be performed with HEPA filter equipped industrial vacuums conforming to ANSI Z9.2. Wet-Vac units, when utilized, shall be exhausted to the manifold of the Negative Air Filtration Unit
- B. Provide tools and specialized equipment including scraping nozzles with integral vacuum hoods connected to a HEPA vacuum with flexible hose. Power tools used to drill, cut, or otherwise disturb ACM shall be equipped with HEPA filtered local exhaust ventilation.

3.1 PART 3 - EXECUTION

3.2 GENERAL REQUIREMENTS

- A. Perform asbestos related work in accordance with 29 CFR 1926.1101, 40 CFR 61 and, 12 NYCRR 56 and as specified herein. Where more stringent requirements are specified, adhere to the more stringent requirements.
- B. During the progress of the work, other contractors may be engaged in performing work. The Abatement Contractor shall coordinate his work with the work of other contractors in such a manner as the Owner or his Construction Manager may direct.
- C. The Abatement Contractor shall complete all asbestos work within the accepted schedule, and shall provide staffing as necessary to complete the scope of work awarded by the Owner. This shall include working multiple shifts Monday through Friday, Saturday, and Sunday, if necessary. The Abatement Contractor's bid shall be inclusive of these costs.
- D. In the event an area beyond the asbestos work area becomes contaminated with asbestos-containing dust or debris as a consequence of the work, immediately institute emergency procedures. The Contractor shall notify the Project Monitor immediately. A Contamination Assessment may be performed to assess the extent of contamination. Contaminated non-work areas shall be isolated and decontaminated in accordance with procedures established for asbestos removal, and/or as established through performance of a Contamination Assessment. *All costs incurred in decontaminating such non-work areas and the contents thereof shall be the responsibility of the Abatement Contractor, at no additional cost to the Building Owner.*
- E. In the event of electric power failure while abatement is in process, abatement activities shall stop immediately and shall not resume until power is restored and exhaust units are fully operational. On extended power failure, longer than one hour, the decontamination facilities, after the evacuation of all abatement personal from the work area, shall be sealed airtight.
- F. Prior to start of abatement work, shut down and lock out the building's heating, ventilating and air conditioning system, *if applicable to the project*, to the regulated asbestos work areas.
- G. Water services will be made available by the building owner. The Abatement Contractor shall secure and maintain all hoses and connections in a leak-free state at all times.
- H. Perform asbestos removal work using wet removal procedures. Avoid excessive water use as to not cause water damage (saturation of) interior building components (i.e., plaster or gypsum wallboard, ceiling system, flooring, electrical circuitry, etc.). Mix and apply surfactant and chemical agents in accordance with manufacturer's instructions. *Dry removal of asbestos-containing materials is not permitted.*

3.2 EXPOSURE ASSESSMENT MONITORING

- A. The Abatement Contractor shall perform exposure assessment air monitoring as required by OSHA 29 CFR Part 1926.1101 to determine the airborne concentrations of asbestos to which workers may be exposed. Exposure shall be made from air samples that are representative of an 8-hour TWA exposure and a 30-minute Excursion Limit (EL) exposure to workers.

- B. Representative TWA worker exposures shall be determined on the basis of one or more samples representing full-shift exposure for workers in each regulated work area. Representative short-term worker exposures shall be determined on the basis of one or more samples representing 30-minute exposures associated with operations that are most likely to produce exposures above the EL for workers in each regulated work area.
- C. For any one specific operation, which will be performed by certified workers, the Abatement Contractor may demonstrate that worker exposures will be below the PELs by data, which conform to the following criteria:
 - 1. Objective data demonstrating that the material containing asbestos or the activity involving such product or material cannot release airborne fibers in concentrations exceeding the TWA and EL under those work conditions; or
 - 2. Where the Contractor has monitored prior asbestos jobs for the PELs within 12 months of the current job; the data were obtained during work operations conducted under workplace conditions "closely resembling" the processes, type of material, control methods, work practices, and the data show that under the conditions prevailing and which will prevail in the current workplace there is a high degree of certainty that worker exposures will not exceed the TWA and EL; or
 - 3. The results of initial monitoring of the current job made from breathing zone air samples that are representative of the TWA and EL exposures of each worker covering operations, which are likely during the performance of the entire asbestos job to result in exposures over the PELs.
- D. The Abatement Contractor shall conduct daily air monitoring that is representative of the exposure of each worker who is assigned to work within a regulated work area, unless the Abatement Contractor has made a negative exposure assessment for the entire operation.
- E. The Contractor shall institute the exposure monitoring whenever there is a significant change in process, control equipment, personnel, or work practices that may result in new or additional exposures above the PELs or when there is any reason to suspect that a change may result in new or additional exposures above the PELs.

3.3 PRE-ABATEMENT REQUIREMENTS

- A. The Abatement Contractor shall take all necessary measures to protect workers, subcontractors, consultants, authorized visitors, and building occupants from exposure to asbestos and shall limit use of the site to only those areas where the asbestos abatement work is required.
- B. Decontamination Enclosure Systems shall be constructed prior to removal preparation activities. Personal Decontamination Enclosure Systems shall be provided outside the work area and attached to locations where persons will enter/exit the regulated work area(s).
- C. Post warning signs at all appropriate work area barriers in accordance with 29 CFR 1910.145(d) (4), and 29 CFR 1926.1101 and Industrial Code Rule 56.

- D. The Contractor shall coordinate with the Owner or Owner's representative to lock out electric power to the work area, and then connect required temporary electrical service. Provide grounded temporary electrical service of sufficient size, capacity, and power to accommodate work, and provide overload-protected disconnect switches for each temporary circuit.
- E. The Contractor shall coordinate with the Owner and the Owner's representatives to disable ventilation systems bringing air into or out of a work area by disconnecting wires, removing circuit breakers, and installing lockable switches that will prevent accidental or premature restarting of equipment.
- F. Provide lighting in the Decontamination Enclosure System as required supplying a 50-foot candle minimum light level. Provide a minimum of one, 200-watt incandescent lamp (or equivalent) per 1,000 SF of floor area to provide uniform lighting throughout each work area.
- G. When applicable, maintain a minimum temperature of 70 degrees Fahrenheit throughout the work area and Decontamination Enclosure Systems.

3.4 WORK AREA PREPARATION

- A. Regulated Work Area: The asbestos abatement work shall be conducted within regulated work areas which shall be demarcated in a manner that minimizes the number of persons within the area and protects persons outside the area from exposure to asbestos. Access to regulated work areas shall be limited to certified persons and authorized visitors.
- B. Critical Barriers: Critical barriers shall be constructed at the interior side of the work areas such as but not limited to, offices, hallways, entrance/exit ways, and other rooms which adjoin specified work areas as indicated on the Contract Drawings, and at all openings at windows, doors, vents, ducts, louvers and grilles near specified work areas.
- C. Isolation Barriers: Isolation barriers that seal off openings in the work area including, but not limited to, windows, corridors, doorways, skylights, ducts, grilles, diffusers and any other penetrations of the work area, shall be constructed using two layers of 6-mil fire-retardant plastic sheeting sealed with duct tape. All seams in system components that pass through the work area shall be sealed. Doorways and corridors, which will not be used for passage during the abatement work, shall be sealed. Construction of isolation barriers to separate the work area from the remainder of the site shall be accomplished as follows:
 - 1. Walls shall be constructed of wood or metal framing to support barriers in all openings larger than 32 square feet.
 - 2. Sheathing material of at least 3/8-inch thickness shall be applied to the work side of the barrier.
 - 3. Edges of the partition shall be caulked at the floor, ceiling, walls, and fixtures to form an airtight seal.

4. The work side of the partition shall be covered with two layers of 6-mil fire-retardant plastic sheeting with staggered joints and sealed.
 5. All floor, wall and ceiling surfaces shall be covered with two layers of 6-mil fire-retardant plastic sheeting. The floor shall be plasticized first and the plastic sheeting shall extend up the walls at least 12 inches on all sides. The walls shall then be plasticized by applying plastic sheeting from ceiling to floor, and overlapping the floor sheeting by at least 12 inches. This process shall be repeated for the second layer of plastic sheeting for the floor and walls. All seams within a layer shall be separated by a distance of at least six feet and sealed airtight, and all seams between layers shall be staggered.
- D. After completion of the decontamination enclosure, critical barriers and polyethylene sheeting applications, a minimum of 12 hours settling period is required before abatement work will be allowed to commence. Damage and defects in the barriers and/or enclosure system shall be repaired immediately upon discovery and prior to resumption of abatement activities.
- E. Enclosure Inspections: *Daily inspections and smoke testing of all barriers shall be performed by the Abatement Contractor and shall be recorded in the daily project log.* These daily inspections shall occur prior to the start of a work shift and upon the completion of the same work shift. Inspections and observations shall be documented in a daily project log. If, at any time during abatement activities, visible emissions are observed outside the work area or if damage occurs to the barriers, work shall be stopped, repairs made, and visible residue immediately cleaned using HEPA vacuuming and/or wet cleaning methods prior to the resumption of abatement activities.
- F. Personal/Waste Decontamination Enclosure System: The Contractor shall place all tools, equipment, and other materials in the work area, then construct or provide for a Personal/Waste Decontamination Enclosure System which complies with Industrial Code Rule 56.
1. Construct a Clean Room sized to accommodate all personnel/authorized persons. Benches, lockers, and hooks shall be provided for street clothes, and shelves shall be provided for storing respirators. The Clean Room shall not be used for the storage of tools, equipment, or materials, and shall not be used for office space. The Clean Room shall be locked during non-work hours.
 2. Construct a Shower Room containing one showerhead per every six workers, supplied with hot and cold water adjustable at the tap. The Shower Room shall be separated from the Clean Room and the Equipment/Waste Wash Room by airlocks constructed of 6-mil, fire-retardant plastic sheeting. Soap, shampoo, and towels shall be available at all times. All used 5.0 micron filters used to filter wastewater from the shower units shall be treated as asbestos contaminated waste and disposed of as asbestos waste. Disposable towels shall be disposed of as asbestos waste. The Contractor shall provide temporary water heaters that are sufficient to provide hot water service to the decontamination chambers upon demand.
 3. Construct an Equipment/Waste Wash Room for the storage of equipment and tools after decontamination. The Equipment/Waste Wash Room shall be separated from the Work

Area and the Holding Area by airlocks constructed of 6-mil fire-retardant plastic sheeting. A walk-off pan filled with water shall be located outside the Equipment/Waste Wash Room for personnel to clean foot coverings. A drum lined with a 6-mil plastic bag shall be located in the Equipment/Waste Wash Room to contain clothing.

4. Construct a Holding Area as a drop location for bagged asbestos waste passed from the Equipment/Waste Wash Room. The Holding Area shall be located so that bagged asbestos waste can be passed from the Equipment/Waste Wash Room into the Holding Area. The Holding Area shall be separated from the Equipment/Waste Wash Room by an airlock constructed of 6-mil, fire-retardant plastic sheeting. A lockable door shall be installed to permit removal of containerized asbestos waste from the Holding Area to a storage facility for transport to a disposal site. The Holding Area shall be locked during non-work hours.
- G. Fire alarm equipment, including smoke detectors, is to remain and shall be protected and decontaminated. Coordinate system shut down, if required, with Owner at least 24-hours in advance prior to system shut down.
- H. Pre-clean fixed objects within the work area using HEPA filtered equipment and/or wet wiping methods as appropriate. Enclose with two layers of 6-mil fire retardant polyethylene sheeting sealed with duct tape and/or spray adhesive in accordance with Industrial Code Rule 56.
- I. In coordination with the Building Owner, shut down and isolate HVAC systems, if applicable, to prevent contamination and fiber dispersal to other areas of the building. Openings to ducts, fans, louvers, windows, and plenums shall be sealed with two layers of fire retardant sheeting prior to start of removal. The Abatement Contractor shall repair any damage to ductwork, grilles, dampers, windows, louvers or HVAC equipment scheduled to remain at the completion of the abatement work, at no cost to the Owner.
- J. All electrical conduit joints, boxes, devices and cable systems within the work area, shall be sealed with tape and polyethylene sheeting sufficient to prevent water penetration during asbestos abatement operations. All loose cables and wiring present in the work area shall be supported so that they do not become disconnected or otherwise damaged during removal operations. Any damage to this wiring will become the responsibility of the Abatement Contractor to repair at his expense.

3.5 WORK AREA ENTRY/EXIT

- A. The Abatement Contractor shall restrict all unauthorized persons from entering the regulated work areas and avoid asbestos-containing dust or debris from passing beyond the critical barriers of the regulated work areas. Should areas beyond a regulated work area become contaminated with asbestos or debris as a result of the work, the Abatement Contractor shall clean those areas in accordance with the applicable regulations. Such cleaning and/or decontamination of these non-work areas by the Abatement Contractor shall be performed at no additional cost to the Owner.
- B. Authorized persons shall enter/exit regulated work areas through a Decontamination Enclosure System. Each time a regulated work area is entered, street clothes shall be removed in the

Clean Room and disposable clothes and clean respirators shall be worn. Respirators shall be inspected prior to each use and fit-checked for proper seal. Personnel shall then proceed through the Shower Room to the Equipment/Waste Wash Room, and into the work area.

3.6 ASBESTOS REMOVAL

- A. The abatement work areas are located in areas as indicated on the Hazardous Material Removal Plans. The Abatement Contractor shall refer to, at a minimum, the Architect's Renovation Drawings as well as the Hazardous Material Removal Plan for a detailed representation of the general layout of the work areas and the extent of asbestos removal and disposal specified at each work area.
- B. The Building Owner, Owner's representative or other authorized personnel shall be allowed unlimited access to all specified work areas located throughout the site building.
- C. The work consists of the removal and disposal of ACM and associated debris. Dispose of all removed material and debris as asbestos contaminated.
- D. The Abatement Contractor shall provide appropriate means (i.e., scaffolding, ladders, etc.) to access the work areas. The Abatement Contractor shall decontaminate equipment prior to moving it from one work area to another and at the completion of the Project.
- E. In lieu of full compliance with Industrial Code Rule 56 the Abatement Contractor may obtain a site-specific variance, *prepared by a NYSDOL certified Project Designer*, to conduct the removal work using alternate methods and procedures. No dry removal or disturbance of asbestos materials shall be permitted.
- F. Asbestos contaminated debris shall be cleaned using wet cleaning methods and/or HEPA vacuuming equipment. *Asbestos contaminated debris and water shall be placed in appropriate bags or containers, sealed, and removed from the work area daily or after each work shift.* Decontamination enclosure systems, clean room, shower, and equipment room shall be cleaned daily. The clean room shall be kept clean, dry and free of any waste.

3.7 EQUIPMENT & WASTE MATERIAL DECONTAMINATION

- A. The Contractor shall remove equipment and asbestos-contaminated waste material from the regulated work area(s) through the Equipment/Waste Room according to the following:
 - 1. At the wash down station, thoroughly wet-clean contaminated equipment and waste disposal bags and pass into the Equipment/Waste Wash Room.
 - 2. When passing equipment or containers into the Equipment/Waste Wash Room, close all doorways of the Decontamination Enclosure System.
 - 3. Once inside the Equipment/Waste Wash Room wet-clean bags, containers, and equipment.

4. When cleaning is complete, pass items into the Holding Area and close all doorways, except the doorway between the Equipment/Waste Wash Room and the Holding Area.
 5. Workers from the exterior shall enter the Holding Area and remove decontaminated equipment and waste. The Contractor *shall require* these workers to wear protective clothing and appropriate respiratory protection.
 6. Workers shall not use the Equipment/Waste Wash Room system as a means to leave or enter the washroom or the work area.
- B. Clean debris from the inside of the Decontamination Enclosure System on a daily basis. All surfaces shall be wet-wiped and/or HEPA vacuumed after each shift change. The Abatement Contractor shall clean debris from shower pans on a daily basis.
- C. Remove asbestos waste from the work area into the Decontamination Enclosure System at least at the end of each work shift, then directly into the waste storage container. Containerized asbestos waste shall not be stored outside of the work area or outside of the waste storage container.
- D. If required, provide a dust tight, enclosed, inclined chute for dropping asbestos material a distance greater than 10 feet. Drop asbestos-containing materials directly into a secured, labeled, container.

3.8 PERSONAL DECONTAMINATION

- A. The Contractor shall require workers to follow a specified decontamination procedure, as a minimum requirement, when exiting a regulated work area:
1. Remove gross contamination while still in the work area. Gross removal shall be conducted by wet cleaning and/or HEPA vacuuming.
 2. Remove disposable coveralls, head covers, and foot covers/boots in the Equipment/Waste Wash Room and deposit into a labeled container. Reusable contaminated clothing, footwear, headgear and gloves shall remain on in the Equipment Room.
 3. While still wearing the respirator enter the shower room and clean the outside of the respirator and the exposed face area under running water prior to removal of the respirator, and then shower completely with soap and water to remove residual asbestos contamination.
 4. Respirator filter cartridges shall be removed, wetted and disposed of in a container provided for the purpose.
 5. Rinse the Shower Room walls and floor prior to exiting. After showering proceed to the Clean Room and don street clothes.

3.9 WASTE STORAGE, TRANSPORT & DISPOSAL

- A. Provide a rigid, enclosed, and lockable waste storage container (i.e., dumpster, trailer, etc.) at the site to contain removed asbestos-containing material/debris which has been double-bagged or double-wrapped. The interior floor and walls of the waste storage container shall be lined with two layers of at least 6-mil plastic sheeting and shall be properly labeled on the exterior sides. The container shall be locked at the end of each workday and during non-work shifts.
- B. Do not store containerized waste outside of a regulated work area or outside of the waste storage container. Load all containerized asbestos waste onto trucks, dumpsters, or other appropriate containers for storage prior to transport. The containerized asbestos waste shall be placed in an enclosed, locked truck or dumpster for storage. The waste storage/transport unit shall be locked when not in use to prevent unauthorized access to the waste material.
- C. Double-bagged and/or double-wrapped asbestos waste may be transported on open trucks if loaded into rigid, steel drums that are properly closed and sealed. The Abatement Contractor shall label all waste disposal drums with the same warning labels as on the waste disposal bags. Drums that have been contaminated shall be disposed of as asbestos-containing waste.
- D. The Contractor shall establish a manifest system that accounts for all ACM waste. The manifest system shall be described in writing and will be subject to the approval of the Owner. The Contractor shall retain receipts from the landfill where the asbestos waste is disposed. Separate waste disposal receipts shall be retained for each load of asbestos waste removed from the work site. The Contractor shall demonstrate custody over all asbestos waste from the time it is removed from the work area until it is deposited at the landfill.
- E. Final manifests and landfill receipts shall be provided to the Owner within 15 working days of the removal of the asbestos waste from the site by the waste hauler. The Abatement Contractor shall comply with current Federal, State and local regulations governing the handling, transportation and disposal of asbestos waste.
- F. Contaminated water from the asbestos work area shall not be disposed of through the shower. Contaminated water must be filtered through a separate 5.0 micron filter system and discharged into the municipal sanitary sewer system, if allowed. If filtered waste water is not allowed to be discharged in the sanitary sewer system, contaminated water, filtered or not, shall be disposed of as asbestos contaminated waste.

3.10 FINAL CLEARANCE TESTING

- A. Clearance air sampling, *if applicable to the project*, may be performed using PCM methodology utilizing aggressive air sampling techniques as required by Industrial Code Rule 56. The clearance air samples shall be considered satisfactory when every PCM air sample result demonstrates an airborne concentration of total fibers below 0.01 fibers per cubic centimeter (f/cc), or background level, whichever is greater.
 - 1. If any PCM clearance air sample result indicates an airborne asbestos fiber concentration at or above 0.01 f/cc or the background level, whichever is greater, than the Abatement

Contractor shall re-clean the affected work area in accordance with Industrial Code Rule 56, and another set of PCM clearance air samples shall be collected and analyzed.

2. When PCM clearance tests indicate non-compliance with Contract Documents, the Abatement Contractor shall incur all costs associated with re-cleaning of the work area, additional air sampling and analysis until compliance is achieved.
- B. Final clearance air sampling *if applicable to the project* shall be performed using TEM methodology in lieu of or in addition to PCM clearance sampling, utilizing aggressive air sampling techniques as required by Industrial Code Rule 56. The final clearance air samples shall be considered satisfactory when the average TEM asbestos fiber concentration for five air samples collected inside a large work area does not exceed 70 structures per square millimeter (s/mm²).
 1. If the average TEM asbestos fiber concentration for five air samples collected inside a large work area exceeds 70 s/mm² then the Abatement Contractor shall re-clean the affected work area in accordance with Industrial Code Rule 56, and another set of TEM clearance air samples shall be collected and analyzed.
 2. When TEM clearance tests indicate non-compliance with Contract Documents, the Abatement Contractor shall incur all costs associated with re-cleaning of the work area, additional air sampling and analysis until compliance is achieved.
- C. Testing requested by the Abatement Contractor for his information and/or convenience shall be paid for by the Abatement Contractor.

3.12 RESTORATION OF FINISHES

- A. After clearance air testing has been achieved, the Abatement Contractor shall remove critical barriers, decontamination enclosure systems, negative air exhaust systems, and restore power affected by the abatement work.
- B. Temporary power shall be disconnected, power lock-outs removed and power restored. All temporary plumbing shall be removed.
- C. After the Abatement Contractor has completely removed equipment and materials from the work area, the Building Owner and/or the Environmental Consultant shall conduct an inspection (final walk-through) of the work area(s) to ensure it is in an acceptable condition.
- D. Finishes, landscaping, structures and/or equipment damaged by the Abatement Contractor shall be restored. Finishes unable to be restored shall be replaced by the Contractor under this Contract at no additional cost to the Owner.

3.13 SATISFACTORY COMPLETION OF WORK

- A. The asbestos abatement work is complete upon fulfilling the following:
 1. Removal of identified ACM and other related materials, and equipment as specified in this Section and the Asbestos Removal Plans.

2. Achieving satisfactory PCM/TEM clearance air sampling analytical results as specified by the Contract Documents and as required by all applicable codes, rules, and regulations, *if applicable to the project*, or satisfactory visual inspection of the work area(s).
 3. Removing all asbestos abatement equipment and materials from the site.
 4. Disposing of all removed asbestos waste material and related construction and demolition debris at an approved waste disposal landfill/facility. Submit waste shipment record forms signed by the Abatement Contractor, waste hauler, and landfill operator for each shipment of asbestos waste removed from the site.
- B. Repairing and/or replacing damaged architectural finishes, mechanical systems, and/or equipment, except those which are specified for demolition, alteration, or removal.
- C. The work under this section shall include but is not limited to the execution of the following principal items as they apply to Prime Contractors for Project Closeout:
1. Consent of surety for final payments.
 2. Assurance, satisfactory to the Owner that unsettled claims will be settled and that work not completed and accepted will be completed without any undue delay.
 3. Guaranties, Warranties and Bonds required by the General Conditions and any other extended guaranties or warranties stated in the Technical Sections of the Specifications.

END OF SECTION

SECTION 033100 - STRUCTURAL CONCRETE

1.0 PART 1 – GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE:

- A. Rough machine excavation and grading for concrete work.
- B. All site concrete.
- C. Provision and installation of masonry reinforcing and filling of block cores.
- D. Decking
- E. Furnishing anchor bolts, anchors, sleeves, and inserts for other trades.

1.2 DESCRIPTION OF WORK: Work covered by this section shall include all labor, material, equipment, and services necessary to complete the job as shown or called for on Architectural and Structural Drawings. Also included, but not limited to, shall be:

- A. Cast-in-place concrete in foundations, floors, columns, and walls including footings, slabs on grade, reinforcing and all miscellaneous concrete as shown on drawings and/or specified.
- B. All hand excavation and cleaning of trenches required in preparation for placing of concrete.
- C. All necessary forms, accessories, tools, labor, and materials.
- D. Build in all sleeves, inserts, anchors, bolts, and other items furnished by other trades, which are required to be built into the concrete work.
- E. All vapor retarders and vapor barriers.
- F. All joint fillers and sealants.
- G. Set all anchor bolts and grout base and/or leveling plates for structural steel or miscellaneous iron as required.
- H. All concrete finishes.

1.3 SUBMITTALS: Submit for review an electronic copy of each of complete plans checked by this Contractor. Shop Drawings shall be clearly and carefully drawn, showing sufficient dimensions and views in plan, elevation, and/or section so that there will be no confusion the field as to the proper location of the reinforcing bars. Show all accessories, mesh, and supports. Review shall not relieve the Contractor of responsibility for supplying all materials required by the plans and specifications or for the proper fabrication and fit of that material. Unchecked shop drawings will not be reviewed. Supply reviewed prints for field use as required. Drawings shall be submitted early enough to allow adequate time for proper review.

1.4 CODES AND STANDARDS: Concrete, forms, and reinforcing shall conform to codes, standards, and specifications of the following:

- A. American Society for Testing and Materials (ASTM).
- B. American Concrete Institute (ACI).
- C. American Welding Society (AWS).
- D. New York State Department of Transportation (NYSDOT).
- E. New York State Building Code.
- F. Occupational Safety and Health Standards (OSHA).

1.5 TESTING: Concrete testing will be performed by an independent testing laboratory engaged by the Owner as per NYS Building Code Chapter 17.

- A. Required tests:
1. Standard 6" x 12" compression cylinders (ASTM C39) in sets of four, moist cured. Break two at 7 days and two at 28 days. Cylinders made by testing laboratory, not by the Contractor.
 - a. One set for approval of each mix design.
 - b. One set for each 50 cubic yards or fraction thereof placed per day.
 2. Slump - Each batch, minimum.
 3. Air content - (ASTM C231) each batch, minimum.
- B. General: The Contractor shall maintain a record set of plans at site showing date and extent of each pour, temperature, and weather conditions during placement. If any portion of work shows low test results, the Engineer may require additional testing, load tests, cored samples, or replacement of the faulty work, etc., at this Contractor's expense. To conform to these specifications, the average of all strength tests, as well as the average of any three consecutive tests shall not be less than 10% over the specified design strength and no individual strength shall have an average value of less than 500 psi of the specified strength.
- C. Reports: All test cylinders shall be cast, water cured, and broken under laboratory conditions in accordance with the standard ASTM method (ASTM C31 and C39). All four cylinders of a test shall be taken from the middle third of a single load. Each cylinder shall be properly labeled with an identifying mark, the mix proportions, amount of water, slump, and the location in the structure where that concrete was placed. Test reports shall include all this information. Copies of all test reports shall be submitted to the Engineer no later than three working days after the tests are completed.
- D. Pumped Concrete: When pumping concrete required tests may be taken at point of placement. Adjustments to the mix design may be necessary based on field and weather conditions. Changes to mix design need to be submitted and approved by the Engineer.

1.6 MIXES

- A. The Contractor shall submit for review by the Engineer laboratory calculations, sieve analysis, specific gravities, minimum three point water-cement ratio versus compressive strength curves, the proposed proportion of aggregates and expected yield for the various mixes as required below. Mix designs shall conform to the ACI Standard Recommended Practice for the Design of Concrete Mixes (ACI 613 and ACI 613A).
- B. Test for approval: Alternate procedure; in lieu of proportioning as specified in paragraph 1.06, Part A above, a mix design employing the same ingredients proposed for use, and used successfully on a previous project under similar conditions to those anticipated on this project, may be used provided the following are submitted and approved:
1. The concrete mix design.
 2. Reports for at least 20 consecutive sets of 7 and 28 day concrete strength tests made during the last 6 months.
 3. Reports of compliance tests of fine and coarse aggregates made during the last 6 months.

- C. No job concrete shall be placed until the mix design for that concrete has been accepted by the Engineer. Once the mix has been accepted, it shall not be changed without the Engineer's written acceptance.
- D. Ready-mixed concrete from an established company will be accepted if conforming to ASTM C94 and to this specification. All concrete shall be batched and mixed in a plant conforming to the following requirements and controlled in a manner to assure uniform concrete for the quality specified.
- E. Specific Requirements: See page 03310-4. Water-cement ratio (W/C) includes aggregate moisture and absorption.
- F. All concrete shall contain an approved water reducing admixture. If required by field conditions, the Engineer may require the use of accepted retarding admixtures. Accelerating admixtures containing chlorides are not acceptable. Accelerating admixtures shall be for cold weather use only subject to acceptance by the Engineer.
- G. All concrete for exposed walls, slabs, beams, columns, and entrance slabs shall contain air entraining admixtures.

1.7 INSPECTION: Work shall be spot inspected in the field by the Engineer or his authorized representative.

- A. Contractor shall notify the Engineer a minimum of 24 hours prior to a concrete placement.
- B. Contractor shall be responsible for providing suitable, safe, and adequate forms of wood or plywood. Where in contact with exposed concrete, forms shall be smooth-faced (plastic coated), true to line, plumb, tight, properly braced, and thoroughly oiled before placing reinforcing.
- C. No placing or wiring of steel less than 6 hours before a pour will be permitted.
- D. Placing of concrete shall not be scheduled until all of the reinforcing for that section is in place and the reinforcing and forms have been accepted by the Engineer.

1.8 FABRICATION: Concrete reinforcing shall meet the following requirements:

- A. Workmanship and details shall conform to ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures".
- B. Provide any special details shown on plans (bars to mason for bond beams, etc.).
- C. All splices not shown on the Contract Drawings shall be accepted in writing by the Engineer.
- D. Provide (2)-#4 diagonal bars at each corner of every rectangular opening in slabs or walls unless shown otherwise on the plans.

<u>Use</u>	<u>f' c, psi</u>	<u>Minimum Cement Factor</u>	<u>Maximum Water Cement (W/C) Ratio</u>		<u>Air Content (%)</u>	<u>Maximum Slump</u>	<u>Maximum Aggregate Size</u>
			<u>Non-Air Entrained</u>	<u>Air Entrained</u>			
Footing and Piers	3,000	5.0 Bags/C.Y.	0.62	~~~~~	~~~~~	3"	1-1/2"
Walls	3,000	5.5 Bags/C.Y.	0.60	0.57	5 to 7	3"	3/4"
Interior Slab on Grade and Metal Deck	4,000	6.0 Bags/C.Y.	0.51	~~~~~	~~~~~	4"	3/4"
Exterior Slab on Grade	4,000	6.0 Bags/C.Y.	~~~~~	0.49	5 to 7	4"	3/4"
Steel Pan Stair Treads	3,000	5.5 Bags/C.Y.	0.57	~~~~~	~~~~~	3"	3/8"
Topping	4,000	6.25 Bags/C.Y.	0.44	0.35	7 to 9	2"	3/8"
Lightweight Concrete (115 pcf Maximum)	4,000	6.5 Bags/C.Y.	~~~~~	0.46	5 to 7	4"	3/4"
Flowable Fill w/ MasterCell 25	110	1.0 Bags/C.Y.	~~~~~	~~~~~	15 to 30	8"	Fines

2.0 PART 2 – PRODUCTS

2.1 MATERIALS: shall be of finest quality, and shall be delivered, stored, and handled so as to prevent damage. Accepted brands or sources must be used, without change for the entire project.

- A. Normal Portland Cement: A standard brand, ASTM C150 Type I or Type II for structural concrete.
- B. Sand: Clean, sharp, durable, and sound material free from harmful amounts of soft, friable, thin, elongated or laminated pieces, conforming to ASTM C33.
- C. Coarse Aggregate: Strong, clean, crushed limestone or gravel conforming to ASTM C33. Crushed limestone shall be used for slabs on metal deck
- D. Water: Clean, potable, and free from strong acids, alkalis, oils, or organic material.
- E. Reinforcing Bars: Shall be manufactured from material conforming to ASTM A615 Grade 60, with sizes and spacing as shown on the plans and sections. All bars are to be from new billet steel produced in the U.S.A. Submit two certified copies of mill reports for all reinforcing before any reinforcing is placed.
- F. Welded Wire Mesh: Shall be cold drawn in accordance with ASTM A185, supplied in flattened sheets or mats and of sizes shown on the drawings.
- G. Reinforcing Accessories: Chairs and bolsters in accordance with ACI 315, plastic tipped.
- H. Form Materials: For all areas not exposed, shall be Class I or II, BB plyform, exterior grade APA. For all exposed surfaces, shall be Class I, BB plyform, exterior grade APA. Other than footings, when first used on the job, shall be new.
- I. Footing Form Materials: Material may be used form material, patent panels, or other suitable form materials, provided they meet the requirements under Paragraph 1.07 B.
- J. Wall-Form Ties: Snap-ties type with integral water stops. Wire form ties will not be permitted.
- K. Perimeter Insulation: extruded plastic foam insulation. See Drawings for thicknesses required.
- L. Vapor Retarder: .010" thick clear polyethylene film in as wide rolls as possible. Vapor retarder shall conform to ASTM E 1745 latest date.
- M. Grouting Under Plates: 5 Star non-shrink grout or an accepted equal.
- N. Curing Compound: Sonneborn's "Kure-N-Seal", "Kure-N-Seal 0800" or accepted equal. Compound shall not affect bond of any applied floor finishes.
- O. Joint Sealer: Toch Brothers "Thiotok Sealant" or accepted equal.
- P. Joint Filler: fibre expansion joints, W.R. Meadows "Sealtight", or accepted equal.
- Q. Water Reducing Admixture: Grace Concrete Products "WRDA with Hycol" or accepted equal.
- R. Air Entraining Admixture - Grace Concrete Products "Darex AEA" or accepted equal.
- S. Fibrous Reinforcing: 100% virgin polypropylene fibrillated engineered fibers, "Fibermesh", by Fibermesh Co. or an accepted equal.
- T. Liquid Hardener: Sonneborn's "Kure-N-Harden" or accepted equal.
- U. Zero Perm Vapor Barrier: Premoulded seven ply membrane consisting of reinforced core and carrier sheet with fortified bitumen layers, protective weather coating and plastic sheet. Water vapor transmission rate of 0.00 grains per square foot per hour when tested according to ASTM E 96, Method B. Provide manufacturer's recommended mastic and gusset tape. Zero perm vapor barrier to be placed below wood floor areas only. W. R. Meadows, Inc. "Sealtight Premoulded Membrane" or accepted equal.
- V. Lightweight Coarse Aggregate: Prior to use, submit for approval the trade name of the lightweight coarse aggregate, the manufacturer's certificate of its physical properties. Only one brand of lightweight coarse aggregate shall be used. Lightweight coarse aggregate shall conform to ASTM C330, be manufactured from shale by an approved

rotary kiln process. Particle sizes shall be uniformly graded from 3/4" to #4 and shall be non-corrosive and free of impurities that will damage finishes or completed concrete. Lightweight coarse aggregate shall have a minimum FSP ratio of 6.0 when determined in accordance with ACI 318 and ASTM C39, C192, and C496 and shall have a maximum absorption of 11% in accordance with C127.

W. Fly Ash: Fly Ash is not permitted to be used in mix design.

3.0 PART 3 – EXECUTION

3.1 WORKMANSHIP: Shall be first quality throughout, conforming to ACI 318 and these specifications.

3.2 INSTALLATION:

- A. Footings shall rest on undisturbed earth. Hand trim excavation to required levels.
- B. No reinforcing shall be placed until shop drawings have been reviewed by the Engineer.
- C. Preparation of form surfaces:
 - 1. All forms shall be sufficiently tight to prevent leakage of grout or cement paste.
 - 2. All butted edges shall occur over supports or backup material.
 - 3. Plywood surfaces shall be thoroughly cleaned and oiled prior to placing reinforcing steel.
 - 4. Use full sheets of plywood where possible. Refer to Architectural Drawings for special relief details on exterior surfaces.
 - 5. Provide clean-out panels at the bottoms of all column, pier, and wall forms.
- D. The Contractor is responsible to determine the time at which forms may be removed without endangering the structure, subject to the following limitations and the acceptance of the Engineer:
 - 1. Footing forms, 24 hours minimum, continue curing as specified.
 - 2. Wall forms, three days minimum, continue curing as specified.
- E. Unless noted on drawings, reinforcement shall not be bent after partially embedded in hardened concrete. Bending shall be accomplished by heating the reinforcing bars as recommended by ACI.
- F. Dowels must be wired in place before concreting begins.
- G. Footing reinforcing shall be supported on pre-cast concrete blocks, spaced at intervals required by size of reinforcing used to keep reinforcing a minimum of 3" above grade.
- H. Cutting of bars to clear openings in walls or slabs is strictly prohibited. Warp bars around such openings.
- I. Welded wire mesh in slabs on grade shall be supported at mid-depth, lap 6" minimum and cut mesh reinforcing at construction and control joints.
- J. Contractor shall accurately set all anchor bolts for structural steel and shall provide all miscellaneous slots, chases, and openings for all trades in accordance with reviewed shop drawings. Sleeves required shall be provided by trades involved and set by this Contractor.
- K. Floor slabs on grade shall meet the following:
 - 1. Provide minimum of 6" compacted select gravel fill.

2. Form depressed ribs under partitions as required and at electrical conduits by shaping the gravel.
 3. Over sub-grade, lay vapor retarder specified. Lap a minimum of 6" and seal all joints with mastic. Installation shall be in accordance with ASTM E 1643 latest date.
 4. Provide for contraction and isolation joints as specified and shown on plans.
 5. Pour slab of thickness shown on drawings. Screed, float level, and finish as specified.
- L. Slabs on metal deck shall meet the following:
1. Over metal deck, lay welded wire mesh of size shown on the Contract Drawings.
 2. Place concrete as dry as possible, using 3/4" maximum aggregate size.
 3. All mesh to be continuously supported with continuous chairs at 2'-0" on center. Vary height for slab thickness. See details.
 4. Slabs shall be monolithic trowelled.
- M. Stair treads and landings shall meet the following:
1. All treads and landings shall be reinforced with 2x2xW0.9xW0.9 welded wire mesh over the entire area, set 1" from the bottom of the slab.
 2. Mix shall be as dry as can be worked. After the concrete fill has been screeded off level and true, it shall be permitted to stand until it will bear the weight of a workman standing on boards. Stairs are to receive a steel trowel finish.
- N. Miscellaneous concrete shall include forms, reinforcing, placing and finishing such miscellaneous concrete as sills, caps, curbs, pads, etc. as shown or required to complete the concrete work of this contract. All exposed miscellaneous concrete shall be rubbed to a smooth, even finish with a carborundum stone.
- O. Anchor bolts, leveling plates, and base plates for structural steel shall be:
1. Accurately set in accordance with accepted anchor bolt plans by the steel fabricator. Centerlines and elevations shall be carefully located by Engineer's transit and bolts set in a wooden template, wired to maintain them perpendicular and at the correct projection during the placement of concrete.
 2. Carefully set on a full bed of non-shrink grout, all loose base plates or leveling plates for structural steel. Plates shall be set true and level at specified elevation. Leveling plates, base plates, and bearing plates shall be bolted in place to provide vertical confinement for grout.
- P. Concrete exterior platforms: Set two layers of 6x6xW2.9xW2.9 welded wire mesh. Place slabs monolithically to minimum 5" thickness. Divide in squares not more than 25 square feet. Screed level, steel trowel, broom slightly, and tool all edges.
- Q. Slabs supported on forms shall meet the following:
1. Build all forms to required dimensions.
 2. Lay all reinforcing as shown on accepted placing plans. Support bars at specified height with bolsters, chairs, etc., so that reinforcing will not be moved from the specified position during the placing of concrete.
 3. All conduit in slabs or beams shall be laid above the bottom bars and below the top bars.

4. Place concrete as specified.
 5. Maintain uniform slab thickness by adjusting screeds to form cambers.
- R. Concrete topping shall meet the following:
1. Plank shall be cleaned and wetted just prior to placing concrete topping, minimum 2" thickness.
 2. Topping shall be continuous over the entire span. Partitions shall be built on top of the topping.
 3. Topping shall have one layer 6x6xW1.4xW1.4 welded wire mesh at center, lapped 6" minimum except as noted otherwise on plans.
- S. Joints in concrete shall meet the following:
1. Construction joints other than slabs on grade.
 - a. Joints shall be located at points which least impair the strength of the structure. Each joint shall be provided with a full dam or stop, drilled to pass all reinforcing bars which cross the joint. Provide keyways in all construction joints. Provisions shall be made to prevent under-run of the second placement.
 - b. Reinforcing projecting through the dam of a construction joint shall be cleaned of spilled concrete immediately after placement. Where a joint is made, the surface of the concrete shall be thoroughly cleaned and all latency removed. Before placing new concrete, the previously placed concrete shall be thoroughly wetted and slushed with neat cement grout to fully bond the joint.
 2. Control joints for shrinkage shall be in all concrete walls. Where practical, locate construction joints at control joints. Half of the horizontal reinforcing shall continue across the joint and the other half stopped at the joint. Create a plane of weakness at the control joint by a vertical chamfered notch on each face of the wall as shown on the plans.
 3. Expansion joints shall be constructed where shown and as detailed on the plans.
 4. Joints in slabs on grade shall meet the following:
 - a. Construction joints in slabs on grade shall be located where shown on the plan. Each joint shall be provided with full dam or stop and continuous keyway. A minimum of 3 days is required before placing concrete adjacent to these construction joints.
 - b. Contraction joints shall be located on column centerlines and where shown on the Contract Drawings. Sawn joints, where shown, shall be cut no more than 24 hours after placing slab and as soon as the slab is hard enough to prevent unraveling under a heavy-duty saw.
- T. Cooperate with Mechanical Contractors in permitting the placing of all necessary sleeves and inserts for their trades. General Contractor shall notify the Mechanical Contractor in ample time for the responsible Contractor to place all embedded items; sleeves, slots, holes, chases, anchor bolts, etc.
- U. Concrete surfaces finish shall meet the following:
1. Typical vertical surfaces as-cast plywood finish is applicable for:

- a. Foundation walls below grade, walls and columns in unfinished space, service areas, slab soffits, and concrete concealed by other materials.
 - b. Remove all metal ties 1" below the surface. Remove all projections and irregularities.
 - c. Point and patch depressions left from removed ties, fins, holes, water, air pockets, honeycombs, etc. with a mortar mix.
 - d. Chip out major stone pockets and repair as directed.
2. Exposed vertical surfaces - smooth finish is applicable for:
 - a. Concrete exposed to view, either on the inside or outside of the structure. Metal ties removed and holes shall be pointed and patched.
 - b. Any exposed surface which is out of level, or alignment, or which does not present a uniform, neat, clean appearance, shall be removed and replaced unless the Engineer and/or Architect grants permission to patch. Permission to patch does not waive the Engineer's and/or Architect's right to require removal and replacement of inferior section if patching does not produce satisfactory results.
3. Concrete finishes on floors or sidewalks:
 - a. See room finish schedule for location and type of floors.
 - b. All finish floors shall be level within a tolerance of 1/4" in 10 feet. See Architectural Finish Schedule for location of particular type of finish. Dusting with dry cement to hasten set is prohibited. All floors shall be cured as specified, whether or not finished.
 - c. Floated Finish: When water sheen has disappeared from surface and/or the mix has stiffened sufficiently to permit proper operation of men and equipment, the surface shall be consolidated with power driven floats leaving a uniform, smooth granular texture.
 - d. Trowelled Finish: Typical all floors. The surface shall be finished first with power floats as specified. Follow with power trowelling to close all pores and surface defects. Final trowelling shall be done when a ringing sound is produced as the trowel moves over the surface. The finished surface shall be free of any trowel marks, uniform in texture and appearance.
 - e. Broom Finish: Sidewalks and entry slabs. Immediately after floating, provide coarse transverse texture by drawing a broom or burlap belt across the surface.
 - f. Surface Treatment: Exposed concrete floors. After surface water is gone and slab can be walked on, spray or brush on two coats of Sonneborn's "Kure-N-Harden". Apply both coats at the rate of 350 s.f. per gallon. Application to be in accordance with manufacturer's recommended procedures. Just before turning the building over to the Owner, clean all dust, dirt and debris from the floors. Lightly acid etch the floors with muriatic acid diluted 10:1 until sufficient slip resistance is achieved. Protect all adjacent surfaces during acid etching. Apply two coats of Sonneborn's "Kure-N-Seal 0800, 21% solids. Application to be in accordance with manufacturer's recommended procedures. Apply the second coat at a rate of 500 s.f. per gallon.

3.3 PROTECTION: Concrete protection and curing shall meet the following:

- A. Warm Weather Protection: See ACI 305R, latest date.
 - 1. Minimum curing period is seven (7) days.
 - 2. Prevent drying out by keeping all surfaces thoroughly wetted at all times.
 - 3. Cover floors with curing compound as specified in strict accordance with the manufacturer's recommendations.
 - 4. Vertical Surfaces - Keep forms on or cover with burlap blankets, keep wet.
 - 5. When the average air temperature exceeds 80°F, shield concrete and its ingredients from the sun where possible and eliminates unnecessary mixing or handling.
 - 6. The maximum temperature of the concrete when first placed shall not exceed 90°F. All concrete exceeding this temperature will be rejected.
- B. Cold Weather Protection: See ACI 306, latest date.
 - 1. Heat aggregate and water, cover placed concrete with tarps and heat with salamanders. Torches, open flames, salts, or chemicals are prohibited.
 - 2. Maintain temperatures above 60°F and below 80°F for not less than the 7 day damp curing period.
 - 3. Accelerating admixtures will not be accepted.
 - 4. Frozen concrete will be rejected.
- C. Contractor shall protect all finished concrete surfaces from mechanical damage.

3.4 MIXING: Concrete batching, mixing, conveying, and placing shall meet the following:

- A. Aggregate, sand, and cement accurately measured by weight. Varying aggregate moisture shall be accounted for in weight measurements. Water measurements by volumetric float control.
- B. Concrete mixed until there is a uniform distribution of materials and discharged completely before the mixer is recharged. Mixer rotated at speed recommended by manufacturer and mixing continued for a least one minute after all materials are in the mixer. Fibrous reinforcing, where required, shall be added at the rate of 1.5 lbs./C.Y. concrete.
- C. Air Entrainment Admixture shall be added to interior and/or exterior concrete mixes subject to freeze/thaw cycles.
- D. Concrete conveyed from mixer to place of final deposit by methods which will prevent the segregation or loss of the material.
- E. Equipment for chuting, dumping, or pneumatically conveying concrete shall be of such size and design as to insure a practically continuous flow of concrete at the delivery end without separation of the material.
- F. Place within 90 minutes of mixing. Discard concrete with initial set before placing. No retempering.
- G. Place in not more than one foot layers within 6 feet of final position; do not attempt to flow concrete horizontally. In deep forms, use a tremie. Concrete shall not be dropped more than 6 feet. If necessary to convey concrete further than 10 feet, use buggies, pump, or crane and bucket. Use of chutes longer than 10 feet or belt conveyors is prohibited.

- H. Vibrate concrete into corners, spade stone away from forms. If free water shows on top surface of concrete, reduce water. Screed all work to level surfaces. Rake surfaces to provide bond for later finishes if required.
- I. Pumping: If concrete is to be moved by pumping, complete information, including special concrete mix and equipment, shall be submitted to the Engineer for acceptance.

END OF SECTION 033100

SECTION 051200 – STRUCTURAL STEEL

1.0 PART 1 – GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete reinforcing steel
- B. Miscellaneous and ornamental ironworks
- C. Steel anchors for work of other trades.
- D. Setting anchor bolts in concrete.
- E. Grouting base or leveling plates for columns, beams, and/or joists.
- F. Erecting loose lintels.
- G. Metal deck
- H. Steel joists
- I. Field painting, except as required in this section for touch-up.

1.2 RELATED WORK FURNISHED BUT NOT INSTALLED

- A. Loose base or leveling plates for column, beams, and/or joists.
- B. Exterior and interior loose lintels.
- C. Anchor bolts for structural steel only.

1.3 DESCRIPTION OF WORK: Work covered by this section shall include all labor, material, equipment, and services necessary to complete the job as shown or called for on Architectural and Structural Drawings. Also included, but not limited to, shall be:

- A. Structural steel beams, girders, and columns
- B. Miscellaneous and connecting material
- C. Hung and clipped lintels
- D. Roof frames for all Mechanical and Architectural openings and roof drains.
- E. Continuous angles

1.4 SUBMITTALS: Submit for review an electronic copy of all erection plans and detailed shop drawings checked by the Fabricator. Unchecked shop drawings will not be reviewed. Reproduction of Contract Drawings are not to be substituted for erection drawings. Revise as necessary. Review of shop drawings does not relieve Fabricator of responsibility for fit, detail design of connections, or for supplying all necessary materials. Supply reviewed prints for field use as necessary. Drawings shall be submitted early enough to allow adequate time for proper review.

1.5 STANDARDS: Structural steel framing is to conform to codes, standards, and specifications of the following (latest date):

- A. American Society for Testing and Materials (ASTM)
- B. American Welding Society (AWS)
- C. American Institute of Steel Construction (AISC)
- D. Occupational Safety and Health Standards (OSHA).
- E. New York State Building Code.

1.6 INSPECTIONS: Work may be inspected both at the shop and in the field by the Engineer, or the testing authority, for the following:

- A. Shop inspection for workmanship only.
- B. Responsibility for accuracy of fit and soundness of connections rests solely with the Contractor.
- C. Final inspection for workmanship and fit made in the field after work has been fitted in place.
- D. Material accepted in shop shall not prevent final rejection at the site or after erection if it fails to conform to drawings and specifications.
- E. All major field and/or shop butt welded splices shall be checked and certified by an independent testing laboratory accepted by the Engineer. All costs for such testing shall be paid by this Contractor. Such testing shall be non-destructive radiographic. All butt welds shall have 100% penetration and fusion.

1.7 FABRICATION: Structural steel fabrication shall conform to the following:

- A. Workmanship and details shall conform to AISC "Specifications for Fabrication and Erection of Structural Steel for Buildings", latest edition. Fabricator/Erector shall be AISC certified unless noted otherwise on plans.
- B. Shop connections are welded unless noted otherwise on plan or section.
- C. Substitution of shapes and/or modification of details by the Fabricator must be accepted by the Engineer in writing.
- D. Mill bearing surfaces to true planes. Fit abutting surfaces closely.
- E. Details of lintel and other steel requiring accurate alignment shall provide for slotted holes and/or washers for truing up steel as required.
- F. Provide any special details shown on plans.
- G. Punch as required for nailers. Check locations where punching is required by referring to Architectural details.
- H. All Architectural clearances must be maintained.
- I. Minimum bolt size is 3/4" diameter.
- J. Provide bearing plates and anchors for all beams bearing on masonry where other detail is not specified.
- K. All connections shall be properly designed for standard end loads of the member connected unless noted otherwise on the plans. Shop connections shall be welded and performed by operators who have been qualified previously by tests as per American Welding Society's "Standard Qualification Procedure" to perform the type of work required. Use equipment supplying the proper current, electrodes suitable for positions and other conditions of intended use. Appearance, quality of welds made, and methods of correcting defective work shall meet the American Welding Society's "Code for Arc Welding in Building Construction".
- L. Field connections shall be bolted in standard framed connections as shown in the AISC manual and designed for loads as indicated in paragraph 1.07 K above.
- M. All high-strength bolts are to be designed in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts".

2.0 PART 2 – PRODUCTS

2.1 STRUCTURAL STEEL SHAPES: shall be manufactured from material conforming to ASTM A992 with sizes as shown on the drawings. No second-hand material permitted. Submit two each of all certified mill test reports.

2.2 STRUCTURAL STEEL CHANNELS, PLATES, AND ANGLES: shall be manufactured from material conforming to ASTM A36 with sizes and thicknesses as shown on the drawings. No secondhand material permitted. Submit two each of all certified mill test reports.

2.3 WELDING RODS: shall conform to E60 or E70 series of ASTM A233, manual shielded arc welding and shall be suitable to the position and condition of intended use.

2.4 BOLTS: shall conform to the following:

- A. High-strength bolts - ASTM A325 N in bearing type connections, except where noted otherwise.
- B. Common bolts - ASTM A307

2.5 FINISH: Apply one thorough and complete coat of #10-1009 Gray Primer, Tnemec Company, Inc. All moisture, scale, rust, grease, or mud shall be removed before painting. Wire brush or sandblast if necessary. Shop coat is not to be omitted at piece marks. Shop coat is to be omitted at areas to be field welded, contact surfaces within friction type connections, welded shear studs and all surfaces to be permanently embedded in concrete or covered by sprayed-on fire proofing. Note: Minimum thickness per coat of paint shall not be less than 2 mil. Paint thickness shall be verified by an independent testing laboratory accepted by the Engineer and paid for by this Contractor. Exterior lintels and other exposed members shall be hot dipped galvanized at the rate of 1.25 oz. per square foot of surfacing in compliance with ASTM A-123 or A-153 as applicable.

2.6 SHEAR CONNECTOR STUDS: 3/4" diameter x 3-1/2" long headed solid flux shear connector studs, Nelson Division of TRW, Inc.

2.7 STRUCTURAL TUBING: ASTM A500 Grade B.

2.8 STRUCTURAL PIPE: ASTM A53 Grade B.

3.0 PART 3 – EXECUTION

3.1 WORKMANSHIP: Care shall be exercised at all times to avoid damage through careless handling during unloading, storing, and erecting. Dropping of steel will not be permitted. Damaged steel will be replaced at no cost to the General Contractor or the Owner. Provide adequate equipment to perform work without damage to construction and provide complete safety for public, personnel, and property.

3.2 INSTALLATION

- A. Provide temporary cable bracing with turnbuckles in sufficient numbers to prevent distortion or damage to the framework due to wind or erection forces. These cables shall be used to plumb and line columns before final bolting and shall be left in place to insure the lateral stability of the building.

- B. Field burning of holes is prohibited. Field correction of holes by drilling and reaming only.
- C. Field weld all slotted connections after final adjustment.
- D. All columns must be plumb before final bolting. After tightening anchor bolts, upset threads to lock.
- E. Field painting of structural steel is not required, except for:
 - 1. Touch-up field welds, bolts, abrasions of shop coat, etc. to provide complete coverage.
 - 2. Touch-up paint is to be the same as the shop coat.
 - 3. All touch-up painting is to be completed before the Erector leaves the site.

END OF SECTION 051200

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wood blocking and nailers.

1.2 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 15 percent.

- C. Dimension Lumber Items: Construction or No. 2 grade lumber of any of the following species:
 - 1. Hem-fir (north); NLGA.
 - 2. Mixed southern pine or southern pine; SPIB.
 - 3. Hem-fir; WCLIB or WWPA.

2.2 PLYWOOD

- A. APA B C, Group 1, "Exterior Type" thickness as indicated on drawings for exterior use of where plywood will be subjected to moisture or high humidity. Uses: Roof decking/blocking and sheathing.

2.3 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat ONLY items in immediate direct contact with masonry or concrete.
- E. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- F. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.4 FASTENERS

- A. General: Fasteners shall be of size and type indicated on drawings and shall comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
 - 2. Expansion anchors: Meeting Federal Spec. FF-S-325, Group II Type 4 Class 1. Material to be Stainless steel. Use: Anchoring to cast in place concrete.

3. Sleeve Anchors: Meeting Federal Spec. FF-S-325, Group II, Type 3, Class 3. Material to be Stainless steel. Head type as appropriate for application. Use: Anchoring to masonry.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Where wood-preservative-treated lumber is installed adjacent to ferrous metal decking or structural components, install continuous membrane separator between wood and metal. (40 mil PVC, EPDM, polyethylene or asphaltic membrane is acceptable)
- B. Builders Hardware: The contractor shall furnish all rough hardware such as nails, screws, bolts, etc. as required to complete the work.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated on drawings and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates as detailed on drawings. Generally, Generally anchor spacing to not be greater than 16" O.C. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Nailers, blocking or furring set to the deck, slab, or wall may be fastened with drive screws, except where bolting is indicated on the drawings.
- D. Nailing: In accordance with industry standards of good practice.

3.3 PROTECTION

- A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 074100 - PREFORMED ROOF - WALL PANELS

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

- A. This section covers the pre-finished, pre-fabricated exposed fastener metal roof and wall system. All metal trim, accessories, fasteners, insulation and sealants indicated on the drawings as part of this section.
- B. Drawings and general provisions of the Contract, including general and Supplementary Conditions and Division 01 Specifications, apply to this section.

1.2 SUMMARY

- A. Section Includes
 - 1. Factory formed exposed fastener metal roof and wall panels

1.3 DEFINITIONS

- A. Metal Roof/Wall Panel Assembly: Metal roof/ panels, attachment system components, miscellaneous metal framing, thermal, and accessories necessary for a complete weathertight roofing system.
- B. References:
 - 1. American Society for Testing and Materials (ASTM)
 - a. ASTM A 792: Steel Sheet, Aluminum-Zinc Alloy Coated by the Hot Dip Process
 - b. ASTM B 209: Aluminum and Aluminum Alloy Sheet and Plate
 - 2. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
 - a. SMACNA Architectural Sheet Metal Manual, 1993 edition
 - 3. American Iron and Steel Institute (AISI)
 - a. AISI Cold Formed Steel Design Manual
 - 4. Aluminum Association
 - a. Aluminum Design Manual
 - 5. Metal Construction Association
 - a. Preformed metal Wall Guidelines
 - 6. Code References
 - a. ASCE, Minimum Loads for Buildings and Other Structures
 - b. BOCA National Building Codes
 - c. UBC Uniform Building Code
 - d. SBC Standard Building Code

1.4 QUALITY ASSURANCE

- A. Manufacturer and erector shall demonstrate experience of a minimum of five (5) years in this type of project.
- B. Panels shall be factory-produced only. No portable, installer-owned or installer-rented machines will be permitted.

1.5 SUBSTITUTIONS

- A. The material, products and equipment specified in this section establish a standard for required function, dimension, appearance and quality to be met by any proposed substitution.

1.6 SYSTEM DESCRIPTION

- A. Material to comply with:

1. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate - .040 Aluminum

1.7 ROOF SYSTEM PERFORMANCE TESTING

- A. General Performance: Metal roof/wall panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation or other defects in construction.

1.8 WARRANTIES

- A. Finish warranty: Manufacturer's standard form in which manufacturer agrees to repair finish or replace standing seam metal panels that show evidence of deterioration of factory-applied finish within specified warranty period.
 1. Exposed Panels Finish – deterioration includes the following:
 - a. Color fading more than 5 hunter units when tested according to ASTM D 2244
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214
 - c. Cracking, checking, peeling or failure of a paint to adhere to a bare metal.
 2. Warranty Period: 30 Years from the date of substantial completion

1.9 SUBMITTALS

- A. Furnish detailed drawings showing profile and gauge of exterior sheets, location and type of fasteners, location, gauges, shape and method of attachment of all trim locations and types of sealants, and any other details as may be required for a weather-tight installation.
- B. Provide finish samples of all colors specified.
- C. Shop drawings: Show fabrication and installation layouts of metal roof panels, metal wall panels or metal soffit panels, details of edge conditions, side-seam joints, panel profiles, corners, anchorages, trim, flashings, closures and accessories, and special details. Distinguish between factory and field-assembled work

1.10 DELIVERY, STORAGE AND HANDLING

- A. Ordering: Comply with manufacturer's ordering instruction and lead time requirements to avoid construction delays.
- B. Deliver components, sheets, metal roof/wall panels and other manufactured items so as not to be damaged or deformed. Package metal roof/wall panels for protection during transportation and handling.
- C. Unload, store and erect metal roof/wall panels in a manner to prevent bending, warping, twisting and surface damage.
- D. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof/wall panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting or other surface damage.
- E. Protect strippable protective coating on any metal coated product from exposure to sunlight and high humidity, except to the extent necessary for material installation.

1.11 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

1.12 COORDINATION

- A. Coordinate sizes and locations of equipment supports and penetrations with actual equipment provided.

PART 2 – PRODUCTS

2.1 PANEL DESIGN

- A. General: Provide factory-formed, prefinished, lappable exposed fastener, structural ribbed metal roof/wall panel system, that has been pretested and certified by manufacturer to comply with specified requirements under installed conditions.
- B. Roof panels shall be exposed fastener
 - 1. Panel with $\frac{3}{4}$ " deep profile ribs, 6" on center, total coverage of Roof/Wall panels when installed shall be 36".
- C. Structural Requirements: Engineer panels for structural properties in accordance with latest edition of American Iron and Steel Institute's Cold Formed Steel Design Manual using effective width concept and Aluminum Associations Aluminum Design Manual.
- D. Forming: Use continuous end rolling method. No end laps on panels. No portable rollforming machines will be permitted on this project, no installer-owned or installer-rented machines will be permitted. It is the intent of the Architect to provide Factory-Manufactured panel systems only for this project.
- E. Panels shall be directly fastened to the substrate.
- F. The panel shall have an overlapping sidelap feature.

2.2 ACCEPTABLE MANUFACTURERS

- A. Design Make: Petersen Aluminum Corporation or approved equal.
 - 1. M-36 Panel

2.3 MATERIALS AND FINISHES

- A. Preformed roofing panels shall be fabricated of .040 Aluminum.
- B. Color to be selected from the manufacturer's full standard range. WHITE
- C. Texture: Panel shall be smooth.
- D. Finish shall be Kynar 500 or Hylar 5000 Fluorocarbon coating with a top side film thickness of 0.70 to 0.90 mil over a 0.25 to 0.3 mil prime coat to provide a total dry film thickness of 0.95 to 1.25 mil, to meet AAMA 621. Bottom side shall be coated with a primer with a dry film thickness of 0.25 mil. Finish shall conform to all tests for adhesions, flexibility and longevity as specified by Kynar 500 or Hylar 5000 finish supplier.
- E. Strippable coating to be applied on the pre-finished panels to the top side to protect the finish during fabrication, shipping and handling, film shall be removed before installation.
- F. Trim: Trim shall be fabricated of the same material and finish to match the profile, and will be press broken in lengths of 10 to 12 feet. Trim shall be formed only by the manufacturer of their approved dealer. Trim to be erected in overlapped condition. Use lap strips only as indicated on drawings. Miter conditions shall be factory welded material to match the sheeting. Trim to be fabricated in accordance with standard SMACNA procedure and details.
- G. Closures: shall be pre-molded polyethylene to match the profile of the exposed fastener panel and shall be in lengths as supplied by the panel manufacturer.
- H. Accessories/Fasteners: Fasteners shall be of type, material, size, corrosion resistance, holding power and other properties required to fasten miscellaneous framing members to substrates. Accessories and their fasteners shall be capable of resisting the specified design wind uplift forces and shall allow for thermal movement of the roof panel system. Exposed fasteners shall not restrict free movement of the roof panel system resulting from thermal forces, except at designed points of roof panel fixity
 - 1. Fasteners shall have combination steel and EPDM washers
 - 2. Screws for panel to girt/purlins shall be sufficient to penetrate the supporting member

by 1". All fasteners shall be applied in accordance with the fastening schedule as provided by panel manufacturer.

3. Screws for flashings and sidelaps shall be #14 HHA x 3/4" sheet metal stitch screws. All accessories, flashings and sidelaps shall be fastened 12" OC.

I. Substrate shall be:

1. Metal suspended system.

2.4 FABRICATION

- A. Comply with dimensions, profile limitations, gauges and fabrication details shown and if not shown, provide manufacturer's standard product fabrication.
- B. Fabricate components of the system in factory, ready for field assembly.
- C. Fabricate components and assemble units to comply with fire performance requirements specified.
- D. Apply specified finishes in conformance with manufacturer's standard, and according to manufacturer's instructions.
- E. Panels are lappable. It is recommended that individual aluminum roof panels not exceed 16' in length and steel roof panels not exceed 32' in length for thermal movement reasons.
- F. Panels shall be roll formed on a stationary industrial type rolling mill to gradually shape the sheet metal. Portable rollformers rented or owned by the installer, are not acceptable.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine alignment of structural steel and related supports, primary and secondary roof framing, solid roof sheathing, prior to installation. Components should comply with shop drawings and be smooth, even, sound and free of depressions.
- B. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FASTENERS

- A. Secure units to supports
- B. Place fasteners as indicated in manufacturer's standards.

3.3 INSTALLATION

- A. Panels shall be installed plumb and true in a proper alignment and in relation to the structural framing. The erector must have at least five years successful experience with similar applications.
- B. Install metal panels, fasteners, trim and related sealants in accordance with approved shop drawings and as may be required for a weather-tight installation. Conform to standards set forth in SMACNA architectural sheet metal manuals and approved shop drawings for this project.
- C. Remove all strippable coating and provide a dry-wipe down cleaning of the panels as they are erected.
- D. Install panel system so it is watertight, without waves, warps, buckles or distortions, and allow for thermal movement considerations.
- E. Abrasive devices shall not be used to cut on or near roof or wall panel system.
- F. Apply sealant tape or caulking as necessary at flashing and panel joints to prevent water penetration.
- G. Remove any strippable film immediately upon exposure to direct sunlight.

3.4 DAMAGED MATERIAL

- A. Upon determination of responsibility, repair or replace damaged metal panels and trim to the satisfaction of the Architect and Owner.

END OF SECTION 07410

SECTION 075323 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

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. Adhered ethylene-propylene-diene-terpolymer (EPDM) roofing system.
2. Substrate board.
3. Vapor retarder.
4. Roof insulation.
5. Cover board.
6. Miscellaneous roof system accessories.

- B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking and for wood-based, structural-use roof deck panels.
2. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
3. Section 077100 "Roof Specialties" for manufactured copings and roof edge flashings.
4. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Construction Manager, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.

3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. For insulation and roof system component fasteners, include copy of FM Approvals' listing.
- B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following: Photocopies of Architect's drawings or manufacturer's standard details are NOT acceptable. Include determined height of roof edge(s) as part of Shop Drawings.
 1. Layout and thickness of flat and tapered insulation with slopes indicated.
 2. Roof edge condition indicating project specific flashing and blocking requirements.
 3. Base flashings and membrane terminations.
 4. Flashing details at penetrations.
 5. Roof plan showing orientation of steel roof deck and orientation of roof membrane and fastening spacings and patterns for mechanically fastened roofing system.
 6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
 7. Clearly identify vapor/air barrier continuity across each joint, including materials and accessories to securely secure membrane and to provide enough flexibility at joint to accommodate movement capability expected at joint.
 8. Tie-in with air barrier.
- C. Samples for Verification: ONLY if requested by Architect, for the following products:
 1. Roof membrane and flashings of color required.
 2. Walkway pads or rolls, of color required.
- D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer. Signed by the roofing system manufacturer on company letterhead, certifying that the Installer is approved, authorized, and licensed by the manufacturer to install roofing system.

B. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer on company letterhead, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of complying with performance requirements.
2. Special Warranty Certificate: Signed by roof membrane manufacturer on company letterhead, certifying that all materials supplied under this Section are acceptable for special warranty.

C. Product Test Reports: For components of roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.

D. Evaluation Reports: For components of roofing system, from ICC-ES.

1. Field Test Reports:
2. Concrete internal relative humidity test reports.
3. Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.

E. Field quality-control reports.

F. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.
- B. Certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section, where applicable.
- C. Manufacturer's Inspection Report: Copy of roofing manufacturer's inspection report of completed roofing installation, following the final inspection.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: The EPDM membrane roofing system must achieve a UL Class A rating and be installed to Factory Mutual Standards.
- B. The specified roofing assembly must have been successfully tested by a qualified testing agency (ANSI/FM 44747) to resist the design uplift pressures calculated to state adopted:
 1. American Society of Civil Engineers (ASCE 7)
 2. International Building Code (IBC)
 3. Minimum accepted assembly uplift rating is 90-lbs/sqft or minimum accepted assembly uplift rating must be equal to or higher than calculated design uplift pressures shown on the drawings.

- C. **Installer Qualifications:** A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty. Unless otherwise noted in this specification, the roofing contractor must strictly comply with the manufacturer's current specifications and details.
 - 1. The roofing applicator shall be thoroughly experienced and upon request, be able to provide evidence of having at least ten (10) years successful experience installing single-ply EPDM roofing systems and having installed at least ten (10) roofing applications of similar or equal scope.
- D. **Source Limitations:** Obtain components for membrane roofing system from same manufacturer as roofing membrane or company approved by roofing membrane manufacturer.
- E. **Proximity:** Roofing contractors must have a working office and warehouse location within 200 miles of project location to ensure prompt service of any potential issues or emergencies.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.
- E. Retain delivery tickets and one each of roofing system component labels with manufacturer's name, part number, description, and dates of manufacturer and delivery for future reference if warranty claims are required. Such labels should be kept with warranty papers in safe location in Owner's possession.

1.10 FIELD CONDITIONS

- A. **Weather Limitations:** Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
- B. **Material Safety Data Sheets (MSDS)** must be on location at all times during the transportation, storage and application of materials.

- C. Proceed with work so new roofing materials are not subject to construction traffic. When traffic is unavoidable, the contractor shall protect new roof sections and inspect upon completion for possible damage.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form, with "No Dollar Limit" (NDL), in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks that must be responded to within twelve hours by original roofer or Owner shall engage the services of available roofer to make necessary repairs that shall be back-charged to roofer who originally installed the roof system.
 - 1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, cover boards, substrate board, walkway products, and other roof accessories or components of roofing system.
 - 2. Warranty Period: Thirty (30) year, 90 mph measured at 10 meters above ground level, NDL, Total Systems Warranty covering both labor and material from the Date of Substantial Completion.
 - a. Include the membrane manufacturer's standard puncture and hail resistant warranty.
 - b. Include a forty (40) year non-prorated membrane material warranty on the field membrane.
 - c. Certification is required with submittals indicating the manufacturer has reviewed and agreed to such wind coverage. All products, accessories, and edgings must be manufactured and/or supplied by the roofing system manufacturer and covered by the warranty.
- B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roof membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, walkway products, and other roof accessories or components for the following warranty period:
 - 1. Warranty Period: Two (2) years from Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing system and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and flashings shall remain watertight.
 - 1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.

2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746, ASTM D4272, or the Resistance to Foot Traffic Test in FM Approvals 4470.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.
- C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897.
- D. FM Approvals' RoofNav Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.
 1. Fire/Windstorm Classification: Class 1A-90.
 2. Hail-Resistance Rating: FM Global Property Loss Prevention Data Sheet 1-34 - SH.
- E. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in SPRI's Directory of Roof Assemblies for roof assembly identical for that specified for this Project.
- F. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- G. Fire-Resistance Ratings: Comply with ASTM E 119 fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.2 MANUFACTURERS

- A. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include:
 1. Carlisle SynTec Incorporated.
 2. Firestone Building Products Company.

2.3 ETHYLENE-PROPYLENE-DIENE-TERPOLYMER (EPDM) ROOFING

- A. EPDM Sheet: ASTM D4637/D4637M, Type I, nonreinforced, EPDM sheet with factory-applied seam tape.
 1. Thickness: 90 mils, nominal.
 2. Exposed Face Color: Black.
 3. Source Limitations: Obtain components for roofing system from roof membrane manufacturer or manufacturers approved by roof membrane manufacturer.
 4. The following is a listing of ASTM Minimum Requirements for EPDM membrane:
 - a. Tolerance on Nominal Thickness per D412 is +/- 10 percent.

- b. Tensile Strength per D412 is 1600psi for 90 mil.
- c. Factory Seam Strength per Modified ASTM D816 Membrane Rupture.
- d. Elongation, Ultimate per D412 is 465 percent.
- e. Tearing Strength per D624 is 200 lbf/in.
- f. Ozone Resistance per D1149 No Cracks.
- g. Properties after Heat Aging per D-573/751 pass.
- h. Resistance to Water Absorption Maximum per D471 is +/-2 percent of mass.
- i. Water Vapor Permeance per E96 shall be 0.03 or less.
- j. Fungi Resistance per ASTM G21 shall be 0.

2.4 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
 - 1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: 60-mil-thick, pressure-sensitive, uncured EPDM w clear poly release liner, width according to application.
- C. Protection Sheet: Epichlorohydrin or neoprene nonreinforced flexible sheet, 55 to 60 mils thick, recommended by EPDM manufacturer for resistance to hydrocarbons, non-aromatic solvents, grease, and oil.
- D. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer, pressure-sensitive, cured, pre-molded EPDM flashing with manufacturer's tape applied to undersize of deck flange, in size appropriate for the penetration.
- E. Bonding Adhesive: Manufacturer's standard, low-VOC high-strength solvent-based contact adhesive.
- F. Low-Rise, Urethane, Membrane Adhesive: Roof system manufacturer's standard spray-applied, low-rise, two-component urethane adhesive formulated for compatibility and use with membrane roofing.
- G. Seaming Material: Manufacturer's standard, synthetic-rubber polymer primer and 6-inch- wide minimum, butyl splice tape with release film. Factory-applied 6-inch-wide seam tape, as recommended by manufacturer.
- H. Lap Sealant: Manufacturer's standard, single-component heavy-bodied gun-consistency sealant, colored to match membrane roofing.
- I. Primer: Manufacturer's standard, low-VOC solvent-based primer for one-step cleaning and priming of membrane surfaces.
- J. Water Cutoff Mastic: Manufacturer's standard one-component, low-viscosity, self-wetting butyl blend mastic sealant.

- K. Metal Termination Bars: Manufacturer's standard, 6063-T6 extruded aluminum bar with top-edge designed for application of sealant, approximately 1 by 1/8-inch thick; pre-punched at 6: on center for anchors.
- L. Miscellaneous Accessories: Provide pressure-sensitive inside/outside corner sheet flashing, pressure-sensitive T-joint covers and joint tape, pourable sealers, preformed cone and vent sheet flashings, reinforced EPDM securement strips, in-seam sealants, termination reglets, cover strips, and other accessories.

2.5 SUBSTRATE BOARDS (THERMAL BARRIER)

- A. Substrate Board: ASTM C1278, impact resistant, non-structural, fiber-reinforced gypsum board manufactured with a 95% certified recycled content, with moisture and mold resistance throughout the panel core and surface. Tested in accordance with ASTM E-84, non-combustible when tested in accordance with ASTM E-136, and UL Classified when tested in accordance with ASTM E-119.
 - 1. Thickness: Type X, 5/8 inch.
- B. Product: Subject to compliance with requirements, provide "Securock" by Carlisle Syntec, or Architect approved equal.
- C. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate panel to roof deck.

2.6 COVER BOARDS

- A. Substrate Board: ASTM C1278, impact resistant, non-structural, fiber-reinforced gypsum board manufactured with a 95% certified recycled content, with moisture and mold resistance throughout the panel core and surface. Tested in accordance with ASTM E-84, non-combustible when tested in accordance with ASTM E-136, and UL Classified when tested in accordance with ASTM E-119.
 - 1. Thickness: 1/2 inch.
- B. Product: Subject to compliance with requirements, provide "Securock" by Carlisle Syntec, or Architect approved equal.

2.7 VAPOR RETARDER / TEMPORARY ROOF

- A. Self-Adhering-Sheet Vapor Retarder: ASTM D1970/D1970M, 5-mil woven polyethylene film laminated to 35 mils self-adhering rubberized asphalt, for a 40-mil-total thickness; cold applied, with a slip-resisting surface and release silicone release liner/backing. Provide standard solvent-based, high-tack adhesive primer recommended by vapor retarder manufacturer.
 - 1. Tensile Strength: ASTM D412 is 250 psi.
 - 2. Elongation: ASTM D412 is 250%.
 - 3. Peel Adhesion: ASTM D903 is 5 lbs/in.
 - 4. Puncture Resistance: ASTM E154 is 60 lbs.
 - 5. Permeability: ASTM D1970 is 0.015 perms.

6. Air Permeance: ASTM E2178 is 0.000 L*m²@75 Pa

- B. Product: Subject to compliance with requirements, provide “VapAir Seal 725TR” by Carlisle Syntec, or Architect approved equal.

2.8 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by EPDM roof membrane manufacturer, approved for use in FM Approvals'.
- B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
1. Compressive Strength: 20 psi.
 2. Size: 48 by 48 inches.
 3. Long Term Thermal Resistance, R-value: 5.7 per inch.
 4. Thickness:
 - a. Base Layer: 3-inches unless otherwise indicated.
 - b. Upper Layer: Thickness indicated in plan but at no point shall system result in an R-value less than 30.
- C. Tapered Insulation: Provide factory-tapered insulation boards.
1. Material: Match roof insulation.
 2. Minimum Thickness: 1/4 inch.
 3. Slope:
 - a. Roof Field: 1/4 inch per foot unless otherwise indicated on Drawings.
 - b. Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings.
- D. Product: Subject to compliance with requirements, provide “Insulbase” by Carlisle Syntec, or Architect approved equal.

2.9 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.
- B. Fasteners: Factory-coated steel fasteners and metal plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening components to substrate, and acceptable to roofing system manufacturer.
1. Metal Deck: To attach insulation to metal deck or substrate board (thru thermal barrier and vapor barrier) using no. 12 diameter, no 3 hex-head, self-tapping screw with 3x3 inch square galvalume plate per Federal Specification 4470.
- C. Insulation Cold Adhesives: Manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
1. Full-spread, spray-applied, low-rise, two-component polyurethane expanding foam adhesive to preserve full warranty.

2. Apply adhesive in full-coverage spray or ribbon method at four (4) inches on center maximum in the field, perimeter, and corners.
- D. Provide preformed sumps, saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated

2.10 WALKWAYS

- A. Flexible Walkways: Factory-formed, pressure-sensitive, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads, approximately 3/8-inch thick and acceptable to roofing system manufacturer.
 1. Size: Approximately 30 by 30 inches.
 2. Color: Manufacturer's standard.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 053100 "Steel Decking."
 4. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
 5. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than 75 percent, or as recommended by roofing system manufacturer when tested according to ASTM F2170.
 - a. Test Frequency: One test probe per each 1000 sq. ft., or portion thereof, of roof deck, with not less than three test probes.
 - b. Submit test reports within 24 hours of performing tests.
 6. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.
 7. Verify any damaged sections of cementitious wood-fiber decks have been repaired or replaced.
 8. Verify adjacent cementitious wood-fiber panels are vertically aligned to within 1/8 inch at top surface.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.
 - 1. Metal decking, including flutes shall be cleaned of all dirt, materials of any kind or debris, with existing roofing fasteners removed.
 - 2. All decks shall be broom cleaned and blown-off with compressed-air to be free of dust and debris.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Perform fastener-pullout tests according to roof system manufacturer's written instructions.
 - 1. Submit test result within 24 hours of performing tests.
 - a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

3.3 INSTALLATION OF ROOFING, GENERAL

- A. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- B. Install roof membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing roofing system.
- C. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified under Section 07.
- D. Any damage to interior and/or contents of building being re-roof, due to temporary seal or faulty workmanship shall be the responsibility of roofing installer. Roof shall remain free of leaks throughout installation period, until Substantial Completion, at which time the Warranty period shall commence.

3.4 INSTALLATION OF SUBSTRATE BOARD (THERMAL BARRIER)

- A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches in adjacent rows.
 - 1. At steel roof decks, install substrate board at right angle to flutes of deck.
 - a. Locate end joints over crests of steel roof deck.
 - 2. Tightly butt substrate boards together.

3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.
4. Mechanically fasten substrate board to wood decks and top flanges of steel deck according to recommendations in FM Approvals' listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29.
 - a. Fasten substrate board to deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions but no less than 1 every 2 square feet in the field and perimeter and 1 every square foot in the corners.

3.5 INSTALLATION OF VAPOR RETARDER / TEMPORARY ROOF

- A. Self-Adhering-Sheet Vapor Retarder: Prime all surfaces to receive the vapor barrier with NYS VOC OTC compliant primer. Apply the primer with long nap roller at the recommended coverage rate. Install self-adhering-sheet vapor retarder in a shingle fashion over area to receive vapor retarder, side and end lapping each sheet a minimum of 3-1/2 and 6 inches, respectively.
 1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board, unless indicated otherwise.
 2. Immediately after installation, roll with a 100-150 pound weighted steel roller. There shall be no gaps in the vapor barrier application.
- B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system. Apply compatible sealant acceptable to the manufacturer where required to maintain an air/water tight seal.
- C. Apply self-adhering/self-healing vapor retarder over the side and top of wood blocking or other support systems forming roof curbs.
- D. Apply self-adhering/self-healing vapor barrier at thru-wall flashing locations to maintain continuity of roof air barrier with wall air barrier. Provide for design movement and deflection joints.
- E. In order to preserve the integrity of the building envelope, overhang the edge of vapor retarder 24-inches minimum, without removing release paper. Fold down and temporarily secure to wall or underside of deck without removing release paper for future adhesion by Roofing Contractor over air barrier applied to the wall below.
 1. Vapor barrier shall be continuous around the entire perimeter of the building.
 2. Follow the wall air barrier manufacturer's instructions for length of exposure to the elements.
 3. Once walls are erected and the wall air barrier is in place, roofing contractor shall unroll previously secured 24-inch remnant of roofing self-adhered vapor barrier and install it in shingle-fashion over wall air barrier to establish a continuous air-tight seal.

3.6 INSTALLATION OF INSULATION

- A. Coordinate installing roofing system components, so insulation is not exposed to precipitation or left exposed at end of workday.

- B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Installation Over Metal, Wood, or Cementitious Wood-fiber Decking:
 - 1. Following installation of substrate board and vapor retarder, install base layer of insulation with joints staggered not less than 24 inches in adjacent rows and end joints staggered not less than 12 inches adjacent rows and with long joints continuous at right angle to flutes of (metal) decking.
 - 2. Where overall insulation thickness is 4-inches or greater, install 2 or more layers with joints of each succeeding layer staggered as described. Strict care must be taken to make sure that all insulation and coverboards lay flat and are in an even plane with adjacent boards. Boards out of plane must be replaced or reset.
 - a. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks. Insulation shall be set and trimmed so that water flow is unrestricted.
 - b. Make joints between adjacent insulation boards not more than 1/4 inch (6 mm) in width.
 - c. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - d. Fill gaps exceeding 1/4 inch with spray insulation.
 - e. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - a. Adhere base layer of insulation to substrate using two-component, low-rise, expanding polyurethane adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
 - 1) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive or maximum 4" on-center ribbon bead of adhesive in the field, perimeter and corners, firmly pressing and maintaining insulation in place.
 - 3. Install upper layers of insulation and tapered insulation where indicated with joints of each layer offset not less than 12 inches from previous layer of insulation.
 - a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
 - b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
 - c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks. Insulation shall be set and trimmed so that water flow is unrestricted.
 - d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - f. Fill gaps exceeding 1/4 inch with insulation.
 - g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - h. Adhere each layer of insulation to substrate using two-component, low-rise, expanding polyurethane adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

- 1) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive or maximum 4" on-center ribbon bead of adhesive in the field, perimeter and corners, firmly pressing and maintaining insulation in place.
4. Strict care must be taken to ensure that all insulation and cover boards lay flat and are in an even plane with adjacent boards. Apply adhesive per manufacturer's recommendations. Walk the boards into the adhesive and roll using a 30" wide, 150 pound weighted steel roller to ensure full embedment.

3.7 INSTALLATION OF COVER BOARDS

- A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.
 1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks. Trim cover so that water flow is unrestricted.
 2. At internal roof drains, conform to slope of drain sump.
 3. Cut and fit cover board tight to nailers, projections, and penetrations.
 4. Loosely lay cover board over substrate.
 5. Adhere cover board to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
 - a. Set cover board in a uniform coverage of full-spread insulation adhesive or maximum 4" on-center ribbon bead of adhesive, firmly pressing and maintaining insulation in place.

3.8 INSTALLATION OF ADHERED ROOF MEMBRANE

- A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll membrane roof membrane and allow to relax before installing.
- C. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.
- E. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeters.
- F. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- G. Membrane Splicing: Factory 6-inch Pre-Applied Splice Tape is required. All details and splice procedures as per the specified warranty. No exceptions or deviations.

1. Overlap adjacent sheets, mark line, clean the dry splice area of membrane with primer as required by the membrane manufacturer.
 2. Apply primer to the membrane and press membrane and tape onto the sheet using hand pressure. Remove the release film and press the top sheet onto the tape using hand pressure. Roll the seam toward the splice edge with steel roller.
 3. Splice intersections are to be overlaid with a layer of 6"x6" and a 12"x12" pressure-sensitive flashing.
 4. All field membrane splices, including factory applied tape splices, flashing splices and membrane terminations are to be sealed with lap sealant, making sure the lap seal edge extends the entire length of all splices. (Thermoset factory splices do not apply).
- H. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- I. Spread sealant or mastic bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.9 INSTALLATION OF BASE FLASHING

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.10 INSTALLATION OF WALKWAYS

- A. Flexible Walkways: Install walkway products according to manufacturer's written instructions.
 1. Install flexible walkways at the following locations:
 - a. Perimeter of each rooftop unit where indicated.
 - b. Top and bottom of each roof access ladders, doors, and hatch.
 - c. Other locations indicated on Drawings.
 - d. As required by roof membrane manufacturer's warranty requirements.
 2. Provide 6-inch clearance between adjoining pads.
 3. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.11 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on an interim basis and at completion, and to prepare inspection report for submission to the Roofer with a copy to the Architect.
- B. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- C. On Phased roofing, when the completion of flashings and terminations is not achieved by the end of the workday, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.12 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing system, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.
- D. Provide daily clean-up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.
- E. Provide a fine broom final cleaning of all roofing membrane, flashing, and metal surfaces prior to final inspection. Additional stain removal, spot-cleaning, or shop-vacuuming of surfaces may be required as determined by the Architect.

3.13 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 - 1. Owner: **<Insert name of Owner>**.
 - 2. Address: **<Insert address>**.
 - 3. Building Name/Type: **<Insert information>**.
 - 4. Address: **<Insert address>**.
 - 5. Area of Work: **<Insert information>**.

6. Acceptance Date: _____.
7. Warranty Period: **<Insert time>**.
8. Expiration Date: _____.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. lightning;
 - b. peak gust wind speed exceeding **<Insert mph>**;
 - c. fire;
 - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. vapor condensation on bottom of roofing; and
 - g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.

6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____.
2. Name: _____.
3. Title: _____.

END OF SECTION 075323

SECTION 076200 - SHEET METAL FLASHING AND TRIM

1.0 PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pre-manufactured formed low slope sheet metal fabrications.
2. Pre-manufactured counterflashing.

1.2 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Install roof edge flashing and copings capable of resisting wind uplift forces indicated.
- C. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.

1.3 SUBMITTALS

- A. Shop Drawings: Show manufacturer's cut sheets and installation layouts of pre-manufactured components including plans, elevations, expansion-joint locations, and keyed details. Include the following:
1. Identification of material, thickness, weight, and finish for each item and location in Project.
 2. Details of termination points and assemblies, including fixed points.
 3. Details of control joint covers, including direction of slope.
 4. Details of connections to adjoining work.
- B. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
1. Pre-manufactured components: 6x6 inch material sample of same material thickness and color as is to be used for each component within the assembly. Labeled for clarity.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

B. Special Warranty.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employee skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose projects have a record of successful in-service performance.
- B. Metal Edge Quality Assurance: High performance gravel stop, coping, and other terminations shall be CERTIFIED by the gravel stop manufacturer to comply with ANSI/SPRI Standard ES-1-98. Roof edge gravel stop, coping, and other terminations shall meet performance design criteria according to the following test standards:
 - 1. ANSI/SPRI ES-1-98 Test Method RE-2 Pull-Off Test for Fascia: The fascia system shall be tested in accord with the ANSI/SPRI ES-1-98 Test Method RE-2. Use the current edition of ANSI/SPRI ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
 - 2. FMRC Loss Prevention Data Sheet 1-49 "Perimeter Flashing." The fascia product shall be listed in current Factory Mutual Research Corporation Approval Guide.
- C. Mockups: If requested by the Architect, build mockups to verify selections made, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Build mockup of typical roof edge, including built-in gutter, fascia, fascia trim, coping, approximately 10 feet long, including supporting construction cleats, seams, attachments, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.7 WARRANTY

- A. All metal roof edge sheet metal and trim shall be included in and part of the Roof System Manufacturer's Total System Warranty covering both labor and material with no dollar limitation as described in roof membrane specification.

- B. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to the following:
 - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from the date of Substantial Completion.

1.8 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surfaces.
 - 1. Exposed Coil-Coated Finish:
 - 1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2.0 PART 2 - PRODUCTS

2.1 PRE-MANUFACTURED ROOF EDGE AND COPING

- A. Provide roof system manufacturer's pre-manufactured roof edge and coping w/ drip edges and components with manufacturer's fluoropolymer coating system.
 - 1. Coping system: Minimum .050 aluminum coping with 20 gauge galvanized steel spring and support cleats and chairs. The system shall be watertight with concealed splice plates and no exposed fasteners. Concealed splice plate with factory applied dual non-curing sealant strips at each joint.
 - a. Provide factory fabricated and formed water dams at copings ending against walls. Seal watertight with silicone sealant.
 - b. Tested, certified and warrantied to exceed design wind pressure as calculated in accordance with the current edition of ANSI/SPRI/FM 4435/ES-1 Wind Design Standard for Edge Systems used with Low-Slope Roofing Systems.

- c. Design Make: SecurEdge Coping by Carlisle Syntec
- 2. Fasteners to be stainless steel ring shank nails 1.5" in length.
- 3. Component lengths to be 12'-0" typical.
- 4. Provide factory fabricated end wall coping, mitered and welded coping corners (inside/outside); typical corners are 90 degrees with others as shown on plans.
- 5. Provide factory fabricated scuppers and accessories to match system and as shown on plans.
- 6. Color: As Selected by Architect from manufacturer's full range of standard color selections.
 - a. Minimum of 26 color selections.
- B. Fasteners:
 - 1. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
 - 2. Fasteners for Aluminum Sheet: Series 300 stainless steel.
 - 3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

2.2 MANUFACTURED COUNTER FLASHING

- A. Provide 1-piece manufactured surface mount type wall counterflashing system as follows:
 - 1. Design Make: Securedge 1-Piece Counterflashing by Carlisle Syntec.
 - 2. Material: .040-inch thick aluminum.
 - 3. Height: 5-5/8-inch unless indicated otherwise.
 - 4. Fabricate continuous in minimum 12-feet long sections. Fabricate discontinuous lintel, sill and similar flashings to extend 6" beyond each side of wall openings; and form with 2" high end dams. Provide with slotted holes at 12-inches on center.
 - a. Prenotched Lap Joints: 3 inches.
 - 5. Color: As selected by Architect from manufacturer's full range of standard color selections.

2.3 FABRICATION, GENERAL

- A. General: Custom fabrication of sheet metal flashing and trim may be done by an Authorized fabricator listed with NRCA's ANSI/SPRI ES-1 Certification.

- B. Sealed Joints: Form movable joints in metal to accommodate elastomeric sealant.
- C. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- D. Fabricate continuous cleats not less than thickness of metal being secured and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- E. Do not use graphite pencils to mark metal surfaces.

3.0 PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Fabricated cleats shall be continuous. Cleats shall be the same or greater thickness than the face metal. Anchor cleats with stainless steel ring shank nails at 6" O.C.
 - 4. Fascia metal deeper than 7.5" shall be increased to .060.
 - 5. Torch cutting of sheet metal flashing and trim is not permitted.
 - 6. Do not use graphite pencils to mark metal surfaces.

- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
 - 1. Coat back side of uncoated aluminum sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection.
- D. Seal splice plate joints with (2) beads of sealant on each side of the joint.

3.3 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with manufacturer's written installation instructions, FMG Loss Prevention Data Sheet 1-49, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Continuous Cleats: To be anchored to substrate at 3-inch centers.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner by means of snap-in installation and sealant.

3.4 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.
 - 1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
 - 2. Extend counterflashing 4 inches (100 mm) minimum over base flashing.

3. Lap counterflashing joints minimum of 3 inches (100 mm).
 - 1) Secure in waterproof manner by means of interlocking folded seam or blind rivets and sealant, unless otherwise indicated.

3.5 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.6 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 079200 - JOINT SEALANTS

1.0 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. Silicone joint sealants.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- D. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

- C. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: 20 years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

2.0 PART 2 – PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Low-Emitting Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 - 1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- E. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- F. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
 - 1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 790. (Design Make)
 - b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
 - c. Pecora Corporation; 301 NS.

- d. Tremco Incorporated; Spectrem 1.
- B. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 - 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. Pecora Corporation; 898.

2.3 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

3.0 PART – EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 3. Remove laitance and form-release agents from concrete.
 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

- G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet (300 m) of joint length for each kind of sealant and joint substrate.
 - b. Perform 1 test for each 1000 feet (300 m) of joint length thereafter or 1 test per each floor per elevation.
 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
 5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal non-traffic surfaces (**JS-01**).
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - c. Joints in exterior insulation and finish systems.
 - d. Joints between different materials listed above.
 - e. Perimeter joints between materials listed above and frames of doors & windows.
 - f. Control and expansion joints in ceilings and other overhead surfaces.
 - g. Other joints as indicated.
 - 1. Joint Sealant: Silicone. Single component, nonsag, neutral curing, Class 100/50.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal Suspension Systems framing members for Gypsum Board Assemblies.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and pre-consumer recycled content and cost.

1.3 DELIVERY, STORAGE AND HANDLING

- ##### A.
- Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Handle in such a manner to insure against racking, distortion or physical damage of any kind.

1.4 SYSTEM REQUIREMENTS

- ##### A. Performance Requirements: Fabricate and install systems as indicated but not less than that required to comply with ASTM C754 under the following conditions:

1. A pre-engineered drywalll suspension system consisting of straight main tees (for Wall to Wall system) that join together to support screw attached flat panels and independently supported light fixtures and air diffusers where applicable.
2. Maximum deflection of 1/360 of distance between supports.

PART 2 - PRODUCTS

2.1 METAL SUSPENSION SYSTEMS, GENERAL

- ##### A. Commercial quality, cold-rolled steel, hot dipped galvanized finish.

1. Main Tees: Fire-Rated Heavy Duty classification 1.617" high x 144" long, integral reversible splice with knurled face.
 - a. Cross Members: Fire-Rated members with knurled face.1-1/2" high x length required by field conditions.
2. Quick release cross tees end for positive locking and removability without tools.

3. Accessory Cross Tees: Knurled faces and quick release for positive locking and removability without tools.
4. Accessories: Splice clips, transition clips, wall attachment, and close mount clip as needed.
5. Wire: Hanger Wire 12 ga galvanized, minimum meeting ASTM E580 requirements for tension and compression strength, when tested per ASTM C1925.
6. Galvanizing: G90 hot-dipped galvanized steel suitable for exterior applications.

B. Design Make: USG DGLW26E (G90) Heavy Duty

2.2 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, substrates and adjoining construction for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Standard reference: Install grid members in accordance with ASTM C636, CISCA installation standards, and other applicable references.
- B. Manufacturer's reference: Install in accordance with manufacturer's current printed recommendations.

3.3 APPLICATION INSTALLATION REQUIREMENTS

- A. Flat Ceiling Applications
1. Hanger Wire Installation: Secure hanger wires to upper structural elements and space hangers so that each hanger wire supports a maximum of 16 sq. ft.
 2. Space main tee members a maximum span of 48: on center or as specified by the UL Fire Resistance Directory.
 3. Space cross tees recommended 16" oc. For maximum allowable spacing. Install extra cross tees where butt joints occur, 8" from each side of the butt joint.
 4. Install compression struts per manufacturer's specifications and spacing, in accordance with wind load. Adjust spacing as necessary for loading conditions.

END OF SECTION 092900

SECTION 220500 - BASIC PLUMBING REQUIREMENTS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work, complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these contract documents. All materials and equipment shall be installed in accordance with the manufacturer's recommendations.

1.2 LICENSING

- A. The Contractor shall hold a license to perform the work as issued by the authority having jurisdiction.
- B. Plumbing contract work shall be performed by, or under, the direct supervision of a licensed master plumber.
- C. Electrical contract work shall be performed by, or under, the direct supervision of a licensed electrician.

1.3 PERMITS

- A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges. Provide certificate of approval from the Authorities Having Jurisdiction prior to request for final payment.
- B. Provide electrical inspection certificate of approval from Middle Department Inspection Agency, Commonwealth Inspection Agency, or an Engineer approved Inspection Agency prior to request for final payment.

1.4 CODE COMPLIANCE

- A. Provide work in compliance with the following Codes and Standards based on the current edition in effect at project location:
 - 1. Building, Code of New York State.
 - 2. Existing Building Code of New York State.
 - 3. Fire Code of New York State.
 - 4. Plumbing Code of New York State.
 - 5. Mechanical Code of New York State.
 - 6. Fuel Gas Code of New York State.

7. Property Maintenance Code of New York State.
8. Energy Conservation Code of New York State
9. Accessible and Usable Buildings and Facilities, ICC A117.1.
10. New York State Department of Labor Rules and Regulations.
11. New York State Department of Health.
12. National Electrical Code (NEC).
13. Occupational Safety and Health Administration (OSHA).
14. Local Codes and Ordinances.
15. Life Safety Code, NFPA 101.
16. New York State Education Department Manual of Planning Standards.

1.5 GLOSSARY

ACI	American Concrete Institute
AGA	American Gas Association
AGCA	Associated General Contractors of America, Inc.
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AFBMA	Anti-Friction Bearing Manufacturer's Association
AMCA	Air Moving and Conditioning Association, Inc.
ANSI	American National Standards Institute
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASTM	American Society for Testing Materials
AWSC	American Welding Society Code
AWWA	American Water Works Association
FM	Factory Mutual Insurance Company
IBR	Institute of Boiler & Radiation Manufacturers
IEEE	Institute of Electrical and Electronics Engineers
IRI	Industrial Risk Insurers

NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NYS/DEC	New York State Department of Environmental Conservation
SBI	Steel Boiler Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UFPO	Underground Facilities Protective Organization
UL	Underwriter's Laboratories, Inc.
OSHA	Occupational Safety and Health Administration
XL - GAP	XL Global Asset Protection Services

1.6 DEFINITIONS

Acceptance	Owner acceptance of the project from Contractor upon certification by Owner's Representative.
As Specified	Materials, equipment including the execution specified/shown in the contract documents.
Basis of Design	Equipment, materials, installation, etc. on which the design is based. (Refer to the article, Equipment Arrangements, and the article, Substitutions.)
Code Requirements	Minimum requirements.
Concealed	Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
Coordination Drawings	Show the relationship and integration of different construction elements and trades that require careful coordination during fabrication or installation, to fit in the space provided or to function as intended.
Delegated-Design Services	Performance and Design criteria for Contractor provided professional services. Where professional design services or certifications by a design professional are specifically required of a Contractor, by the Contract Documents. Provide products and systems with the specific design criteria indicated. If criteria indicated is insufficient to perform services or certification required, submit a written request for additional information to the Engineer. Submit wet signed and sealed certification by the licensed design professional for each product and system specifically assigned to the Contractor to be designed or certified by a design professional. Examples: structural maintenance ladders, stairs and platforms, pipe anchors, seismic compliant system, wind, structural supports for material equipment, sprinkler hydraulic calculations.

Equal, Equivalent, Equal To, Equivalent To, As Directed and As Required	Shall all be interpreted and should be taken to mean "to the satisfaction of the Engineer".
Exposed	Work not identified as concealed.
Extract	Carefully dismantle and store where directed by Owner's Representative and/or reinstall as indicated on drawings or as described in specifications.
Furnish	Purchase and deliver to job site, location as directed by the Owner's Representative.
Inspection	Visual observations by Owner's site Representative.
Install	Store at job site if required, proper placement within building construction including miscellaneous items needed to affect placement as required and protect during construction. Take responsibility to mount, connect, start-up and make fully functional.
Labeled	Refers to classification by a standards agency.
Manufacturers	Refer to the article, Equipment Arrangements, and the article, Substitutions.
Prime Professional	Architect or Engineer having a contract directly with the Owner for professional services.
Product Data	Illustrations, standard schedules, performance charts, instructions, brochures, wiring diagrams, finishes, or other information furnished by the Contractor to illustrate materials or equipment for some portion of the work.
Provide (Furnish and Install)	Contractor shall furnish all labor, materials, equipment and supplies necessary to install and place in operating condition, unless otherwise specifically stated.
Relocate	Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.
Remove	Dismantle and take away from premises without added cost to Owner, and dispose of in a legal manner.
Review and Reviewed	Should be taken to mean to be followed by "for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents".
Roughing	Pipe, duct, conduit, equipment layout and installation.
Samples	Physical full scale examples which illustrate materials, finishes, coatings, equipment or workmanship, and establishes standards by which work will be judged.
Satisfactory	As specified in contract documents.
Shop Drawings	Fabrication drawings, diagrams, schedules and other instruments, specifically prepared for the work by the Contractor or a Sub-contractor, manufacturer, supplier or distributor to illustrate some portion of the work.
Site Representative	Owner's Inspector or "Clerk of Works" at the work site.

Submittals Defined
(Technical)

Any item required to be delivered to the Engineer for review as requirement of the Contract Documents.

The purpose of technical submittals is to demonstrate for those portions of the work for which a submittal is required, the manner in which the Contractor proposes to conform to the information given and design concepts expressed and required by the Contract Documents.

1.7 EXISTING CONDITIONS

- A. Contractor shall review all available record documents of existing construction or other existing conditions and hazardous material information. Owner does not guarantee that existing conditions are the same as those indicated in these documents. Contractor shall record existing conditions via measured drawings and preconstruction photographs or video. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage, removal or construction operations.
- B. Owner will occupy portions of the building immediately adjacent to the area(s) of removals. Conduct removals so Owner's operations are not disrupted. Contractor shall locate, identify, disconnect and seal or cap mechanical, plumbing, fire protection and/or electrical systems serving areas of removals, unless noted otherwise in the contract documents. Contractor shall arrange shut-down of systems with the Owner's Representative. Piping and ductwork indicated to be removed shall be removed and capped or plugged with compatible materials. If services/systems are required to be removed, relocated or abandoned, provide temporary services/systems the bypass area(s) of removals to maintain continuity of services/systems to other parts of the building, as required.

1.8 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

- A. Provide submittals on all items of equipment and materials to be furnished and installed. Submittals shall be accompanied by a transmittal letter, stating name of project and contractor, name of vendor supplying equipment, number of drawings, titles, specification sections (name and number) and other pertinent data called for in individual sections. Submittals shall have individual cover sheets that shall be dated and contain: Name of project; name of prime professional; name of prime contractor; description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed. Individual piecemeal or incomplete submittals will not be accepted. Similar items, (all types specified) shall be submitted at under one cover sheet per specification section (e.g. lighting fixtures, valves, plumbing fixtures, etc.). Submittals shall include all required documentation for each product listed in the specification section at the same time as a complete package. Number each submittal by trade. Indicate deviations from contract requirements on Letter of Transmittal. Submittals will be given a general review only. Corrections or comments made on the Submittals during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for: confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. If submitting hard copies, submit four (4) copies for review.

- B. If submittals are to be submitted electronically, all requirements in Item A apply. Submittals shall be emailed in PDF format to specific email address provided by the Construction Manager, General Contractor, Architect or Project Manager. Name of project shall be in subject line of email. Send emails to mee.merochsubmittalclerk@salasobrien.com.
- C. If submittals are to be submitted electronically through **AUTODESK**, all requirements in Item A apply. Submittals shall be emailed in PDF format to specific email address provided by the Construction Manager, General Contractor, Architect or Project Manager. Name of project shall be in subject line of email. Send emails to the following people:

Tessa Rath - tessa.rath@salasobrien.com
Katie Godfrey - katie.godfrey@salasobrien.com
Rachael Potocki - rachael.potocki@salasobrien.com
Erin Lovejoy - erin.lovejoy@salasobrien.com
Alyssa Thompson - alyssa.thompson@salasobrien.com
- D. Refer to Division 01 for additional requirements.

1.9 PROTECTION OF PERSONS AND PROPERTY

- A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

1.10 EQUIPMENT ARRANGEMENTS

- A. The contract documents are prepared using one manufacturer as the Basis of Design, even though other manufacturers' names are listed. If Contractor elects to use one of the listed manufacturers other than Basis of Design or if the physical size, performance or electrical characteristics for the Basis of Design equipment differs from what is indicated in the contract documents, submit detailed drawings, indicating proposed installation of equipment. Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in the work of other trades, at no increase in any contract. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace doorframes, access doors, walls, ceilings, or floors required to install. If revised arrangement submittal is rejected, revise and resubmit specified Basis of Design item which conforms to Contract Documents.

1.11 SUBSTITUTIONS

- A. If Contractor desires to bid on any other kind, type, brand, or manufacture of material or equipment than those named in specifications, secure prior approval. To request such approval, Contractor shall submit complete information comparing (item-for-item) material or equipment offered with design material or equipment.

Include sufficient information to permit quick and thorough comparison, and include performance curves on same basis, capacities, power requirements, controls, materials, metal gauges, finishes, dimensions, weights, etc., of major parts. If accepted, an addendum will be issued to this effect ahead of bid date. Unless such addendum is issued, substitution offered may not be used.

- B. Refer to Division 01 for additional requirements.

1.12 CONTINUITY OF SERVICES

- A. The building will be in use during construction operations. Maintain existing systems in operation within all rooms of building at all times. Refer to "General Conditions of the Contract for Construction" for temporary facilities for additional contract requirements. Schedules for various phases of contract work shall be coordinated with all other trades and with Owner's Representative. Provide, as part of contract, temporary mechanical and electrical connections and relocations as required to accomplish the above. Obtain approval in writing as to date, time, and location for shutdown of existing mechanical/electrical facilities or services.

1.13 ROUGHING

- A. The Contract Drawings have been prepared in order to convey design intent and are diagrammatic only. Drawings shall not be interpreted to be fully coordinated for construction.
- B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of a contract to accommodate work to avoid obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. **DO NOT SCALE** plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Owner's Representative for review. Obtain written approval for all major changes before installing.
- C. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Provide new materials, including new piping and insulation for relocated work.
- D. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Owner's Representative exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and electrical drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, speakers, and other items. Do not rough-in contract work without reflected ceiling location plans.

- E. Before roughing for equipment furnished by Owner or in other Divisions, obtain from Owner and other Divisions, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to ensure proper location and size of connections to ensure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:
 - 1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.
 - 2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Owner's Representative.

1.14 REMOVAL WORK

- A. Where existing equipment removals are called for, submit complete list to Owner's Representative. All items that Owner wishes to retain that do not contain asbestos or PCB material shall be delivered to location directed by Owner. Items that Owner does not wish to retain shall be removed from site and legally disposed of. Removal and disposal of material containing asbestos, lead paint, mercury and PCB's shall be in accordance with Federal, State and Local law requirements. Where equipment is called for to be relocated, contractor shall carefully remove, clean and recondition, then reinstall. Remove all abandoned piping, wiring, equipment, lighting, ductwork, tubing, supports, fixtures, etc. Visit each room, crawl spaces, and roofs to determine total Scope of Work. The disturbance or dislocation of asbestos-containing materials causes asbestos fibers to be released into the building's atmosphere, thereby creating a health hazard to workmen and building occupants. Consistent with Industrial Code Rule 56 and the content of recognized asbestos-control work, the Contractor shall apprise all of his workers, supervisory personnel, subcontractors, Owner and Consultants who will be at the job site of the seriousness of the hazard and of proper safeguards and work procedures which must be followed, as described in New York State Department of Labor Industrial Code Rule 56.
- B. For materials indicated to contain lead, that are being affected by demolition or construction, the contractor shall comply with all Federal, State and Local law requirements regarding worker exposure to lead disturbance and abatement procedures.
- C. Refer to the Owner's Lead Paint Survey. The Survey identifies the surfaces within the buildings that were tested for lead by collecting paint samples and performing laboratory analysis. If any unidentified surfaces are to be impacted the lead content shall be tested by analytical determinations conducted by a qualified laboratory approved by the Owner. The contractor shall review the current owner's lead paint reports on file before starting any work which may disturb existing surfaces.
- D. Refer to Division 02 for additional information regarding hazardous materials.

1.15 REFRIGERANT RECOVERY

- A. Existing equipment to be removed, as shown on the plans may contain refrigerant and refrigerant oils. This refrigerant and refrigerant oil must be handled in accordance with Federal, State and Local law requirements.
- B. Removal and recovery of refrigerant shall be in accordance with the current edition of Section 608 of the Clean Air Act of 1990, including all final regulations.
- C. Refrigerant recovery must be performed by a technician, certified by an EPA-approved certification program, using refrigerant recovery and recycling equipment certified by an EPA-approved testing organization.
- D. Owner "reserves the right of first refusal" on ownership of recovered refrigerant. Should Owner choose to maintain ownership of refrigerant, refrigerant shall be reclaimed, cleaned by this Contractor to ARI 700-1993 Standard of Purity, by an EPA certified refrigerant reclaimer. Refrigerant shall be turned over to the Owner in suitable marked containers to be stored on site, at a place of the Owner's choosing.

1.16 EQUIPMENT AND MATERIAL REQUIREMENTS

- A. Provide materials that meet the following minimum requirements:
 - 1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
 - 2. All equipment and material for which there is a listing service shall bear a UL label.
 - 3. Potable water systems and equipment shall be built according to AWWA Standards.
 - 4. Gas-fired equipment and system shall meet AGA Regulations and shall have AGA label.
 - 5. All electrical equipment and systems, as a whole, shall be tested and listed by an OSHA approved Nationally Recognized Testing Laboratory (NRTL) for the intended use in accordance with the applicable standards and have a physical label indicating such.
 - 6. Fire protection equipment shall be UL listed and FM approved.
- B. Exterior and wet locations shall utilize materials, equipment supports, mounting, etc. suitable for the intended locations. Metals shall be stainless steel, galvanized or with baked enamel finish as a minimum. Finishes and coatings shall be continuous and any surface damaged or cut ends shall be field corrected in accordance with the manufacturer's recommendations. Hardware (screws, bolts, nuts, washers, supports, fasteners, etc.) shall be:
 - 1. Stainless steel where the associated system or equipment material is stainless steel or aluminum.

2. Hot dipped galvanized or stainless steel where the associated system or equipment is steel, galvanized steel or other.

1.17 CUTTING AND PATCHING

- A. Each trade shall include their required cutting and patching work unless shown as part of the General Construction Contract. Refer to General Conditions of the Contract for Construction, for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch cut or abandoned holes left by removals of equipment or fixtures. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

1.18 PAINTING

- A. Refer to Division 9 - Finishes, for additional information.

1.19 CONCEALMENT

- A. **Conceal all contract work** above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after their review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

1.20 CHASES

- A. New Construction:
 1. Certain chases, recesses, openings, shafts, and wall pockets will be provided as part of General Construction Trade. Mechanical and Electrical trades shall provide all other openings required for their contract work.
 2. Check Architectural and Structural Design and Shop Drawings to verify correct size and location for all openings, recesses and chases in general building construction work.
 3. Assume responsibility for correct and final location and size of such openings.
 4. Rectify improperly sized, improperly located or omitted chases or openings due to faulty or late information or failure to check final location.
 5. Provide 18 gauge galvanized sleeves and inserts. Extend all sleeves 2 in. above finished floor. Set sleeves and inserts in place ahead of new construction, securely fastened during concrete pouring. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Firestop all unused sleeves.
 6. Provide angle iron frame where openings are required for contract work, unless provided by General Construction trade.

B. In Existing Buildings:

1. Drill holes for floor and/or roof slab openings.
2. Multiple pipes smaller than 1 in. properly spaced and supported may pass through one 6 in. or smaller diameter opening.
3. Seal voids in fire rated assemblies with a fire-stopping seal system to maintain the fire resistance of the assembly. Provide 18 gauge galvanized sleeves at fire rated assemblies. Extend sleeves 2 in. above floors.
4. In wall openings, drill or cut holes to suit. Provide 18 gauge galvanized sleeves at shafts and fire rated assemblies. Provide fire-stopping seal between sleeves and wall in drywall construction. Provide fire stopping similar to that for floor openings.

1.21 PENETRATION FIRESTOPPING

A. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:

1. Provide materials and products listed or classified by an approved independent testing laboratory for "Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Penetrations Fire-Stops" designated ASTM E814.
2. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
4. The methods used shall incorporate qualities which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion, and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.
5. Plastic pipe/conduit materials shall be installed utilizing intumescent collars.
6. Provide a submittal including products intended for use, manufacturer's installation instructions, and the UL details for all applicable types of wall and floor penetrations.
7. Fire-stopping products shall not be used for sealing of penetrations of non-rated walls or floors.

8. Piping insulation is allowed to be reduced in thickness only when a specific UL assembly detail for piping passing thru a rated wall indicates a maximum insulation thickness that is less than the insulation specification section calls for. In this case reduce the insulation thickness just for the rated wall penetration. The reduction of insulation thickness shall be limited to the length of the penetration only.

B. Acceptable Manufacturers:

1. Dow Corning Fire-Stop System Foams and Sealants.
2. Nelson Electric Fire-Stop System Putty, CLK and WRP.
3. S-100 FS500/600, Thomas & Betts.
4. Carborundum Fyre Putty.
5. 3-M Fire Products.
6. Hilti Corporation.

C. Refer to Division 07 for project-wide fire stopping information.

1.22 NON-RATED WALL PENETRATIONS

- A. Each trade shall be responsible for sealing wall penetrations related to their installed work, including but not limited to ductwork, piping, conduits, etc. See individual specification sections for requirements.

1.23 SUPPORTS

- A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above.
- B. For precast panels/planks and metal decks, support mechanical/electrical work as determined by manufacturer and the Engineer. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.
- C. For finished areas without a finished ceiling system such as classrooms, offices, conference rooms, etc., where decking and structure is exposed, and ductwork/piping/conduit is exposed: All mounting brackets, channel support systems and mounting hardware for ductwork, piping, lighting, etc. shall be concealed and approved by the Architect/Engineer prior to the installation. AirCraft cable style hanging for ductwork is required. It is recommended that room mockups be done and receive Architect/Engineer approval prior to proceeding with installation.

- D. Equipment, piping, conduit, raceway, etc. supports shall be installed to minimize the generation and transmission of vibration.
- E. Materials and equipment shall be solely supported by the building structure and connected framing. Gypboard, ceilings, other finishes, etc. shall not be used for support of materials and equipment.

1.24 APPLIED FIREPROOFING

- A. Scope: Provide encapsulation of surfaces where applied fireproofing materials have been disturbed, removed, or left missing by the removal of hangers or upper attachments, or when new hangers or upper attachment are installed.
- B. Fire Resistance Rating: Fireproofing shall meet the original hourly rating when applied to the construction assembly where materials have been removed or disturbed, or is missing.
- C. Fire Hazard Classification: Fireproofing shall be listed in the Underwriters Laboratories Building Materials Directory with the following performance properties:
 - 1. Flame Spread: 10 or less.
 - 2. Smoke Developed: 5 or less.
- D. Product Data: Provide manufacturer's product descriptions for each required fireproofing material. Include application instructions, including primer/adhesive requirements and recommended minimum thickness and density for each required hourly rating.
- E. Fire Proofing Manufacturer:
 - 1. Retro-Guard cementitious replacement fireproofing by Grace Construction Products, or equivalent Cafco Blaze Shield, and Cafco 300 by Isolotek.
 - 2. Physical Properties:
 - a. Dry Field Density (ASTM E 605): 15 lb/cu ft minimum average.
 - b. Cohesion/Adhesion (Bond Strength) (ASTM E 736): 200 lb/sq ft minimum average.
 - c. Compressive Strength (ASTM E 761): 500 lb/sq ft minimum.
 - d. Impact (Bond Impact) Resistance (ASTM E 760): Shall not crack or delaminate.
 - e. Effect of Deflection (ASTM E 759): Shall not crack or delaminate.
 - f. Corrosion Resistance (ASTM E 937): No evidence of corrosion.
 - g. Air Erosion (ASTM E 859): Maximum 0.025 g/sq ft weight loss.

- h. Provide primer or adhesive recommended by the fireproofing manufacturer to obtain required bond strength for the specific fireproofing and substrate.
- F. Apply fireproofing prior to installation of ductwork, piping, conduits, and other suspended items. Hangers, clips and other supports for these items shall be installed before application of fireproofing.
- G. Examine the substrate and conditions under which fireproofing is to be applied. Do not proceed with the fireproofing work until unsatisfactory conditions have been corrected. Verify that hangers, clips, sleeves, and other items that will penetrate the fireproofing are in place. Check paint on substrate for compatibility with primer/fireproofing and adequacy of bond strength in accordance with fireproofing manufacturer's instructions.
- H. Surface Preparation: Remove dirt, dust, oil, grease, loose paint and rust, mill scale, and other foreign matter that may impair the bonding of the fireproofing to the substrate. Clean substrate free of contamination from chemicals and solvents.

Apply primer/adhesive where necessary to obtain bond strength of fireproofing to steel shop paint and where recommended by the fireproofing manufacturer.
- I. Apply the fireproofing in accordance with UL fire test report and the manufacturer's application instructions. Thickness and density of fireproofing shall be in accordance with the approved product data and as required to produce the hourly fire resistance rating required.

1.25 ACCESS PANELS

- A. Provide access panels for required access to respective trade's work. Location and size shall be the responsibility of each trade. Access panels provided for equipment shall provide an opening not smaller than 22 in. by 22 in. Panels shall be capable of opening a minimum of 90 degrees. Bear cost of construction changes necessary due to improper information or failure to provide proper information in ample time. Access panels over 324 square inches shall have two cam locks. Provide proper frame and door type for various wall or ceiling finishes. Access panels shall be equal to "Milcor" as manufactured by Inland Steel Products Co., Milwaukee, Wisconsin. Provide General Construction trade with a set of architectural plans with size and locations of access panels.

1.26 CONCRETE BASES

- A. Provide concrete bases for all floor mounted equipment. Provide 3,000 lb. concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases 4 in. high (unless otherwise indicated); shape and size to accommodate equipment. Provide anchor bolts in equipment bases for all equipment provided for the project, whether mounted on new concrete bases or existing concrete bases.

1.27 HVAC EQUIPMENT CONNECTIONS

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Provide final connections to all equipment as required by the equipment. Provide final connections, including domestic water piping, wiring, controls, and devices from equipment to outlets left by other trades. Provide equipment waste, drip, overflow and drain connections extended to floor drains.
- C. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, insulation, sheet metal work, controls, dampers, as required.
- D. Refer to manufacturer drawings and specifications for requirements of equipment. Verify connection requirements before bidding.

1.28 PLUMBING EQUIPMENT CONNECTIONS

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Provide roughing and final connections to all equipment. Provide loose key stops, sanitary "P" traps, tailpiece, adapters, gas or air cocks, and all necessary piping and fittings from roughing point to equipment. Provide installation of sinks, faucets, traps, tailpiece furnished by others. Provide cold water line with gate valve and backflow prevention device at locations called for. Provide continuation of piping and connection to equipment that is furnished by others. Provide relief valve discharge piping from equipment relief valves.
- C. Provide valved water outlet adjacent to equipment requiring same. Provide equipment type floor drains, or drain hubs, adjacent to equipment.
- D. Install controls and devices furnished by others.
- E. Refer to Contract Documents for roughing schedules, and equipment and lists indicating scope of connections required.
- F. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, as required.
- G. Refer to Manufacturer drawings and specifications for requirements of equipment. Verify connection requirements before bidding.

1.29 ELECTRICAL EQUIPMENT CONNECTIONS

- A. Provide complete power connections to all electrical equipment. Provide control connections to equipment. Heavy duty NEC rated disconnect ahead of each piece of equipment. Ground all equipment in accordance with NEC.
- B. Provide for Owner furnished and Contractor furnished equipment all power wiring, electric equipment, control wiring, switches, lights, receptacles, and connections as required.
- C. Refer to Manufacturer's drawings/specifications for requirements of equipment. Verify connection requirements before bidding.

1.30 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT

- A. Store Materials on dry base, at least 6 in. aboveground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.
- B. Refer to Division 01 for additional information.
- C. Division 23 shall provide airtight plastic covers over all supply and return air openings prior to the start of construction by any trade. The plastic shall be maintained airtight throughout the project construction and removed only with the approval of the Owner's Representative.
- D. Ductwork shall be delivered to the site from the fabrication shop with air tight plastic covers over all ends of the ducts. The plastic covers shall be in place during transportation and shall be removed prior to installation.

1.31 FREEZING AND WATER DAMAGE

- A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner's operating staff.

1.32 OWNER INSTRUCTIONS

- A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

1.33 OPERATION AND MAINTENANCE MANUALS

- A. Submit by email (preferred) or digital media, thru the normal project submittal process. Include a copy of each final approved Shop Drawing, wiring diagrams, piping diagrams, spare parts lists, final testing and balancing report, as-built drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, summer-winter changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of installing contractor and of supplier manufacturer Representative and service agency for all major equipment items. Provide a table of contents page and dividers based upon specification section numbers. Submit in a compiled and bookmarked PDF format as outlined below. Each item listed in the table of contents shall include a hyperlink to the associated section of the O&M Manual, in addition to the bookmarking.

- B. Provide content for Operation and Maintenance Manuals as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Engineer and Commissioning Agent will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

- C. Submit Operation and Maintenance Manuals in the following format:
 - 1. Submit by uploading to web-based project software site, or by email to Architect, as a formal project submittal in conformance with the project specific submittal procedures. Enable reviewer comments on draft submittals.
 - 2. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 3. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in the table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

- D. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing Owner training. Engineer and Commissioning Agent will comment on whether general scope and content of manual are acceptable.

- E. Final Manual Submittal: Submit O&M manual in final form prior to requesting inspection for Substantial Completion and at least 2 weeks before commencing Owner training.

Engineer and Commissioning Agent will return copy with review comments.

1. Correct or revise O&M manual to comply with Engineer's and Commissioning Agent's comments. Submit copies of each corrected manual within 2 weeks of receipt of Engineer's and Commissioning Agent's comments.

F. Refer to Division 01 for additional requirements.

1.34 RECORD DRAWINGS

- A. The Contractor shall obtain at his expense one (1) set of construction Contract Drawings, (including non-reproduction black and white prints or electronic files) for the purpose of recording as-built conditions.
- B. The Contractor shall perform all survey work required for the location and construction of the work and to record information necessary for completion of the record drawings. Record drawings shall show the actual location of the constructed facilities in the same manner as was shown on the bid drawings. All elevations and dimensions shown on the drawings shall be verified or corrected so as to provide a complete and accurate record of the facilities as constructed.
- C. It shall be the responsibility of the Contractor to mark **EACH** sheet of the contract documents in red and to record thereon in a legible manner, any and all approved field changes and conditions as they occur. A complete file of approved field sketches, diagrams, and other changes shall also be maintained.

At completion of the work, the complete set of red marked contract documents, plus all approved field sketches and diagrams shall be submitted to the engineer and used in preparation of the record drawings.

- D. A complete set of red marked contract drawings shall be submitted, at one time, as the "Record" set. If there are no changes to a specific drawing, the contractor shall indicate "NO CHANGES" on that drawing. ALL drawings shall be included in the "Record" set.
- E. The complete set of red marked Contract Documents or electronic files shall be certified by the Contractor as reflecting record conditions and submitted to the engineer for review.
- F. The Contractor shall have the marked up set scanned, if they are not already electronic files, and then submit them to the Engineer as the "Record Set".
- G. Refer to Division 01 for additional requirements.

1.35 FINAL INSPECTION

- A. Upon completion of all Engineering Site Observation list items, the Contractor shall provide a copy of the Engineering Site Observation Report back to the Engineer with each item noted as completed or the current status of the item. Upon receipt, the Engineer will schedule a final review.

1.36 COMMISSIONING

- A. Refer to General Commissioning Requirements in Division 01 for additional requirements.

1.37 TEMPORARY HEATING AND COOLING

- A. Refer to the General Conditions of the Contract for Construction and Supplemental General Conditions.
- B. Systems and equipment installed as part of this project shall not be used for temporary heating or cooling.

1.38 TEMPORARY FACILITIES

- A. Refer to the Division 01 Sections, General Conditions and Supplemental General Conditions.

1.39 TEMPORARY LIGHT AND POWER

- A. Refer to the Division 01 Sections, General Conditions and Supplemental General Conditions.

1.40 CLEANING

- A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:
 - 1. Thoroughly clean entire installation, both exposed surfaces and interiors.
 - 2. Remove all debris caused by work.
 - 3. Remove tools, surplus, materials, when work is finally accepted.

1.41 SYSTEM START-UP AND TESTING

- A. Prior to commencement of work, the Division(s) effecting such system shall survey all building mechanical, plumbing, fire protection and electrical systems and components and make written notice to the Owner's Representative regarding any damage, missing items and/or incomplete systems. Prior to the conclusion of this project, the Contractor shall verify with the Owner's Representative that all building systems have been returned to their original conditions.
- B. Start-up and testing of HVAC systems shall occur while the area of work is not occupied by Owner and only after notice to the Owner's Representative is made at least 24 hours in advance. Division 23 shall be responsible for providing temporary filter media over all supply air registers and diffusers during the HVAC system start-up procedure.

Division 23 shall provide airtight plastic covers over all supply and return air openings prior to the start of construction by any contractor. The plastic shall be maintained airtight throughout the project construction and removed only with the approval of the Owner's Representative.

1.42 TRANSFER OF ELECTRONIC FILES

- A. Salas O'Brien Consulting and Engineering Group of New York, Inc. (FKA M/E Engineering) will provide electronic files for the Contractor's use in the preparation of sheet metal shop drawings, coordination drawings, or record drawings related to the project, subject to a \$50.00 charge per drawing file, \$2500.00 charge for a Revit model and the following terms and conditions:
1. The Contractor shall submit a formal request for electronic drawing files on the our website, by utilizing the following website link:
<http://www.meengineering.com/contact-pages/contractor-request>
 2. Salas O'Brien Consulting and Engineering Group of New York, Inc. (FKA M/E Engineering) makes no representation as to the compatibility of these files with the Contractor's hardware or the Contractor's software beyond the specific release of the referenced specifications.
 3. We can only provide CAD files of M/E/P/FP drawing levels for which we are the Engineer of Record. CAD files of Architectural backgrounds, reflected ceiling plans, structural plans, etc. must be obtained separately from the Architect of Record.
 4. Data contained on these electronic files is part of our instruments of service shall not be used by the Contractor or anyone else receiving data through or from the Contractor for any purpose other than as convenience in the preparation of shop drawings for the referenced project. Any other use or reuse by the Contractor or by others will be at the Contractor's sole risk and without liability or legal exposure to Salas O'Brien Consulting and Engineering Group of New York, Inc. (FKA M/E Engineering). The Contractor agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against Salas O'Brien Consulting and Engineering Group of New York, Inc. (FKA M/E Engineering), its officers, directors, employees, agents or sub-consultants which may arise out of or in connection with the Contractor's use of the electronic files.
 5. Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless, Salas O'Brien Consulting and Engineering Group of New York, Inc. (FKA M/E Engineering) from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from the Contractor's use of these electronic files.
 6. These electronic files are not contract documents. Significant difference may arise between these electronic files and corresponding hard copy contract documents due to addenda, change orders or other revisions. We make no representation regarding the accuracy or completeness of the electronic files the Contractor receives.

In the event that a conflict arises between the signed contract documents prepared by us and electronic files, the signed contract documents shall govern. The Contractor is responsible for determining if any conflicts exist. By the Contractor's use of these electronic files the Contractor is not relieved of the Contractor's duty to comply with the contract documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, field verify conditions and coordinate the Contractor's work with that of other contractors for the project.

1.43 VIDEO RECORDING OF TRAINING SESSIONS

- A. The contractor shall video record all training sessions required by their discipline. Video shall be in Windows Media Player video format saved on flash drives. Two (2) copies on flash drives are to be provided as a formal submittal. . Flash drives are to be tagged with project name, training session name(s), installing Contractor and date of training. The flash drive shall include a scanned version of the training session sign in list(s), including the presenter and the owner's participants.

1.44 ENERGY INCENTIVES

- A. The Contractor, his Subcontractors and Suppliers shall provide to the Owner all paperwork necessary to support the Owners pursuit of incentives related to energy conservation as offered by the utility company or state sponsored incentive programs. This shall include at a minimum, receipts, and quantities and data sheets for energy efficient equipment such as: lighting, motors, variable frequency drives, etc.

1.45 INFECTION CONTROL

- A. Construction procedures, temporary partitions, negative air systems, cleaning procedures, HVAC system isolation, dust control, etc. shall be in accordance with the infection control standards set forth by the Facility. A copy of the facilities standards are available from the Owner upon request.

END OF SECTION 220500

SECTION 220523 - VALVES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Document.

1.2 SUBMITTALS

- A. Submit manufacturer's data in accordance with Basic Mechanical and Electrical Requirements. Obtain approval prior to ordering material.
- B. Provide submittals for all items specified under Part 2 of this section.

PART 2 - PRODUCTS

2.1 VALVES - GENERAL

- A. Valves shall have following requirements:
 - 1. Working pressure stamped or cast on bodies.
 - 2. Stem packing serviceable without removing valve from line.
 - 3. All items here-in used to convey water for potable use shall be lead free in accordance with NSF Standard, Standard 61, Section 9 - Standard for Drinking Water and Lavatory Faucets and NSF Standard 372 - Maximum Lead Requirements. Compliance shall be via third party testing and certification.
- B. Acceptable Manufacturers:
 - 1. Ball Valves: Apollo, Hammond, Milwaukee, Nibco, Red White, Watts.
 - 2. Gate and Check Valves: Hammond, Milwaukee, Nibco, Red White, Stockham, Watts.
 - 3. To establish a standard of quality and identify features, certain manufacturer's numbers are given in the following paragraphs.

2.2 DOMESTIC WATER VALVES

- A. Check Valves:
 - 1. 3 in. and Larger: IBBM, renewable seat and disc, bolted flange cap, flanged ends, 125 SWP; Milwaukee F-2974.
 - 2. 2 in. and Smaller: Lead-free swing check with silicone bronze body, bonnet and trim, PTFE disc seat and stainless steel seat disc washer, 200 psi working pressure, Nibco T-413-Y-LF (threaded) or Nibco's S-413-Y-LF (solder).

3. Silent Type: Lead-free spring check with silicone bronze body, stainless steel trim and PTFE disc: 250 psi working pressure; Nibco T-480-4-LF (threaded) or Nibco S-480-Y-LF (solder).

B. Ball Valves:

1. 2-1/2 in. and Larger: Lead-free, forged copper silicon 2-piece body, chrome plated brass ball, full port, teflon seats and stem packing, separate packing and handle nut, blowout proof stem extended for insulation, vinyl insulator for handle, 600 WOG, 125 WSP; Watts LF-FBV-3C Series (threaded ends) or Watts LF-FBVS-3C series (sweat ends).
2. 2 in. and Smaller: Lead-free, forged copper silicon alloy 2-piece body, chrome-plated lead-free brass ball, full port, teflon seats and stem packing, separate packing and handle nut, blowout proof stem extended for insulation, vinyl insulator for handle, 400 WOG, 125 WSP; Watts LFFBV-3C-M1 Series (threaded ends) or Watts LFFBVS-3C-M1 series (sweat ends).

C. Pressure Reducing Valves:

1. Direct Operated for Cold Water Service:
 - a. Bronze body construction, renewable stainless steel seat, reinforced Buna-N diaphragm and valve disc integral strainer, adjustable reduced pressure range, for dead end service.
 - b. Acceptable Manufacturers: Watts Series #223, Cash, Spence or approved equal.
2. Pilot Operated for Cold Water Service:
 - a. Globe or angle pattern, flanged ends, epoxy coated, ductile or cast iron body, bronze seat, stainless steel trim, hydraulically operated, diaphragm actuated, pilot controlled, adjustable pressure settings, pressure gauges, UL labeled, minimum 150 psi WWP for entire assembly.
 - b. Acceptable Manufacturers: Watts, Bermad, Spence or approved equal.
3. Direct Operated for Hot Water Service:
 - a. Water Wash Hoods: Same as cold water except with built-in by-pass option; outlet set at 40 psi, rated at 160°F.
 - b. Dishwashers: Same as cold water except with low pressure range and built-in by-pass option; outlet set at 22 psi, rated at 200°F.
 - c. Acceptable Manufacturers: Watts Series #223, Cash, Spence or approved equal.

D. Valves for Gauges and Instruments:

1. 1/2 in. Size: Brass bar stock for 1000 psi and 300°F; Trerice No. 735 needle valve.

E. Hose Thread Drain Valves:

1. Ball valve, bronze body, hardened chrome ball with hose thread end, cap and chain; Watts #LFFBV/FBVS-3C-CC.

2.3 SANITARY DRAINAGE VALVE

A. Gate Valves:

1. 2-1/2 in. and Larger: IBBM, solid wedge disc, OS&Y, flanged ends, 125 SWP; Milwaukee F-2885.
2. 2 in. and Smaller: Bronze, solid wedge disc, rising stem, 125 SWP; Milwaukee 1152 (threaded ends, union bonnet) or Milwaukee 149 (sweat ends, threaded bonnet.)

B. Check Valves:

1. 3 in. and Larger: Cast iron body, epoxy coated, sinking metal ball type check, access port for cleanout, flanged connections, stainless steel fasteners; Flomatic Model 408, or GA Industries.
2. 2-1/2 in. and Smaller: Cast iron body, epoxy coated, sinking ball type check, two bolt access cover for cleanout, replaceable Buna-N valve seat; Flomatic Model 508, or GA Industries.

C. Backwater Valves:

1. Type A, 2 in. through 8 in.: Flap type on hinge with revolving disc. Cast iron body with cleanout of sufficient size to permit removal of interior parts. Hinge, disc and seat shall be bronze. Set position of disc to be slightly opened. Threaded cover with countersunk plug; Jay R. Smith Figure 7022S.
2. Type B, 2 in. through 8 in.: Flap type on hinge with revolving disc. Cast iron body with cleanout of sufficient size to permit removal of interior parts. Hinge, disc and seat shall be bronze. Set position of disc to be slightly opened. Bolted cover with stainless steel bolts; Jay R. Smith Figure 7012S.
3. Type C, 2 in. through 6 in.: Drain outlet type, cast iron body with ball float, neoprene seat with removable bronze ring; Jay R. Smith Figure 7080.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide all shutoff, check, balancing and other type valves as indicated, as required by Code and as required for proper system maintenance, isolation and safety.

Provide at major building and systems sections. Provide shutoff valves on all branch lines serving two fixtures or more, at all equipment, fixtures, before and after automatic control valves, and at future connections.

- B. Locate valves for easy access and provide separate support where necessary. Install valves with stems at or above the horizontal position. Install swing check valves in horizontal position with hinge pin level.
- C. Provide drain valves with hose thread connections on all equipment. Provide hose thread drain valves at all low points to enable complete drainage of all piping systems including, water mains, branches, at base of vertical risers and at strainers.
- D. Provide shutoff valve and wye-strainer before all automatic control valves and pressure reducing valves.
- E. Inspect valves for proper operation before installation. Install underground valve boxes vertically over each valve. Adjust top of box to proper grade. Immediately backfill with crushed stone and carefully tamp into place. Unless otherwise noted, leave in the open position.

3.2 DOMESTIC WATER SYSTEM

- A. The main water service shutoff valve inside the building and valves for a 3 in. and larger water meter assembly shall be OS&Y gate valves in accordance with the local water authority requirements.
- B. Install balance valves in each hot water circulation branch and where noted.

END OF SECTION 220523

SECTION 220553 - PLUMBING IDENTIFICATION

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

1.2 QUALIFICATIONS

- A. All identification devices shall comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles.

1.3 SUBMITTALS

- A. Submit manufacturer's technical product data and installation instructions for each identification material and device. Submit valve schedule for each piping system typewritten on an 8-1/2 in. x 11 in. paper (minimum), indicating valve number, location and valve function. Submit schedule of pipe, equipment and name identification for review before stenciling or labeling.

1.4 MAKES

- A. Allen Systems, Inc., Brady (W.H.) Co.; Signmark Div., Industrial Safety Supply Co., Inc., Seton Name Plate Corp.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide manufacturer's standard products of categories and types required for each application. In cases where there is more than one type specified for an application, selection is installer's option, but provide single selection for each product category.
- B. All adhesives used for labels in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits as called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.
- C. For work within an existing building, the mechanical identification shall meet the intent of this section, but match the Owner's existing identification symbology.

2.2 PIPING IDENTIFICATION

- A. Identification Types:
 - 1. Pressure Sensitive Type: Provide manufacturer's standard pre-printed, permanent adhesive, color coded, pressure sensitive vinyl pipe markers complying with ANSI A13.1. Provide a 360° wrap of flow arrow tape at each end of pipe label.

B. Lettering:

1. Piping labeling shall conform to the following list:

PIPE FUNCTION	IDENTIFICATION
Cold Water	DOMESTIC COLD WATER
Hot Water	DOMESTIC HOT WATER
Hot Water Recirculating	DOMESTIC HOT WATER RECIRCULATING
140 Degree Hot Water	DOMESTIC HOT WATER - 140°F
140 Degree Hot Water Recirculating	DOMESTIC HOT WATER RECIRCULATING - 140°F
Sanitary Waste	SANITARY WASTE
Indirect Waste	INDIRECT WASTE
Storm	STORM
Secondary Storm	SECONDARY STORM
Vent	VENT

2.3 VALVE IDENTIFICATION

A. Valve Tags:

1. Standard brass valve tags, 2 in. diameter with 1/2 in. high black-filled numerals. Attach to valve with brass jack chain and "S" hook. Identify between heating and plumbing services with 1/4 in. letters above the valve number.
2. Acceptable Manufacturers: Seton Style No. M4507, or approved equal.

B. Valve Chart:

1. Provide valve chart for all valves provided as a part of this project. Frame and place under clear glass. Mount in Mechanical Room.

2.4 EQUIPMENT IDENTIFICATION

A. General:

1. Provide engraved vinyl nameplates for each major piece of mechanical equipment provided, 2-1/2 in. x 3/4 in. size.
2. Acceptable Manufacturers: Seton Style No. M4562, or approved equal.

2.5 ABOVE CEILING EQUIPMENT LOCATOR

- A. 3/4 in. diameter adhesive stickers placed on ceiling grid and color-coded.
- B. The color for all plumbing valves shall be BLUE.

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide valve tags for all valves provided on project.
- B. Provide equipment tags for all equipment provided on project.
- C. Provide piping identification with directional flow arrows for all piping on project, maximum intervals of 20'-0". For piping installed through rooms, provide at least one (1) pipe label in each room, for each pipe function.

END OF SECTION 220553

SECTION 220580 - EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment, and services to perform operations required for the complete installation and related work as required in the Contract Documents.

1.2 SUBMITTALS

- A. Backfill Materials:
 - 1. Cushion sand, identify source.
 - 2. Crushed stone, identify source.
 - 3. Gravel fill, identify source.
 - 4. Ordinary fill, identify source.

1.3 CODES

- A. Comply with local, state, and federal codes, regulations, and laws affecting work of this section.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cushion Sand: Clean, coarse, and free of organic matter, conforming to New York State DOT Item No. 703.06.
- B. Crushed Stone: Crushed stone, graded, free of organic materials, No. 1 to No. 4 size. Conforming to New York State DOT Item No. 703-0201.
- C. Gravel Fill: Well-graded natural inorganic sand and gravel conforming to New York State DOT Item No. 703-0202.
- D. Ordinary Fill: Well-graded, natural soil, meeting the following requirements:
 - 1. Free of organic and other compressible materials, debris and frozen materials, and of stones larger than 4 in. maximum dimension.
 - 2. Be of such nature and character that it can be compacted to the specified densities.
 - 3. Free of highly plastic clays, of materials subject to decay, decomposition, or dissolution, and of cinders, ash and other corrosive materials.
 - 4. Maximum dry density of not less than 115 lbs. per cu. ft.

5. Material from excavation on the site may be used as ordinary fill if it meets the above requirements.

PART 3 - EXECUTION

3.1 PREPARATORY WORK, SCHEDULING SHUTDOWNS, AND TEMPORARY WORK

- A. Build lines to grade and elevations shown. Provide stakes, grade boards, cleats, nails, and instruments. Locate and stake each new run for its entire length. Verify elevations given. Start excavation at low point. Notify Engineer of elevation discrepancies. Protect marks and stations. Before starting excavation work, coordinate with and furnish schedule of work to Owner's Representative and other trades. Provide and maintain temporary walks and bridges over excavations where underground utility lines, sewers, water lines, etc., cross access roads, walks, and streets. Make necessary arrangement with authorities having jurisdiction.

3.2 PROTECTION

- A. Provide bracing, shoring, sheathing and other work for protection of personnel, the contract work, excavations, trees, shrubs, existing structures, and surrounding properties. Provide and maintain barricades, warning signs, flags, and lights for the protection of work, workmen, public, and property. Plank walks, pavements, and curbs to be crossed by equipment. Protect adjacent property, fences, trees, shrubs, roads, curbs, sidewalks, manholes, hydrants, and other items.
 1. Restore, repair or replace any items damaged or destroyed to a condition equal to that existing before such damage occurred.
 2. Establish conditions, before starting work, by taking photographs to determine state to which existing conditions must be restored. Submit such photographs notarized, identified and dated for record.
- B. The use of equipment with metal tracks over paved areas is not permitted unless the pavement is protected with methods as approved by the Owner's Representative.

3.3 INVESTIGATION AND PROTECTION OF EXISTING UTILITIES

- A. Every attempt has been made to indicate existing utilities as accurately as possible from existing drawings, surveys, and data. Immediately report other utility lines encountered, but not shown on the drawings. Notify Underground Facilities Protection Organization (UFPO) before starting work. Phone (800)-962-7962 for information and location of nearest organization address and telephone number. Verify exact location of existing utility lines where work crosses existing utilities and where connections are to be made by test hole before starting work. Notify utility companies, municipalities, and other involved jurisdictions when excavating occurs within vicinity of existing underground service such as sewers, water, electric, gas, telephone, including such services owned by Owner. If existing service lines, utilities and utility structures which are to remain in service are uncovered or encountered during this excavation, they shall be protected from damage, and securely supported as directed and approved by the involved jurisdiction. Comply with all local, state and federal regulations when working in vicinity of combustible gas piping.

Immediately report damage to utility lines to Owner's Representative and involved jurisdiction. Repair or replace utility lines damaged or destroyed as directed and approved by the involved jurisdiction. Excavate by hand in proximity to existing underground utility lines; take extreme care when excavating around ductbanks carrying energized cable. Remove, plug or cap inactive or abandoned utilities encountered during construction operations. The location of such utilities shall be noted on the record drawings. Verify inactivity of services with involved jurisdiction before start of work.

- B. Saw cut floor slabs perpendicular to surface and parallel with/perpendicular to walls. Replace slabs and adjacent surfaces damaged by excavation operations with materials equal to adjacent existing materials.

3.4 CUTTING AND PATCHING

- A. Prior to starting work, obtain necessary permits and pay all costs and fees. Cut paved areas, perpendicular to surface and in straight saw-cut lines. Replace pavements, roadways, streets, blacktop areas and walks damaged by excavating operations with materials equal to adjacent pavements.

3.5 EXCAVATION

- A. Provide for buried work in contract both inside and outside of building. Excavate to proper depth and width for installation work and comply with rules set forth by New York State Department of Labor. Remove materials including masonry work, rubble, earth, brickwork, concrete, sand, debris, abandoned pipe lines, drains, sewers, rocks, boulders, and concrete, all of which is considered "earth excavation". Provide for legal disposition of excess excavated materials. Make allowance for gravel fill, sand bases, form work, floor slabs, manholes, anchor and thrust blocks, sheet piling, drainage pumps, and work space. Start excavation at rough grade and provide form work and sheet piling where required.
- B. Trench Excavation:
 - 1. By open cut, to proper depth and grade no wider than required for placement of work and not more than 100 ft. in advance of utility being installed.
 - 2. Should trench bottom be wet, unstable or otherwise incapable of supporting the contract work, immediately report the condition to the Owner's Representative. Should it be deemed unsuitable, excavate to depth as directed and backfill with gravel to trench depth, or provide concrete cradling.
 - 3. Should rock be encountered, excavate 6 in. deeper and fill space between trench bottom and pipe with coarse sand, well compacted to form a firm pipe bed.
- C. Shoring, Bracing, Sheathing:
 - 1. In addition to governing codes, protect sides of excavations with shoring, bracing and sheathing to prevent sliding or caving of banks and to protect adjacent structures. Remove as backfill is placed.
 - 2. Provide at locations adjacent to existing manholes, hydrants, and similar items.

D. General Excavation:

1. As required for all buried work. This shall include, but not be limited to, piping, tanks, ductbanks, conduits, footings, manholes, anchors, concrete pads, thrust blocks, fixture bases, and other work in contract.

3.6 BACKFILL

A. Bedding:

1. Around piping with cushion sand from 6 in. below to 8 in. above. Apply by hand and compact under and at sides by mechanical means.
2. Piping, jackets and sand bed must be inspected and tested prior to backfill of any nature. Provide necessary anchors, thrust blocks, for testing.

B. Remainder of Trench:

1. Backfill remainder of trench in 12 in. layers, with ordinary fill materials, except as otherwise specified. Do not use frozen material. Remove boulders, stones, broken rock, wood, bricks, blocks, and debris from fill materials before backfill operation.

C. Under Roadways, Manholes, Drives, Parking Areas, Walks, Slabs on Grade and at Utility Entrance to Building:

1. Backfill in 6 in. layers with gravel fill or crushed stone, free from organic or other unsuitable material, to grade. Thoroughly compact each layer.

D. Compaction Requirements:

1. Compaction to not less than 95% density compared to maximum laboratory tests by weight, per modified ASTM D1557-64T, latest editions, Method "A" under slab on grade, roadways, drives, and other paved areas and 85% for general grading. Submit certified test results by an approved soil testing laboratory.

3.7 REMOVAL OF WATER

- A. Provide pumps, hoses, pipe, labor and fuel, necessary to keep excavations free of water accumulation. Maintain and operate equipment. Discharge water in manner not to interfere with any trade's work, undermine or disturb adjacent structures or properties. Grade to prevent surface water from flowing into all excavations and trenches. Do not discharge dirt, backfill or debris into sanitary or storm drainage systems.

3.8 ROUGH GRADING

- A. Trim and grade areas to receive fill material or topsoil specified.
- B. Set grade stakes where spot elevations are shown, at breaks in grade, along drainage "swales" and as otherwise required to correctly grade the area to existing conditions.

- C. On completion of rough grading, obtain Owner's Representative's approval before spreading topsoil or preparing pavement subgrade.
- D. Compact fill as specified.

3.9 FINAL GRADING

- A. Spread topsoil conforming to New York State DOT Item No. 713-01 over entire area disturbed by work of this project unless otherwise noted.
- B. Spread, compact and manipulate topsoil to a minimum of six (6) inches thickness after compaction to smooth draining grades true to original elevations. Remove all excess topsoil remaining after all needs of this contract are met.
- C. Repair to proper grade any settlement of slab, pavement, utility, structure, or lawn adversely affected by settlement within one year after final acceptance at no expense to the Owner.
- D. Protect all disturbed areas during and after earthwork operation to prevent gully, erosion, and subsequent deposition on or off site. Repair/remove all erosion and deposition that occurs at no expense to the Owner.

3.10 LAWNS

- A. Make all lawn areas disturbed by work of this contract new lawn unless otherwise noted. A qualified landscape subcontractor with a proven record of lawn projects and five years minimum experience shall perform all lawn installation work.
- B. Complete work by reseeding using New York State DOT Item No. 713-03 fertilizer and Item 713.04 grass seed. Application rates to suit New York State DOT Item No. 610-3.02.

3.11 REPAVING

- A. Replace pavement and subbase materials for roads, streets, parking areas, walks, and other surfaces that were damaged or removed during construction. Use details shown on drawings and follow the New York State Department of Transportation item numbers given for base, binder and top courses of bituminous pavement.

3.12 FLOOR SLABS

- A. Upon completion of backfilling, drill and grout steel dowels into existing slab, place steel rebar and pour concrete slab the same thickness as the existing slab. All work shall be performed by workmen skilled in the appropriate trade in accordance with the requirements of the Architect.
- B. New slab shall be finished smooth and flush with existing slab.

3.13 RESTORATION

- A. On completion of the work, clean the entire site, remove surplus earth, large stones and debris and legally dispose to an off-site location. Remove tools and equipment and leave the entire area in a neat condition.

END OF SECTION 220580

SECTION 220700 - INSULATION

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 SUBMITTAL

- A. Shall include product description, manufacturer's installation instructions, types and recommended thicknesses for each application, and location of materials.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Insulation, jackets, adhesive, and coatings shall comply with the following:
 - 1. Treatment of jackets or facing for flame and smoke safety must be permanent. Water-soluble treatments not permitted.
 - 2. Insulation, including jackets, finishes and adhesives on the exterior surfaces of pipes and equipment, shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less.
 - 3. Asbestos or asbestos bearing materials are prohibited.
 - 4. Energy Conservation Code of New York State.
 - 5. All adhesives and sealants used for insulation in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits as called for in the current version of U.S. Green Building Council LEED Credits EQ E4.1 and EQ E4.2.
 - 6. Provide materials which are the standard products of manufacturers regularly engaged in the manufacture of such products and that essentially duplicate items that have been in satisfactory use for at least two (2) years prior to bid opening. Provide insulation systems in accordance with the approved MICA or NAIMA Insulation Standards.
 - 7. Insulation shall be clearly marked with manufacturer's name, identification of installed thermal resistance (R) value, out-of-package R value, flame spread and smoke developed indexes in accordance with Energy Code requirements.

2.2 ACCEPTABLE MANUFACTURERS

- A. Fiberglass: Knauf, Johns Manville, Owen-Corning, Certainteed
- B. Polyisocyanurate: Dow Trymer 2000XP, HyTherm.

- C. Calcium Silicate: Industrial Insulation Group (ILG).
- D. Adhesives: Childers Products, Foster.

2.3 PIPE INSULATION (RIGID FIBERGLASS TYPE)

- A. Product meeting ASTM C 547, ASTM C 585, and ASTM C 795; rigid, molded, noncombustible.
- B. 'K' Value: ASTM C 335, 0.23 at 75°F mean temperature. Maximum Service Temperature: 1000°F.
- C. Vapor Retarder Jacket: ASJ/SSL conforming to ASTM C 1136 Type I, secured with self-sealing longitudinal laps and butt strips.
- D. Field-Applied PVC Fitting Covers with Flexible Fiberglass Insulation: Proto Corporation 25/50 or Indoor/Outdoor, UV-resistant fittings, jacketing and accessories, white or colored. Fitting cover system shall consist of pre-molded, high-impact PVC materials with blanket type fiberglass wrap inserts. Blanket fiberglass wrap inserts shall have a thermal conductivity ('K') of 0.26 at 75°F mean temperature. Closures shall be stainless steel tacks, matching PVC tape, or PVC adhesive per manufacturer's recommendations.
- E. Field-Applied PVC Fitting Covers with Molded Fiberglass Inserts: Hamfab Products, Division of ICA Inc., UV-resistant fittings, jacketing and accessories, white or colored. Fitting cover system consists of pre-molded, high-impact PVC materials with rigid molded fiberglass inserts. Closures to be stainless steel tacks, matching PVC tape, or PVC adhesive per manufacturer's recommendations.
- F. Prefabricated Thermal Insulating Fitting Covers: Comply with ASTM C 450 for dimensions used in pre-forming insulation to cover valves, elbows, tees, and flanges.

2.4 PIPE INSULATION (RIGID POLYISOCYANURATE TYPE)

- A. Preformed Rigid Polyisocyanurate Insulation: Cellular foam complying with ASTM C591, rigid molded, non-combustible. 2-lb./ft³ nominal density. Maximum thermal conductivity (k) shall be 0.19 BTU-in/ft² hr. °F at 75°F mean temperature.

2.5 CALCIUM SILICATE

- A. Flat, curved, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement.
- B. Product meeting ASTM C 533/447, Type I, 1200 °F maximum service temperature.

2.6 FIELD-APPLIED JACKETS

- A. Piping:
 - 1. PVC Pipe Jacket: High-impact, ultraviolet-resistant PVC; 30 mils thick; 25 or less flame spread rating/50 or less smoke developed rating, roll stock ready for shop or field cutting and forming. Adhesive: As recommended by insulation material manufacturer. PVC Jacket Color: White.

2. Aluminum Jacket: Factory cut and rolled to indicated sizes. Comply with ASTM B 209, 3003-alloy, and H-14 temper. Finish and Thickness: Corrugated finish, 0.010 inch thick. Moisture Barrier: 1-mil- thick, heat-bonded polyethylene and kraft paper. Elbows: Preformed, 45- and 90-degree, short- and long-radius elbows; same material, finish, and thickness as jacket.
3. Stainless-Steel Jacket: ASTM A 666, Type 304 or 316; 0.010 inch thick; and factory cut and rolled to indicated sizes. Moisture Barrier: 3-mil- thick, heat-bonded polyethylene and kraft paper. Elbows: Gore type, for 45- and 90-degree elbows in same material, finish, and thickness as jacket. Jacket Bands: Stainless steel, Type 304, 3/4 inch wide.
4. Alumaguard Jacketing: Self adhesive, 60 mil thick, rubberized bitumen, foil faced membrane. Polyguard Products, Inc. Alumaguard 60, or equal.
5. Venture Guard Jacketing: 26.6 mil thick, Hypalon self adhesive membrane. Venture Tape Corp. Venture Guard, or equal.

2.7 COATINGS, MASTICS, ADHESIVES AND SEALANTS

- A. Vapor Barrier Coatings: Used in conjunction with reinforcing mesh to coat insulation on below ambient services temperatures. Permeance shall be no greater than 0.08 perms at 45 mils dry as tested by ASTM F1249. Foster 30-65 Vapor Fas; Childers CP-34, or approved equal.
- B. Lagging Adhesives: Used in conjunction with canvas or glass lagging cloth to protect equipment/piping indoors. Foster 30-36 Sealfas; Childers CP-50AMV1 Chil Seal, or approved equal.
- C. Weather Barrier Mastic: Used outdoors to protect above ambient insulation from weather. Foster 46-50 Weatherite; Childers CP-10 Vi Cryl, or approved equal.
- D. Fiberglass Adhesive: Used bond low density fibrous insulation to metal surfaces. Shall meet ASTM C916 Type II. Foster 85-60; Childers CP-127, or approved equal.
- E. Elastomeric Insulation Adhesive: Used to bond elastomeric insulation. Foster 85-75; Childers CP-82, or approved equal.
- F. Elastomeric Insulation Coating: Water based coating used to protect outside of elastomeric insulation. Foster 30-65, Childers CP-34 or approved equal.
- G. Calcium Silicate Adhesive: Used to bond calcium silicate insulation. IIG CalBond Gold, or approved equal.
- H. Calcium Silicate Vapor Barrier Coating: Manufacturer's recommended coating to seal insulation system from water intrusion. IIG Insulkote ET, or approved equal.
- I. Foster 95-50; Childers CP-76, or approved equal.
- J. Metal Jacketing Sealant: Used as a sealant on metal jacketing seams to prevent water entry. Foster 95-44; Childers CP-76, or approved equal.

- K. Reinforcing Mesh: Used in conjunction with coatings/mastics to reinforce. Foster Mast A Fab; Childers Chil Glass #10, or approved equal.

2.8 PIPE SUPPORT INSULATION INSERTS

- A. 20 lbs./cu. ft. molded fiberglass, for -120°F to +450°F service temperature, non-combustible, 0.30 thermal conductivity (k), same thickness as pipe insulation.
- B. Acceptable Manufacturers: Hamfab "H" Block, or approved equal.

2.9 MATERIALS AND SCHEDULES

- A. See Exhibits at the end of this section.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. All materials shall be installed by skilled labor regularly engaged in this type of work. All materials shall be installed in strict accordance with manufacturer's recommendations, building codes, and industry standards.
- B. Locate insulation and cover seams in the least visible location. All surface finishes shall be extended in such a manner as to protect all raw edges, ends and surfaces of insulation. No glass fibers shall be exposed to the air.
- C. All pipe insulation shall be continuous through hangers, sleeves, walls, ceiling, floor, or roof openings, unless not allowed by fire stop system. Refer to Sections 220500, "Basic Plumbing Requirements" and 221010, "Piping Systems and Accessories" for firestop systems.
- D. Provide thermal insulation on clean, dry surfaces and after piping and equipment (as applicable) have been tested. Do not cover pipe joints with insulation until required tests are completed.
- E. All cold surfaces that may "sweat" must be insulated. Vapor barrier must be maintained; insulation shall be applied with a continuous, unbroken moisture and vapor seal. All hangers, supports, anchors, or other projections that are secured to cold surfaces shall be insulated and vapor sealed to prevent condensation. Cover valves, fittings and similar items in each piping system with insulation as applied to adjoining pipe run. Extra care must be taken on piping appurtenances to insure a tight fit to the piping system. For piping systems with fluid temperatures below ambient, all vapor retarder jacket (ASJ) seams must be coated with vapor barrier coating. All associated elbows, fittings, valves, etc. must be coated with vapor barrier coating and reinforcing mesh to prevent moisture ingress. Valve extension stems require Elastomeric insulation that is tight fitting to the adjoining fiberglass system insulation. Pumps, strainers, drain valves, etc. must be totally encapsulated with Elastomeric insulation.
- F. Items such as manholes, handholds, clean-outs, plugged connections, pet cocks, air vents, ASME stamp, and manufacturers' nameplates, may be left un-insulated unless omitting insulation would cause a condensation problem.

When such is the case, appropriate tagging shall be provided to identify the presence of these items. Provide neatly beveled edges at interruptions of insulation.

- G. Provide protective insulation as required to prevent personal injury.
- H. All pipes shall be individually insulated.
- I. If any insulation material becomes wet because of transit or job site exposure to moisture or water, the contractor shall not install such material, and shall remove it from the job site.
- J. All exposed surfaces shall be white, unless noted otherwise.

3.2 PIPE INSULATION

- A. Insulate piping systems including fittings, valves, flanges, unions, strainers, and other attachments installed in piping system, whether exposed or concealed.
- B. Insulation installed on piping operating below ambient temperatures must have a continuous vapor retarder. All joints, seams and fittings must be sealed. Insulation shall be continuous through hangers on all water piping and storm water piping.
- C. Hanger Shields: Refer to Section 221010 "Piping Systems and Accessories".
- D. Hanger shields shall be installed between hangers or supports and the piping insulation. Rigid insulation inserts shall be installed as required between the pipe and the insulation shields. Inserts shall be of equal thickness to the adjacent insulation and shall be vapor sealed as required.
 - 1. Pre-Insulated Type: Butt insulation to hanger shields and apply a wet coat of vapor barrier cement to the joints and seal with 3 in. wide vapor barrier tape.
 - 2. Field Insulated Type: Provide Hamfab Co. "H" blocks per manufacturers recommended spacing between pipe and shield.
 - 3. Tape shields to insulation.
- E. Joints in section pipe covering made as follows:
 - 1. All ends must be firmly butted and secured with appropriate butt-strip material. On high-temperature piping, double layering with staggered joints may be appropriate. When double layering, the inner layer should not be jacketed.
 - 2. Standard: Longitudinal laps and butt joint sealing strips cemented with white vapor barrier coating, or factory supplied pressure sensitive adhesive lap seal.
 - 3. Vapor Barrier: For cold services, Longitudinal laps and 4 in. vapor barrier strip at butt joints shall be sealed with white vapor barrier coating. Seal ends of pipe insulation at valves, flanges, and fittings with white vapor barrier coating.

F. Fittings, Valves and Flanges:

1. Domestic Hot and Cold Water: Premolded fitting insulation of the same material and thickness as the adjacent pipe insulation.
2. White PVC jacketing, with continuous solvent weld of all seams. Tape all fittings.

G. For piping exposed to the elements, jacketing shall be aluminum or stainless steel with a factory applied moisture barrier. Fitting covers shall be of similar materials. The insulation and jacketing shall be held firmly in place with a friction type Z lock or a minimum 2 in. overlap joint. All joints shall be sealed completely along the longitudinal seam and installed so as to shed water. All circumferential joints shall be sealed by use of preformed butt strips; minimum 2 in. wide or a minimum 2 in. overlap. Butt strips shall overlap the adjacent jacketing a minimum 1/2 in. and be completely weather sealed. Jacket at elbows and tees shall be mitered, or pre-manufactured fitting jackets shall be provided, with additional aluminum holding bands, as required. All joints shall be sealed watertight using specified metal jacketing sealant as recommended by the manufacturer.

H. Apply PVC jacket where indicated, with 1 in. overlap at longitudinal seams and end joints. Seal with manufacturers recommended adhesive.

I. Apply either aluminum or PVC jacketing to exposed insulated pipe, valves, fittings, and specialties, at an elevation of 8 feet or less above finished floor in mechanical/electrical rooms, penthouses, and services aisles/pipe chases. Fittings of aluminum-jacketed piping may be either aluminum or standard PVC fitting covers.

J. All exposed piping less than 8'-0" above finished floor in occupied spaces shall be insulated with polyisocyanurate insulation (for cold services) or calcium silicate (for hot services) and rigid fiberglass fittings. All exposed piping shall have a continuous 30 mil thick white PVC jacketing.

K. Piping in exterior walls, spaces, overhangs, attics, or where subject to freezing: Insulate pipe with double the thickness called for. Piping in wall chases: In addition to the above, pack chase with loose glass fiber insulation.

L. Provide insulation on exposed hot and cold plumbing piping to within 18 in. of fixture or equipment connection.

M. Insulate exposed domestic water and waste piping for plumbing fixtures designated for use by the handicapped.

3.3 EXISTING INSULATION

- A. Patch existing insulation damaged during the course of the work.
- B. Insulate existing piping and equipment as called for.
- C. Jacketing for piping in existing areas shall match existing jacketing.

EXHIBIT "I" - PIPE INSULATION MATERIALS
(Notes at end of Exhibit "I")

<u>SERVICE</u>	<u>INSULATION MATERIAL</u>	<u>THICKNESS</u>	<u>REMARKS</u>
Domestic cold water	Glass fiber	1-1/2 in. and larger: 1 in. 1-1/4 in. and smaller: 1/2 in.	SEE NOTES 1
Domestic hot, tempered and circulation water (105°F - 140°F)	Glass fiber	1-1/2 in. and larger: 1-1/2 in. 1-1/4 in. and smaller: 1 in.	SEE NOTES 1
Domestic hot, tempered and circulation water (141°F - 200°F)	Glass fiber	1-1/2 in. and larger: 2 in. 1-1/4 in. and smaller: 1-1/2 in.	SEE NOTES 1
AC unit drains, overflows and indirect waste piping associated with any HVAC equipment	Glass fiber	All sizes: 1/2 in.	
Storm and secondary storm water	Glass fiber	All sizes: 1 in.	Insulate body of drain and storm water piping, horizontal and vertical, down to connection below ground floor slab or in crawl space
Sanitary and waste	Glass fiber	All sizes: 1/2 in.	SEE NOTE 2

NOTES FOR EXHIBIT I:

NOTE 1: Exposed insulation shall be covered with PVC jacket.

NOTE 2: Insulation on sanitary and waste piping located within plumbing chases and crawl spaces are not required.

END OF SECTION 220700

SECTION 221010 - PIPING SYSTEMS AND ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 SUBMITTALS

- A. Provide a schedule of pipe materials, fittings and connections.
- B. Provide a detailed matrix listing the specific UL approved firestop system assembly to be used for each type of piping provided and each type of construction to be penetrated along with all associated UL assembly details.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Pipe and fittings shall be new, marked with manufacturer's name and comply with applicable ASTM and ANSI Standards.
- B. All items here-in used to convey water for potable use shall be lead free in accordance with NSF, Standard 61, Section 9 - Standard for Drinking Water and Lavatory Faucets and NSF Standard 372 - Maximum Lead Requirements. Compliance shall be via third party testing and certification.

2.2 COPPER TUBE AND FITTINGS

- A. Pipe: ASTM B88; Type K or L, hard temper. Soft temper only as called for. Plans show copper tube sizes.
- B. Fittings: Wrought copper and copper alloy, ASME B16.22 or cast copper alloy, ASME B16.18; solder end connections.
- C. Joints: Comply with the requirements of ASTM B828.
- D. Unions and Flanges: 2 in. and smaller use unions, solder type, cast bronze, ground joint, 150 lb. swp; 2-1/2 in. and over use flanges, cast bronze, companion type, ASME drilled, solder connection, 150 lb. swp.
- E. Flux Materials: Flux shall comply with ASTM B813 and the provisions of the New York State Plumbing Code.
- F. Solder Materials: No-lead solder, using alloys made from tin, copper, silver and nickel. Harris, Inc., "Stay-Safe 50" and "Bright", Engelhard "Silvabright 100", Canfield "Watersafe" or approved equal.
- G. Brazing Materials: Class BcuP-5 for brazing copper to brass, bronze to copper. Harris, Inc. "Stay-Silv 15" or approved equal.

2.3 COPPER TUBE AND FITTINGS - PRESS FITTINGS

- A. Tubing Standard: Copper tubing shall conform to ASTM B75 or ASTM B88.
- B. Fitting Standard: Copper fittings shall conform to ASME B16.18, ASME B16.22, or ASME B16.26.
- C. Press Fittings: Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22. O-rings for copper press fittings shall be EPDM.
- D. Acceptable Manufacturers: Apollo, Mueller, Nibco, Viega.

2.4 COPPER DRAINAGE TUBE AND FITTINGS

- A. Pipe: ASTM B306, Type DWV, hard temper.
 - 1. Copper not allowed for urinal waste.
- B. Fittings: Wrought copper, ANSI B16.29 or cast bronze, ANSI B16.23; solder end connections.
- C. Flux Materials: Flux shall comply with ASTM B813 and the provisions of the New York State Plumbing Code.
- D. Solder Materials: No lead solder, using alloys made from tin, copper, silver and nickel.
- E. Acceptable Manufacturers: Harris, Inc., "Stay-Safe 50" and "Bright", Engelhard "Silvabright 100", Canfield "Watersafe", or approved equal.

2.5 BRASS PIPE AND FITTINGS

- A. Piping: ASTM B43, semi-annealed, red brass containing not less than 85% copper; chrome plated where called for.
- B. Fittings: Cast brass, sps, malleable iron pattern, reinforced corresponding to weight of pipe; chrome plated with high polished finish where called for.

2.6 HUB AND SPIGOT CAST IRON SOIL PIPE AND FITTINGS

- A. Pipe: ASTM A74 service weight cast iron, bitumen coated.
- B. Fittings: Cast iron, service weight, hub and spigot, drainage pattern, bitumen coated.
- C. Connections: ASTM C564 neoprene gaskets and lubricant.
- D. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.

2.7 NO-HUB CAST IRON SOIL PIPE AND FITTINGS

- A. Pipe: ASTM A888, CISPI Standard 301, no-hub cast iron, bitumen coated.
 - 1. For above grade only.
- B. Fittings: Cast iron, no-hub drainage pattern, bitumen coated.
- C. Couplings:
 - 1. 1-1/2 in. to 2 in.: CISPI standard 310 with 300 series stainless steel corrugated shield and clamp assembly with ASTM C564 neoprene sealing sleeve (or) same as specified for 3 in. and larger.
 - 2. 3 in. and Larger: 24 gauge, Type 304 stainless steel housing clamp assembly with ASTM C564 neoprene sealing sleeve, 60 in. lbs. minimum torque rating, shall meet requirements of pipe manufacturer and shall be compatible with specified pipe. Acceptable Manufacturers: Clamp-All Coupling System, Tyler "Wide Body", Husky "Series 2000", Mission "Heavy Weight", Ideal Tridon or approved equal.
- D. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.

2.8 SPECIAL FITTINGS

- A. Cast Iron to Lead Pipe: Red brass ferrules and wiped joints. Caulk ferrule into cast iron hub.
- B. Copper to Cast Iron: Cast bronze, cast iron to sweat adapter.
- C. Copper to Steel Piping:
 - 1. Cast bronze copper to iron male or female adapter with shoulder for drainage piping only.
 - 2. Dielectric pipefittings.
- D. Steel to Cast Iron: Cast iron soil pipe connector with spigot and IPS male thread end (Manhoff fittings).
- E. No-Hub, Cast Iron, Glass, Polypropylene or High Silicon Cast Iron: Proper adapter to piping being connected.
- F. Cast Iron and PVC Solvent: Aerators and deaerators as manufactured by Conine Manufacturing Co., Inc.

2.9 DIELECTRIC PIPE FITTINGS

- A. Description: Assembly or fitting having insulating material isolating joined dissimilar metals to prevent galvanic action and stop corrosion.

- B. Unions: Factory fabricated, for 250 psi minimum working pressure at 180°F, threaded or solder ends, insulating material suitable for system fluid, pressure and temperature.
- C. Flanges: Factory-fabricated, companion-flange assembly, for 150 or 300 psig minimum pressure to suit system fluid pressures and temperatures with flange insulation kits and bolt sleeves.
- D. Acceptable Manufacturers: EPCO, Capitol Manufacturing, Watts or approved equal.

2.10 HANGERS, INSERTS AND SUPPORTS

- A. Hangers, Inserts, Clamps: B-Line, Grinnell, Michigan Hanger, PHD Manufacturing.
- B. Hangers:
 - 1. Adjustable, wrought malleable iron or steel with electroplated zinc or cadmium finish. PVC coated where in contact with copper piping.
 - 2. Adjustable ring type where piping is installed directly on hanger for piping 3 in. and smaller.
 - 3. Adjustable steel clevis type for piping 4 in. and larger.
 - 4. Nuts, washers and rods with electroplated zinc or cadmium finish.
 - 5. Provide hot dipped galvanized finish for hangers and accessories installed in exterior locations and interior areas with moist environment conditions such as pools, pool filter rooms, areaways, garages and similar areas.
- C. Spacing Schedule:

Pipe Size	Steel	Copper	Plastic	Cast Iron	Rod Size
3/4 in. to 1 in.	8 ft.	6 ft.	3 ft.	Each Horizontal Joint 5 ft. Maximum O.C.	3/8 in.
1-1/4 in. to 2 in.	10 ft.	6 ft.	3 ft.		3/8 in.
2-1/2 in. to 4 in.	12 ft.	10 ft.	4 ft.		1/2 in.
5 in. and over	12 ft.	10 ft.	4 ft.		5/8 in.
8 in.	12 ft.	10 ft.	4 ft.		3/4 in.
Over 8 in.	To suit loading conditions.				

- D. Cast Iron No-Hub Supports:
 - 1. In accordance with manufacturer's recommendations.
 - 2. Vertical piping supported at each stack base, at each floor and 15 ft. on center, maximum. Freestanding vertical pipe should be adequately staked or braced during construction to maintain alignment. Bases of stacks shall be supported on concrete, brick laid in cement mortar, metal brackets attached to the building construction or by other methods approved by the Owner's Representative.
 - 3. Horizontal piping supported within 24 in. each side of the coupling joint at 10 ft. intervals for 10 ft. pipe lengths and at 5 ft. intervals for 5 ft. pipe lengths.

Supports or hangers placed to maintain alignment and grade with provision made to prevent shear. Greater than 3 in. diameter pipe braced at changes of direction to prevent horizontal movement.

E. Beam Attachments:

1. C-Clamp style, locknut, restraining strap, electroplated finish, UL listed, FM approved for pipe sizes 2 in. and smaller.
2. Center loaded style with clamp attachments that engage both edges of beam, electroplated finish, UL listed, FM approved, for pipe sizes larger than 2 in., refer to "Supports" for additional requirements.

F. Inserts: Carbon steel body and square insert nut, galvanized finish, maximum loading 1300 lbs., for 3/8 in. to 3/4 in. rod sizes, reinforcing rods on both sides, MSS-SP-69 Type 19 or approved equal.

G. Supports:

1. Provide intermediate structural steel members where required for hanger attachment. Members shall span across the bar joists at panel points of joists. Secure member to structure. Select size of members based on a minimum factor of safety of four.
2. For Weights Under 1000 lbs.: "Drill-In" inserts, "U" shaped Channel, beam clamps or other structurally reviewed support. The factor of safety shall be at least four. Follow manufacturer's recommendations.
3. For Weights Above 1000 lbs.: Drill through floor slabs and provide flat flush plate welded to top of rod or provide additional "Drill-In" inserts and hangers to reduce load per hanger below 1000 lbs.
4. For Metal Decks: Drill hole through for hanger rods and imbed a welded plate in concrete or use devices designed for this application, with a safety factor of four.
5. For Wood Construction: Provide hangers and supports designed for attachment to wood construction.
6. Acceptable Manufacturers: Hilti, ITW Ramset, Phillips "Red Head" or approved equal.

H. Trapeze Hangers:

1. For use on 1-1/2 in. and smaller piping only.
2. For plumbing systems only.
3. Hangers shall be supported with rod sized with a safety factor of four.
4. May be manufactured type "U" shaped channel, or suitable angle iron or channel. Round off all sharp edges.

5. Securely fasten piping to trapeze with "U" bolt or pipe clamps, dissimilar metals shall not touch, use isolation gaskets, similar to HoldRite strut-mounted cushion clamps. Fasten piping to trapeze at every third support, except uninsulated piping which shall be fastened at every support using strut-mounted cushion clamps.
6. Acceptable Manufacturers: B-Line, HoldRite, Kindorf, Unistrut or approved equal.

I. Cabinet Pipe Space Supports:

1. Piping below casework countertops within space behind cabinet shall be supported using continuous slot metal channels with pipe clamps.
2. Acceptable Manufacturers: B-Line, Kindorf, Unistrut or approved equal.

J. Hanger Insulation Shields:

1. Hanger insulation shields shall be provided for all water and storm water piping. Hangers shall attach directly to pipe for all remaining services.
2. Piping 2 in. and Smaller: Pipe insulated with glass fiber insulation shall be protected at point of support by a sheet metal shield. Shield shall be #18 gauge, galvanized steel, minimum 120 degree arc, formed to fit insulation thickness and 12 in. long. Tape shields to pipe insulation.
3. Piping 3 in. and Larger: Pipe insulated with glass fiber insulation shall be protected at point of support by a sheet metal shield and pipe support insulation insert(s) between pipe and hanger. Shield shall be #18 gauge, galvanized steel, minimum 120 degree arc, formed to fit insulation thickness and 12 in. long. Tape shields to pipe insulation. Provide temporary blocking to maintain proper spacing for insulation.

- K. Piping systems with material not listed above shall be supported and protected in accordance with manufacturer's recommendations.

2.11 PIPING ACCESSORIES

- A. Escutcheon Plates: Steel or cast brass, split hinge type with setscrew, high plates where required for extended sleeves. Chrome plated in finished areas and at plumbing fixtures.
- B. All cleanout plugs, bushings and nipples, required for instruments and gauges shall be brass.
- C. Hubless cast iron fitting restraints shall be Holdrite Series #117 or approved equal.

2.12 SLEEVES

- A. Standard Type:
 1. Schedule 40 black steel pipe sleeves for structural surfaces, two pipe sizes larger than the pipe, and as recommended by the sealing element manufacturer.

Provide full circle water stop collar for sleeves located within below grade walls, wet wells and waterproofed surfaces. The collar shall be fabricated from steel plate and welded to the sleeve around its entire circumference.

2. Schedule 40 PVC sleeves or sheet metal sleeves for nonstructural surfaces and existing construction. Sheet metal sleeves shall be 18 gauge minimum and braced to prevent collapsing.

2.13 SEALING ELEMENTS

- A. Expanding neoprene link type, watertight seal consisting of interlocking links with zinc plated bolts.

1. Acceptable Manufacturers: Thunderline "Link-Seal" Series 200, 300 or 400, Pyropac, Calipco.

2.14 FIRESTOP SYSTEM FOR OPENINGS THROUGH FIRE RATED WALL AND FLOOR ASSEMBLIES

- A. Materials for firestopping seals shall be listed by an approved independent testing laboratory for "Through-Penetration Firestop Systems". The system shall meet the standard fire test for Through-Penetration Firestop Systems designated ASTM E814. Firestop system seals shall be provided at locations where piping pass through fire rated wall, floor/ceiling, or ceiling/roof assembly. Minimum required fire resistant ratings of the assembly shall be maintained by the Firestop System. Installation shall conform with the manufacturer's recommendations and other requirements necessary to meet the testing laboratory's listing for the specific installation.

2.15 STACK SLEEVE

- A. Cast iron body with caulking recess, flashing clamp and under deck clamp.
- B. Acceptable Manufacturers: Jay R. Smith Series 1720, Zurn, Wade.

2.16 STRAINERS

- A. Description: Y-Pattern, self-cleaning, except where otherwise indicated, full size of connecting piping, Type 304 stainless steel screens, 125 lb. SWP, unless otherwise indicated.
- B. Copper Piping 2-1/2 in. and Smaller: Lead free, cast bronze body, threaded ends, tapped retainer cap with closure plug, 20 mesh screen, Watts #LF777S.
- C. Piping 3 in. and Larger, Cold Water Applications: Lead free, cast iron body, flanged ends, standard screen openings, FDA approved epoxy coating, tapped retainer cap and gasket with closure plug; Watts #77F-DI-FDA-125.

2.17 PIPING MATERIALS AND SCHEDULE

- A. See Exhibit "A", "Schedule of Piping Materials" at end of this Section for (Plumbing) piping.

- B. See Exhibit "B", "Testing" at end of this Section.

PART 3 - EXECUTION

3.1 EQUIPMENT AND SYSTEMS

- A. Install equipment and systems in accordance with provisions of each applicable Section of these Specifications, and Local/State Codes/Regulations having jurisdiction. Accurately establish grade and elevation of piping before setting sleeves. Install piping without springing or forcing, except where specifically called for, making proper allowance for expansion and anchoring. Changes in sizes shall be made with reducing fittings. Reducing couplings are not acceptable. Arrange piping at equipment with necessary offsets, unions, flanges, and valves, to allow for easy part removal and maintenance. Offset piping and change elevation as required to coordinate with other work. Avoid contact with other mechanical or electrical systems. Provide adequate means of draining and venting units, risers, circuits and systems. Conceal piping unless otherwise called for. Copper tubing shall be cut with a wheeled tubing cutter or other approved copper tubing cutter tool. The tubing must be cut square to permit proper joining with the fittings. Ream pipes after cutting and clean before installing. Cap or plug equipment and pipe openings during construction. Install piping parallel with lines of building, properly spaced to provide clearance for insulation. Make changes in direction and branch connections with fittings. Do not install valves, unions and flanges in inaccessible locations. Materials within a system and between systems shall be consistent. If this is not possible, install dielectric fittings.

3.2 PIPING OVER ELECTRICAL EQUIPMENT

- A. Contractor shall route piping to avoid installation directly over electric equipment, including, but not limited to panels, transformers, disconnects, starters, motor control center, adjustable speed drives and fused switches.
- B. Piping shall not be installed in the dedicated electric and working space as defined by NEC 110. Dedicated electrical space is generally equal to the depth and width of electrical equipment, and extends 6 ft. above the electrical equipment, or to a structural ceiling. Dedicated working space is a minimum of 30 in. wide or the width of equipment (whichever is larger) a minimum of 6 ft.-6 in. tall, with a depth of 3ft. to 9 ft. depending on the voltage.

3.3 HANGERS, INSERTS AND SUPPORTS

- A. Piping shall not be supported by wires, band iron, chains, from other piping, or by vertical expansion bolts. Support piping with individual hangers from concrete inserts, wood construction, welded supports, or beams clamps of proper configuration and loading design requirements for each location; replace if not suitable. Follow manufacturer's safe loading recommendations. Suspend with rods of sufficient length for swing and of size called for, using four (4) nuts per rod. Provide additional structural steel members, having one coat rustproof paint, where required for proper support. Provide oversized hangers where insulation/supports must pass between pipe and hanger. Provide continuous support or extra supports for plastic piping per manufacturer's requirements. Hangers, when attached to joists, shall only be placed at the top or bottom chord panel point.

Only concentric type hangers are permissible on piping larger than 2-1/2 in.; "C" types are permitted for piping 2 in. and smaller on joists. Provide riser clamps for each riser at each floor. Use trapeze hangers where a group of piping can be installed.

- B. Provide a pipe hanger within 12 inches of pipe unions and piping connections to equipment, in order to facilitate disconnections of piping without pipe sagging.

3.4 HANGERS ATTACHED TO JOISTS

- A. Individual hangers may be suspended directly from the bottom chord panel point provided that the sum of the concentrated loads within the chord panel does not exceed 100 pounds and the attachments are concentric to the chord. (Eccentrically loaded joists using beam clamps or other attachment methods are not acceptable.)
- B. For nominal concentrated loads between panel chords, which have been accounted for in the specified uniform design load for the joists, this Contractor is to provide struts to transfer the load to a panel point on the opposite chord as reviewed and acceptable by the Structural Engineer of Record.

3.5 PIPE CONNECTIONS

- A. No-Lead Solder Connections: Nonacid flux and clean off excess flux and solder.
- B. Copper Press Connections: Copper press fittings shall be made in accordance with the manufacturer's installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool approved by the manufacturer.
- C. Brazed Connections: Make joints with silver brazing alloy in accordance with manufacturer's instructions. Remove working parts of valves before applying heat.
- D. Threaded Connections: Clean out tapering threads, made up with pipe dope; screwed until tight connection. Pipe dope must be specifically selected for each application.
- E. Flanged Joints: Select appropriate gasket material, size, type and thickness for service applications. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- F. Dielectric Pipe Fittings: Provide dielectric unions at ALL equipment connections where dissimilar metals meet. In addition, provide dielectric unions in all open type piping systems (condensing water, domestic water, etc.) where dissimilar metals are to be joined.

3.6 WELDING

- A. Welding shall be performed in compliance with the welding procedure specifications prepared by the National Certified Pipe Welding Bureau. Welded pipe fabricated by certified welder. Contractor shall submit proof of current certification of each welder if requested by Owner. Use full-length pipe where possible; minimum distance between welds, 18 in. on straight runs.

Welds must be at least full thickness of pipe inside smooth and remove cutting beads, slag and excess material at joints; chamfer ends. Minimum gap 1/8 in., maximum 1/4 in., for butt welds. Overlaps on position and bench welds to be not less than 3/4 in. One internal pass and one external pass minimum required on slip-on flanges. Do not apply heat to rectify distorted pipe due to concentrated welding; replace distorted pipe.

- B. When welding galvanized pipe, apply cold galvanizing on joint following welding.

3.7 SLEEVES

- A. Provide for pipes passing through floors, walls or ceilings. Not required for floors that are core-drilled, except where floor is waterproofed.
- B. Extend 1/8 in. above finished floor in finished areas. In above grade Mechanical Rooms and other areas with floor drains, use steel pipe sleeves 2 in. above floor.
- C. Use steel pipe sleeves in bearing wall, structural slabs, beams and other structural surfaces, and where called for.
- D. Sleeves shall be as small as practical, consistent with insulation, so as to preserve fire rating.
- E. Fill abandoned sleeves with concrete.
- F. Provide rubber grommet seals for pipes passing through ducts or air chambers or built-up housings.

3.8 SLEEVE PACKING

- A. Seal void space at sleeves as follows:
 - 1. Interior Locations: Firmly pack with fiberglass and caulk.
 - 2. Exterior Walls and Below Grade Cored Holes: Use sealing element.
 - 3. Cored Holes: Use sealing element.
 - 4. Fire Rated, Partitions and Floor Slabs: Use fire rated sealing elements, materials and methods. Provide per manufacturer's instructions to maintain firestop.
 - 5. Waterproofed Walls/Floors: Use waterproof sealing element, device or compound.

3.9 ESCUTCHEON PLATES

- A. Provide polished chrome setscrew type escutcheon plates for all exposed piping passing through floors, walls or ceilings, in all rooms except in Boiler, Fan and Mechanical Rooms.

3.10 TESTS

- A. Refer to Exhibit "B" at the end of this section for testing of Plumbing Systems.

- B. Provide all necessary items to complete proper testing of work. Perform all testing in accordance with governing Codes, local utilities and other agencies having jurisdiction and as specified. Pay all costs to perform tests. Perform all testing in a safe manner. Isolate existing systems.
- C. Domestic Water:
 - 1. Do not cover joints with insulation until required tests are completed and the Owner's Representative accepts the system.
 - 2. Make leaks tight; no caulking permitted. Replace defective fittings, pipe or connections. Piping shall be tight and show no loss of pressure.
 - 3. Air test not acceptable as final test.
 - 4. Confirm in writing that tests and flushing have been conducted and successfully completed. Submit copy of the test report to Owner's Representative.
- D. Sanitary and Storm:
 - 1. There shall be no loss of water when testing interior piping.
 - 2. Air test not acceptable as final test.
 - 3. Should any leaks, defective joints or defective construction be detected in sewers and/or floors or walls of appurtenant structures, they shall be permanently stopped. Should any defective pipes, fittings or accessories be discovered they shall be removed and replaced at the Contractor's expense.
 - 4. Confirm in writing that tests have been conducted and successfully completed. Submit copy of the test report to Owner's Representative.

3.11 DOMESTIC WATER PIPING CLEANING AND DISINFECTION

- A. Cleaning and disinfecting shall be in accordance with requirements of New York State Department of Health and authority having jurisdiction. Prior to disinfecting, flush piping to remove any sediment and debris.
- B. Clean and disinfect water distribution piping systems and parts of existing potable water systems that have been altered, extended or repaired.
- C. After disinfection procedures, submit water samples in sterile bottles to an approved Department of Health Laboratory. Samples shall be proven equal to the water quality served to the public from the existing water supply system and acceptable to the Department of Health. Flush and disinfect all sections of pipe that fail the laboratory tests. Submit test results indicating water is potable.

3.12 PIPE LINE SIZING

- A. Pipe sizes called for are to be maintained. Pipe size changes made only as reviewed by Owner's Representative. Where discrepancy in size occurs, the larger size shall be provided.

EXHIBIT "A" - PIPING MATERIALS (PLUMBING)
(Notes at end of Exhibit "A")

<u>SERVICE</u>	<u>PIPE MATERIALS</u>	<u>FITTINGS</u>	<u>CONNECTIONS</u>
Domestic water interior/hot, cold and circulating 3 in. and smaller	Type L copper	Wrought or cast copper	No-lead solder
	Type L copper	Wrought or cast copper	Press fit
Domestic water interior/hot, cold and circulating 4 in. and larger	Type L copper	Wrought copper	Brazed
Sanitary, sanitary vent, grease waste and storm (buried)	SEE "UNDERGROUND PIPING AND ACCESSORIES" SECTION 221020		
Sanitary, sanitary vent and grease waste	Service weight cast iron soil pipe	Cast iron hub and spigot	Neoprene compression type gasket
	Service weight cast iron soil pipe	No hub	No hub neoprene gasket and stainless steel clamp assembly
Storm/Secondary Storm	Service weight cast iron soil pipe	Cast iron hub and spigot	Neoprene compression type gasket
	Service weight cast iron soil pipe	No hub	No hub neoprene gasket and stainless steel clamp assembly
Indirect waste	Type DWV copper	Wrought copper	No-lead solder

NOTES FOR EXHIBIT A:

NOTE 1: All uninsulated piping supported by trapeze hangers shall be securely fastened to each hanger using strut-mounted cushion clamps.

EXHIBIT "B" - TESTING

SERVICE

TEST REQUIREMENTS

Domestic water	Test hydrostatically at 150 PSI for two (2) hours or at 1.5 times the working pressure when working pressure exceeds 100 PSI
Sanitary, sanitary vent, storm	Maintain 10 ft. head of water for two (2) hours.
Indirect waste	Maintain 10 ft. head of water for two (2) hours.

END OF SECTION 221010

SECTION 221020 - UNDERGROUND PIPING AND ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents

1.2 SUBMITTALS

- A. Provide a schedule of pipe materials, fittings and connections.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Pipe and fittings new and marked with manufacturer's name, complying with applicable ASTM and ANSI Standards.

2.2 CAST IRON SOIL PIPE AND FITTINGS

- A. Pipe: ASTM A74 service weight cast iron, bitumen coated, hub and spigot.
- B. Fittings: Service weight cast iron, bitumen coated, hub and spigot, ASTM C564 service weight neoprene gasket of same manufacturer as piping.
- C. All cast iron pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.

2.3 DETECTABLE TAPE

- A. Detectable underground warning tape, 5 mil. polyethylene, 6 in. wide, aluminum backing, APWA approved background colors within permanent black lettering identifying service below.
- B. Schedule:
 - 1. Sanitary: Green color, "Caution Buried Sewer Line Below".
 - 2. Storm: Green color, "Caution Buried Sewer Line Below".
 - 3. Water: Blue color, "Caution Buried Water Line Below".
 - 4. Gas: Yellow color, "Caution Buried Gas Line Below".
 - 5. Electric: Red color, "Caution Buried Electric Line Below".
- C. Acceptable Manufacturers: Seton, Terra Tape, Pro-Line Safety Products, Inc.

2.4 SCHEDULE OF PIPING MATERIALS

- A. See Exhibit "A", Schedule of Piping Materials at end of this section for piping.

PART 3 - EXECUTION

3.1 TESTING

- A. Sanitary and Storm:

1. Do not backfill over piping until required tests are completed and the Owner's Representative accepts the system.
2. There shall be no loss of water when testing interior piping inside the building foundation.
3. Air test not acceptable as final test.
4. Should any leaks, defective joints or defective construction be detected in sewers, floors or walls of appurtenant structures, they shall be permanently stopped. Should any defective pipes, fittings or accessories be discovered they shall be removed and replaced at the Contractor's expense.
5. Test exterior piping outside the building foundation in 100 ft. sections. The allowable rate of leakage per 24 hours per in. of diameter per 1,000 ft. of sewer tested shall not exceed 25 gallons. Piping shall be inspected and tested prior to backfill.
6. Confirm in writing that tests have been conducted and successfully completed. Submit copy of the test reports to Owner's Representative.

3.2 DETECTABLE TAPE

- A. Provide detectable tape directly over the buried pipe lines at a depth of 1 ft. - 0 in. below finished grade. Install tape over the continuous length of the pipe.

3.3 WELDING

- A. Welding shall be performed in compliance with the welding procedure specifications prepared by the National Certified Pipe Welding Bureau. Welded piping fabricated by a certified welder. Use full length pipe where possible; minimum distance between welds, 18 in., maximum 1/4 in., for butt welds. Overlaps on position and bench welds shall be not less than 3/4 in. One internal pass and one external pass minimum required on slip-on flanges. Do not apply heat to rectify distorted pipe due to concentrated welding; replace distorted pipe.

3.4 UNDERDRAIN PIPING

- A. Install piping in excavation laid on foundation of No. 2 stone surface throughout its entire length. Install perforated pipe true to line and grade with holes down over underdrain filter material. Place remaining underdrain filter material around and over pipe as detailed subgrade.

Pipes and fittings shall be thoroughly cleaned before installation and shall be kept clean until completion. Provide temporary end caps on piping sections in work areas. Elbows, tees, shall be backed up and anchored so that there will be no movement of the pipe due to internal or external pressure.

3.5 CATHODIC PROTECTION

- A. Provide all electrical work, wiring fittings, anodes, bonding, thermite brazing and all other work and items required for a complete cathodic protection system.
- B. Anodes shall be installed and backfilled in wet native soil, a minimum of 3 ft. from the pipe and below the center line of the pipe. Anode lead wires shall terminate on a test station lug with a lead wire thermite brazed to the pipe.
- C. Wiring shall be buried 2 ft. below grade, with 6 in. minimum separation from other underground structures. Wiring shall be backfilled with material free from rocks and debris.
- D. Splices and electrical connections shall be made with copper compression bolts and shall be made moistureproof. Electrical connections to the piping shall be made using the thermite weld process.
- E. Thermite brazing techniques shall comply with the manufacturer's recommendations. Only proper size cartridges and welders will be permitted. Clean pipe to bright metal 3 sq. in. in area to be brazed. The brazed connection and pipe shall be coated with a cold applied coal tar compound.
- F. Test leads shall be #12 AWG solid copper conductors with TW insulation and installed with thermite brazing. Terminate within test station at grade.
- G. Electrical Isolation Fittings: Provide electrical isolating fittings at tank connection at building wall penetration.
- H. Testing:
 - 1. Testing shall be performed in accordance with accepted practices as recommended by National Association of Corrosion Engineers (NACE).
 - 2. Test insulating fittings for electrical isolation.
 - 3. Measure structure-to-soil potential at representative locations throughout the system.
 - 4. Record anode current outputs at test stations.
 - 5. Adjust the cathodic protection system to comply with the criteria for protection as given in NACE RP-01-69.

EXHIBIT "A" - PIPING MATERIALS (PLUMBING)
(Notes are at end of Exhibit "A")

<u>SERVICE</u>	<u>PIPE MATERIALS</u>	<u>FITTINGS</u>	<u>CONNECTIONS</u>
Sanitary and grease waste	Service weight cast iron soil pipe	Cast iron, hub and spigot	Neoprene gasket compression type
Sanitary and grease waste vent	Service weight cast iron soil pipe	Cast iron, hub and spigot	Neoprene gasket compression type
Storm	Service weight cast iron soil pipe	Cast iron, hub and spigot	Neoprene gasket compression type

EXHIBIT "B" - TESTING

<u>SERVICE</u>	<u>TEST REQUIREMENTS</u>
Sanitary, sanitary vent, storm	Maintain 10 ft. head of water for two (2) hours.

END OF SECTION 221020

SECTION 221100 - WATER SUPPLY

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 QUALITY ASSURANCE

- A. Follow all requirements, recommendations and appendices to comply with the following publications, codes, standards, and listings/approvals:
 - 1. ANSI/AWWA C600: AWWA Standard for Installation of Ductile Iron Water Mains and Their Appurtenances.
 - 2. NFPA 24: Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
 - 3. New York State Health Department.
 - 4. Local municipality and fire department requirements and standards.
 - 5. All items here-in used to convey water for potable use shall be lead free in accordance with NSF 61, Standard 61, Section 9 - Standard for Drinking Water and Lavatory Faucets and NSF Standard 372 - Maximum Lead Requirements. Compliance shall be via third party testing and certification.

1.3 SUBMITTALS

- A. Provide submittals for all items specified under Part 2 of this Section.

PART 2 - PRODUCTS

2.1 WATER PIPING

- A. Piping Materials: Refer to Specification Section 221010, "Piping Systems and Accessories" and Section 221020, "Underground Piping and Accessories".

2.2 BACKFLOW PREVENTERS AND ACCESSORIES

- A. Reduced Pressure Type (Domestic Water - 2 in. and Smaller):
 - 1. All bronze body construction, stainless steel bolts and internal parts, stainless steel check seats. All castings with less than .025% lead content.
 - 2. Four (4) test cocks, bronze strainer and full port ball valve shutoffs.
 - 3. Design Equipment: Watts Series LF909.
 - 4. ASSE Standard 1013: AWWA Standard C511-92

5. Acceptable Manufacturers: Ames, Febco, Wilkins, Watts.

B. Terminal Valve:

1. Cast iron body with flapper valve, coated finish.
2. Design Equipment: Josam 67800 Series.
3. Acceptable Manufacturers: Josam, J.R. Smith, Waterman.

2.3 VACUUM BREAKERS

A. Atmospheric Type:

1. Lead free brass body, silicone disc, ASSE 1001, threaded inlet and outlet connections, polished chrome for finished areas.
2. Design Equipment: Watts Series #LF288-A
3. Acceptable Manufacturers: Watts, Conbraco, Zurn or approved equal.

B. Hose Connection Type:

1. Brass body, stainless steel working parts, rubber diaphragm and disc, drainable, non-removable feature, polished chrome for finished areas.
2. Design Equipment: Watts #8A.
3. Acceptable Manufacturers: Watts, Conbraco, Zurn or approved equal.

C. Pressure Type and Spill Resistant Type - Interior use:

1. Lead free bronze body, anti-siphon and spill resistant type, one-piece thermoplastic modular check and float assembly, stainless steel springs, ball valve shutoffs on inlet and outlet, test connection.
2. Design Equipment: Watts #LF008PCQT.
3. Acceptable Manufacturers: Watts, Conbraco, Zurn or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

- A. Coordinate work with all other trades and utility companies.
- B. Inspect pipe, fittings and equipment prior to installation. Remove all defective materials from the site.
- C. Do not backfill until inspection by Owner's Representative.

- D. Install pipe and equipment in accordance with manufacturer's recommendations and in a workmanlike manner as determined by the Owner's Representative.

3.2 WATER SERVICE

- A. Install all piping on firm bed, using caution where piping passes over excavation. Provide concrete thrust blocks to support hydrant and prevent movement at all changes in direction of piping. Thrust blocks not required for Type K copper piping installation. Provide rods, clamps and retainer glands on all elbows and fittings in accordance with manufacturer's recommendations to prevent fitting from blowing off under line pressure. Coat all clamps, rods, nuts with two coats of bitumastic.
- B. Minimum earth cover shall be 5 ft. - 0 in. unless otherwise noted.
- C. Water mains crossing sanitary or storm sewers shall be installed to provide a minimum vertical distance of 1 ft. - 6 inches between the outside of the pipes where the water main is above or below the sewer. Locate the water pipe so that the crossing of the sewer occurs at the mid-section of a full length of pipe. The minimum horizontal separation between water mains and sewer mains shall be 10 ft. - 0 in. measured from the outside of the pipes. If separation or distance of joints from pipe crossing cannot be established, encase water piping in 6 in. concrete for a distance 10 ft. - 0 in. each side of crossing.

3.3 BACKFLOW PREVENTERS

- A. Provide hub style drain for emergency relief drain with a pipe separation of at least two (2) pipe diameters from backflow preventer relief outlet.

3.4 PIPING

- A. Run slightly off level to low points; provide drain valves at low points. Provide shock absorbers where shown or specified. Branch headers serving flush valves shall be full size as shown. Exposed water piping in Kitchen shall be chrome plated brass (from insulation to fixture or equipment connection.). Provide dielectric pipe fittings when connecting to piping systems of dissimilar metals. All supply piping to fixtures, faucets, hydrants and flush valves shall be anchored to prevent movement.
- B. Provide shock absorbers where flush valves and quick closing valves are used as specified in Section 223010.

3.5 CLEANING AND DISINFECTING

- A. Refer to Specification Section 221010, "Piping Systems and Accessories" for domestic water piping cleaning and disinfecting requirements.

3.6 TESTS

- A. Provide all necessary items to complete proper testing of work. Perform all testing in accordance with governing codes, local utilities and other agencies having jurisdiction and as specified. Pay all costs to perform tests. Perform all testing in a safe manner.

- B. Test each vacuum breaker according to authorities having jurisdiction and the device's reference standard.
- C. Refer to Specification Section 221010, "Piping Systems and Accessories" for pipe testing requirements.

END OF SECTION 221100

SECTION 221300 - SANITARY, WASTE AND STORM DRAINAGE SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 SUBMITTALS

- A. Provide submittals for all items specified under Part 2 of this section.

PART 2 - PRODUCTS

2.1 PLUMBING DRAINAGE SYSTEM

- A. Piping Materials: Refer to Section 221010, "Piping Systems and Accessories" and 221020, "Underground Piping and Accessories" for piping materials.

2.2 HYDROFLUSHING

- A. The hydroflushing equipment used for sewer cleaning shall be designed and constructed for sewer cleaning and be capable of removing sludge, grease, dirt and other foreign materials. It shall consist of, but not be limited to, booster pump, high pressure hose, water spray jet, cutting nozzles and all accessories required to complete the work.

2.3 TELEVISION INSPECTION

- A. The television camera used for inspection shall be designed and constructed for sewer inspection and shall be sufficient to allow a clear, visible picture. It shall consist of, but not be limited to, camera, TV monitor, videotape equipment and all accessories required to complete the work.

PART 3 - EXECUTION

3.1 GENERAL

- A. Prior to commencing work, the Contractor shall verify inverts and locations. Any discrepancy between plans and field conditions shall be reported to the Owner or Engineer. No work shall start until discrepancies have been resolved. All costs related to Contractor's failure to verify and report discrepancies will be borne by the Contractor.
- B. Install pipe and equipment in accordance with manufacturer's recommendations and in a workmanlike manner as determined by the Owner's Representative.

3.2 PIPE INSTALLATION

- A. Minimum Slope: 2-1/2 in. and under - 1/4 in. per ft.; 3 in. to 6 in. - 1/8 in. per ft; 8 in. and larger - 1/16 in. per ft.

- B. All underground sanitary piping shall be a minimum of 3 inch size and sloped no less than 1/4 inch per foot.
- C. Urinal Waste: Copper is not allowed.
- D. In all finished spaces, paint exposed waste piping 2 in. and over with chromium paint.
- E. Slope piping as indicated on drawing; verify inverts given. Inspect piping before installation to detect apparent defects. Remove defective piping from site. Lay piping beginning at low point of system, true to grades and alignment indicated, with unbroken continuity of invert. Install piping and gaskets in accordance with manufacturer's recommendations and other special installation requirements. Clean interior of piping of dirt and other foreign material as work progresses. Place plugs in ends of pipe at end of day or whenever work stops. Flush lines if required to remove collected debris.
- F. Inspect piping to determine whether line displacement or other damage has occurred. Make inspections after lines have been installed and approximately 2 ft. of backfill is in place, and again at completion of project. If inspection indicates poor alignment, debris, displaced pipe, infiltration, or other defects, correct such defects, and reinspect.

3.3 HYDROFLUSHING

- A. Upon completion of the project, mechanically auger and hydroflush clean all existing and new sanitary, waste and storm drainage piping from roof drains or vents out to site connections. Use cutting nozzles when applicable. Do not mechanically auger or use cutting nozzles when piping is clay tile or plastic piping.
- B. Hydroflush piping utilizing full length of jet hose. Thoroughly flush all piping for 30 minutes upon completion of hydroflushing. Piping shall be clean.
- C. Field check existing piping layout prior to commencement of cleaning operations. Take all precautions to prevent water leaks within the buildings.
- D. Determine the existing sewer materials prior to cleaning. Should pipe be any material other than cast iron, do not proceed. Notify Owner's Representative.
- E. All hydroflushing of drain lines shall be performed against the direction of flow of the waste water, unless otherwise noted.
- F. Restore all areas disturbed to match existing.
- G. The cleaning and flushing services shall be performed by one approved service firm.

3.4 TELEVISION INSPECTION

- A. After completion of hydroflushing, furnish all labor, materials and equipment necessary to provide television inspection of all hydroflushed piping.
- B. Provide a digital video copy accompanied with a written report and drawings locating all sources of infiltration, blockages and obstructions, broken pipe, collapsed pipe, misalignments, pipe sags and unusual conditions observed.

The digital video copy and report shall be cross-referenced. Provide a copy of each to the Owner's Representative.

3.5 TESTING

- A. Refer to Specification Section 221010, "Piping Systems and Accessories" for pipe testing requirements.

END OF SECTION 221300

SECTION 223010 - EQUIPMENT

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Document.

1.2 SUBMITTALS

- A. Provide submittals for all items specified under Part 2 of this section.

PART 2 - PRODUCTS

2.1 ROOF DRAINS

- A. Drain Description: All Roof Drains Type A unless otherwise noted.
 - 1. Type A: Epoxy coated cast iron dual outlet roof drain/overflow combination with flashing clamp, integral gravel stop, 4" high internal overflow standpipe, vandal proof ductile iron dome, sump receiver and underdeck clamp. Adjustable extension flange as required; Watts Drainage RD-700.
- B. Expansion Joints:
 - 1. Coated cast iron, bronze sleeve, packing gland, bolted pressure ring; Jay R. Smith Figure #1710.
- C. Downspout Nozzles
 - 1. DN-A: Stainless steel type 304 downspout cover with hinged perforated cover. J.R. Smith Figure 1775
- D. Make: Josam, Jay R. Smith, Mifab, Watts or Zurn.

2.2 CLEANOUTS

- A. Floors: Cast iron body, nickel-bronze top with adjustable feature, bronze plug and flashing clamp where required, carpet marker and tile cover where applicable; Jay R. Smith Series #4028.
- B. Walls: Cast iron ferrule, with bronze plug and stainless steel smooth access cover.
 - 1. Horizontal: Jay R. Smith Figure #4402.
 - 2. Vertical: Jay R. Smith Figure #4531.
- C. Yard Cleanout:
 - 1. Cast iron body, adjustable round heavy duty top, with tractor cover, vandal proof screws and bronze plug; Jay R. Smith Figure #4246.

- D. Make: Josam, Jay R. Smith, Mifab, Watts or Zurn.

2.3 SHOCK ABSORBERS

- A. Hydropneumatically controlled with permanently sealed expansion chamber pre-charged with non-combustible gas; lead-free, threaded connection, meets or exceeds Plumbing and Drainage Institute Standard PDI WH-201 and ASSE Standard 1010.
 - 1. Bellows Type: Stainless steel construction with stainless steel bellows.
 - 2. Piston Type: Hard drawn copper body with brass piston, cap and adapter, and elastomer seals.
- B. Elastomer or rubber compound type bellows not allowed.
- C. Make: Watts #LF15M2, Precision Plumbing Products, Jay R. Smith, or Zurn.

PART 3 - EXECUTION

3.1 EQUIPMENT CONNECTIONS

- A. Plumbing Contractor shall:
 - 1. Provide all roughing and final water, waste, vent, gas, air, vacuum, diesel and/or oxygen connections to all equipment requiring same as called for on Contract Documents.
 - 2. Refer to Contract Documents for roughing schedules, and equipment and lists indicating scope of connections required.
 - 3. Provide loose key stops, "P" traps, tailpieces, adapters, gas or air cocks and all necessary piping and fittings from roughing point to equipment.
 - 4. Provide for installation of sinks, faucets, traps, tailpieces provided by an Equipment Contractor. These items to be delivered, in easily identified cartons, to the proper room for Contractor's installation.
 - 5. Install controls and devices furnished by others.
 - 6. Provide cold water line with gate valve and backflow prevention device at locations called for. Continuation and connection to equipment by others.
 - 7. Install relief valve discharge piping from equipment relief valves.

3.2 ROOF DRAINS

- A. Install according to manufacturer's written installation instructions.
- B. Clean drains and strainers just prior to final inspection.
- C. Provide expansion joints for roof drains located more than 25 ft. - 0 in. above finished floor.

3.3 CLEANOUTS

- A. Install cleanouts out of traffic patterns and flush to floor. Provide offset from sanitary line served. Do not locate under doors or under lockers. Maintain distance between cleanouts on piping 4 in. and smaller, 50 ft.; over 4 in., 100 ft. At changes in direction greater than 45°. Install at base of soil, waste, vent, stacks and roof conductors and where called for.
- B. Cleanouts: Same nominal size as pipe, but not larger than 4 in.

3.4 SHOCK ABSORBERS

- A. Install in vertical position.

END OF SECTION 223010

SECTION 230500 - BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work, complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these contract documents. All materials and equipment shall be installed in accordance with the manufacturer's recommendations.

1.2 LICENSING

- A. The Contractor shall hold a license to perform the work as issued by the authority having jurisdiction.
- B. Plumbing contract work shall be performed by, or under, the direct supervision of a licensed master plumber.
- C. Electrical contract work shall be performed by, or under, the direct supervision of a licensed electrician.

1.3 PERMITS

- A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges. Provide certificate of approval from the Authorities Having Jurisdiction prior to request for final payment.
- B. Provide electrical inspection certificate of approval from Middle Department Inspection Agency, Commonwealth Inspection Agency, or an Engineer approved Inspection Agency prior to request for final payment.

1.4 CODE COMPLIANCE

- A. Provide work in compliance with the following Codes and Standards based on the current edition in effect at project location:
 - 1. Building, Code of New York State.
 - 2. Existing Building Code of New York State.
 - 3. Fire Code of New York State.
 - 4. Plumbing Code of New York State.
 - 5. Mechanical Code of New York State.
 - 6. Fuel Gas Code of New York State.

7. Property Maintenance Code of New York State.
8. Energy Conservation Code of New York State
9. Accessible and Usable Buildings and Facilities, ICC A117.1.
10. New York State Department of Labor Rules and Regulations.
11. New York State Department of Health.
12. National Electrical Code (NEC).
13. Occupational Safety and Health Administration (OSHA).
14. Local Codes and Ordinances.
15. Life Safety Code, NFPA 101.
16. New York State Education Department Manual of Planning Standards.

1.5 GLOSSARY

ACI	American Concrete Institute
AGA	American Gas Association
AGCA	Associated General Contractors of America, Inc.
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AFBMA	Anti-Friction Bearing Manufacturer's Association
AMCA	Air Moving and Conditioning Association, Inc.
ANSI	American National Standards Institute
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASTM	American Society for Testing Materials
AWSC	American Welding Society Code
AWWA	American Water Works Association
FM	Factory Mutual Insurance Company
IBR	Institute of Boiler & Radiation Manufacturers
IEEE	Institute of Electrical and Electronics Engineers
IRI	Industrial Risk Insurers

NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NYS/DEC	New York State Department of Environmental Conservation
SBI	Steel Boiler Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UFPO	Underground Facilities Protective Organization
UL	Underwriter's Laboratories, Inc.
OSHA	Occupational Safety and Health Administration
XL - GAP	XL Global Asset Protection Services

1.6 DEFINITIONS

Acceptance	Owner acceptance of the project from Contractor upon certification by Owner's Representative.
As Specified	Materials, equipment including the execution specified/shown in the contract documents.
Basis of Design	Equipment, materials, installation, etc. on which the design is based. (Refer to the article, Equipment Arrangements, and the article, Substitutions.)
Code Requirements	Minimum requirements.
Concealed	Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
Coordination Drawings	Show the relationship and integration of different construction elements and trades that require careful coordination during fabrication or installation, to fit in the space provided or to function as intended.
Delegated-Design Services	Performance and Design criteria for Contractor provided professional services. Where professional design services or certifications by a design professional are specifically required of a Contractor, by the Contract Documents. Provide products and systems with the specific design criteria indicated. If criteria indicated is insufficient to perform services or certification required, submit a written request for additional information to the Engineer. Submit wet signed and sealed certification by the licensed design professional for each product and system specifically assigned to the Contractor to be designed or certified by a design professional. Examples: structural maintenance ladders, stairs and platforms, pipe anchors, seismic compliant system, wind, structural supports for material equipment, sprinkler hydraulic calculations.

Equal, Equivalent, Equal To, Equivalent To, As Directed and As Required	Shall all be interpreted and should be taken to mean "to the satisfaction of the Engineer".
Exposed	Work not identified as concealed.
Extract	Carefully dismantle and store where directed by Owner's Representative and/or reinstall as indicated on drawings or as described in specifications.
Furnish	Purchase and deliver to job site, location as directed by the Owner's Representative.
Inspection	Visual observations by Owner's site Representative.
Install	Store at job site if required, proper placement within building construction including miscellaneous items needed to affect placement as required and protect during construction. Take responsibility to mount, connect, start-up and make fully functional.
Labeled	Refers to classification by a standards agency.
Manufacturers	Refer to the article, Equipment Arrangements, and the article, Substitutions.
Prime Professional	Architect or Engineer having a contract directly with the Owner for professional services.
Product Data	Illustrations, standard schedules, performance charts, instructions, brochures, wiring diagrams, finishes, or other information furnished by the Contractor to illustrate materials or equipment for some portion of the work.
Provide (Furnish and Install)	Contractor shall furnish all labor, materials, equipment and supplies necessary to install and place in operating condition, unless otherwise specifically stated.
Relocate	Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.
Remove	Dismantle and take away from premises without added cost to Owner, and dispose of in a legal manner.
Review and Reviewed	Should be taken to mean to be followed by "for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents".
Roughing	Pipe, duct, conduit, equipment layout and installation.
Samples	Physical full scale examples which illustrate materials, finishes, coatings, equipment or workmanship, and establishes standards by which work will be judged.
Satisfactory	As specified in contract documents.
Shop Drawings	Fabrication drawings, diagrams, schedules and other instruments, specifically prepared for the work by the Contractor or a Sub-contractor, manufacturer, supplier or distributor to illustrate some portion of the work.
Site Representative	Owner's Inspector or "Clerk of Works" at the work site.

Submittals Defined
(Technical)

Any item required to be delivered to the Engineer for review as requirement of the Contract Documents.

The purpose of technical submittals is to demonstrate for those portions of the work for which a submittal is required, the manner in which the Contractor proposes to conform to the information given and design concepts expressed and required by the Contract Documents.

1.7 EXISTING CONDITIONS

- A. Contractor shall review all available record documents of existing construction or other existing conditions and hazardous material information. Owner does not guarantee that existing conditions are the same as those indicated in these documents. Contractor shall record existing conditions via measured drawings and preconstruction photographs or video. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage, removal or construction operations.
- B. Owner will occupy portions of the building immediately adjacent to the area(s) of removals. Conduct removals so Owner's operations are not disrupted. Contractor shall locate, identify, disconnect and seal or cap mechanical, plumbing, fire protection and/or electrical systems serving areas of removals, unless noted otherwise in the contract documents. Contractor shall arrange shut-down of systems with the Owner's Representative. Piping and ductwork indicated to be removed shall be removed and capped or plugged with compatible materials. If services/systems are required to be removed, relocated or abandoned, provide temporary services/systems the bypass area(s) of removals to maintain continuity of services/systems to other parts of the building, as required.

1.8 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

- A. Provide submittals on all items of equipment and materials to be furnished and installed. Submittals shall be accompanied by a transmittal letter, stating name of project and contractor, name of vendor supplying equipment, number of drawings, titles, specification sections (name and number) and other pertinent data called for in individual sections. Submittals shall have individual cover sheets that shall be dated and contain: Name of project; name of prime professional; name of prime contractor; description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed. Individual piecemeal or incomplete submittals will not be accepted. Similar items, (all types specified) shall be submitted at under one cover sheet per specification section (e.g. lighting fixtures, valves, plumbing fixtures, etc.). Submittals shall include all required documentation for each product listed in the specification section at the same time as a complete package. Number each submittal by trade. Indicate deviations from contract requirements on Letter of Transmittal. Submittals will be given a general review only. Corrections or comments made on the Submittals during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for: confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. If submitting hard copies, submit four (4) copies for review.

- A. If submittals are to be submitted electronically, all requirements in Item A apply. Submittals shall be emailed in PDF format to specific email address provided by the Construction Manager, General Contractor, Architect or Project Manager. Name of project shall be in subject line of email. Send emails to mee.merochsubmittalclerk@salasobrien.com.
- B. If submittals are to be submitted electronically through **AUTODESK**, all requirements in Item A apply. Submittals shall be emailed in PDF format to specific email address provided by the Construction Manager, General Contractor, Architect or Project Manager. Name of project shall be in subject line of email. Send emails to the following people:

Tessa Rath - tessa.rath@salasobrien.com
Katie Godfrey - katie.godfrey@salasobrien.com
Rachael Potocki - rachael.potocki@salasobrien.com
Erin Lovejoy - erin.lovejoy@salasobrien.com
Alyssa Thompson - alyssa.thompson@salasobrien.com
- C. Refer to Division 01 for additional requirements.

1.9 PROTECTION OF PERSONS AND PROPERTY

- A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

1.10 EQUIPMENT ARRANGEMENTS

- A. The contract documents are prepared using one manufacturer as the Basis of Design, even though other manufacturers' names are listed. If Contractor elects to use one of the listed manufacturers other than Basis of Design or if the physical size, performance or electrical characteristics for the Basis of Design equipment differs from what is indicated in the contract documents, submit detailed drawings, indicating proposed installation of equipment. Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in the work of other trades, at no increase in any contract. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace doorframes, access doors, walls, ceilings, or floors required to install. If revised arrangement submittal is rejected, revise and resubmit specified Basis of Design item which conforms to Contract Documents.

1.11 SUBSTITUTIONS

- A. If Contractor desires to bid on any other kind, type, brand, or manufacture of material or equipment than those named in specifications, secure prior approval. To request such approval, Contractor shall submit complete information comparing (item-for-item) material or equipment offered with design material or equipment.

Include sufficient information to permit quick and thorough comparison, and include performance curves on same basis, capacities, power requirements, controls, materials, metal gauges, finishes, dimensions, weights, etc., of major parts. If accepted, an addendum will be issued to this effect ahead of bid date. Unless such addendum is issued, substitution offered may not be used.

- B. Refer to Division 01 for additional requirements.

1.12 CONTINUITY OF SERVICES

- A. The building will be in use during construction operations. Maintain existing systems in operation within all rooms of building at all times. Refer to "General Conditions of the Contract for Construction" for temporary facilities for additional contract requirements. Schedules for various phases of contract work shall be coordinated with all other trades and with Owner's Representative. Provide, as part of contract, temporary mechanical and electrical connections and relocations as required to accomplish the above. Obtain approval in writing as to date, time, and location for shutdown of existing mechanical/electrical facilities or services.

1.13 ROUGHING

- A. The Contract Drawings have been prepared in order to convey design intent and are diagrammatic only. Drawings shall not be interpreted to be fully coordinated for construction.
- B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of a contract to accommodate work to avoid obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. **DO NOT SCALE** plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Owner's Representative for review. Obtain written approval for all major changes before installing.
- C. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Provide new materials, including new piping and insulation for relocated work.
- D. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Owner's Representative exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and electrical drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, speakers, and other items. Do not rough-in contract work without reflected ceiling location plans.

- E. Before roughing for equipment furnished by Owner or in other Divisions, obtain from Owner and other Divisions, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to ensure proper location and size of connections to ensure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:
 - 1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.
 - 2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Owner's Representative.

1.14 REMOVAL WORK

- A. Where existing equipment removals are called for, submit complete list to Owner's Representative. All items that Owner wishes to retain that do not contain asbestos or PCB material shall be delivered to location directed by Owner. Items that Owner does not wish to retain shall be removed from site and legally disposed of. Removal and disposal of material containing asbestos, lead paint, mercury and PCB's shall be in accordance with Federal, State and Local law requirements. Where equipment is called for to be relocated, contractor shall carefully remove, clean and recondition, then reinstall. Remove all abandoned piping, wiring, equipment, lighting, ductwork, tubing, supports, fixtures, etc. Visit each room, crawl spaces, and roofs to determine total Scope of Work. The disturbance or dislocation of asbestos-containing materials causes asbestos fibers to be released into the building's atmosphere, thereby creating a health hazard to workmen and building occupants. Consistent with Industrial Code Rule 56 and the content of recognized asbestos-control work, the Contractor shall apprise all of his workers, supervisory personnel, subcontractors, Owner and Consultants who will be at the job site of the seriousness of the hazard and of proper safeguards and work procedures which must be followed, as described in New York State Department of Labor Industrial Code Rule 56.
- B. For materials indicated to contain lead, that are being affected by demolition or construction, the contractor shall comply with all Federal, State and Local law requirements regarding worker exposure to lead disturbance and abatement procedures.
- C. Refer to the Owner's Lead Paint Survey. The Survey identifies the surfaces within the buildings that were tested for lead by collecting paint samples and performing laboratory analysis. If any unidentified surfaces are to be impacted the lead content shall be tested by analytical determinations conducted by a qualified laboratory approved by the Owner. The contractor shall review the current owner's lead paint reports on file before starting any work which may disturb existing surfaces.
- D. Refer to Division 02 for additional information regarding hazardous materials.

1.15 REFRIGERANT RECOVERY

- A. Existing equipment to be removed, as shown on the plans may contain refrigerant and refrigerant oils. This refrigerant and refrigerant oil must be handled in accordance with Federal, State and Local law requirements.
- B. Removal and recovery of refrigerant shall be in accordance with the current edition of Section 608 of the Clean Air Act of 1990, including all final regulations.
- C. Refrigerant recovery must be performed by a technician, certified by an EPA-approved certification program, using refrigerant recovery and recycling equipment certified by an EPA-approved testing organization.
- D. Owner "reserves the right of first refusal" on ownership of recovered refrigerant. Should Owner choose to maintain ownership of refrigerant, refrigerant shall be reclaimed, cleaned by this Contractor to ARI 700-1993 Standard of Purity, by an EPA certified refrigerant reclaimer. Refrigerant shall be turned over to the Owner in suitable marked containers to be stored on site, at a place of the Owner's choosing.

1.16 EQUIPMENT AND MATERIAL REQUIREMENTS

- A. Provide materials that meet the following minimum requirements:
 - 1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
 - 2. All equipment and material for which there is a listing service shall bear a UL label.
 - 3. Potable water systems and equipment shall be built according to AWWA Standards.
 - 4. Gas-fired equipment and system shall meet AGA Regulations and shall have AGA label.
 - 5. All electrical equipment and systems, as a whole, shall be tested and listed by an OSHA approved Nationally Recognized Testing Laboratory (NRTL) for the intended use in accordance with the applicable standards and have a physical label indicating such.
 - 6. Fire protection equipment shall be UL listed and FM approved.
- B. Exterior and wet locations shall utilize materials, equipment supports, mounting, etc. suitable for the intended locations. Metals shall be stainless steel, galvanized or with baked enamel finish as a minimum. Finishes and coatings shall be continuous and any surface damaged or cut ends shall be field corrected in accordance with the manufacturer's recommendations. Hardware (screws, bolts, nuts, washers, supports, fasteners, etc.) shall be:
 - 1. Stainless steel where the associated system or equipment material is stainless steel or aluminum.

2. Hot dipped galvanized or stainless steel where the associated system or equipment is steel, galvanized steel or other.

1.17 CUTTING AND PATCHING

- A. Each trade shall include their required cutting and patching work unless shown as part of the General Construction Contract. Refer to General Conditions of the Contract for Construction, for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch cut or abandoned holes left by removals of equipment or fixtures. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

1.18 PAINTING

- A. Refer to Division 9 - Finishes, for additional information.

1.19 CONCEALMENT

- A. **Conceal all contract work** above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after their review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

1.20 CHASES

- A. New Construction:
 1. Certain chases, recesses, openings, shafts, and wall pockets will be provided as part of General Construction Trade. Mechanical and Electrical trades shall provide all other openings required for their contract work.
 2. Check Architectural and Structural Design and Shop Drawings to verify correct size and location for all openings, recesses and chases in general building construction work.
 3. Assume responsibility for correct and final location and size of such openings.
 4. Rectify improperly sized, improperly located or omitted chases or openings due to faulty or late information or failure to check final location.
 5. Provide 18 gauge galvanized sleeves and inserts. Extend all sleeves 2 in. above finished floor. Set sleeves and inserts in place ahead of new construction, securely fastened during concrete pouring. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Firestop all unused sleeves.
 6. Provide angle iron frame where openings are required for contract work, unless provided by General Construction trade.

B. In Existing Buildings:

1. Drill holes for floor and/or roof slab openings.
2. Multiple pipes smaller than 1 in. properly spaced and supported may pass through one 6 in. or smaller diameter opening.
3. Seal voids in fire rated assemblies with a fire-stopping seal system to maintain the fire resistance of the assembly. Provide 18 gauge galvanized sleeves at fire rated assemblies. Extend sleeves 2 in. above floors.
4. In wall openings, drill or cut holes to suit. Provide 18 gauge galvanized sleeves at shafts and fire rated assemblies. Provide fire-stopping seal between sleeves and wall in drywall construction. Provide fire stopping similar to that for floor openings.

1.21 PENETRATION FIRESTOPPING

A. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:

1. Provide materials and products listed or classified by an approved independent testing laboratory for "Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Penetrations Fire-Stops" designated ASTM E814.
2. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
4. The methods used shall incorporate qualities which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion, and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.
5. Plastic pipe/conduit materials shall be installed utilizing intumescent collars.
6. Provide a submittal including products intended for use, manufacturer's installation instructions, and the UL details for all applicable types of wall and floor penetrations.
7. Fire-stopping products shall not be used for sealing of penetrations of non-rated walls or floors.

8. Piping insulation is allowed to be reduced in thickness only when a specific UL assembly detail for piping passing thru a rated wall indicates a maximum insulation thickness that is less than the insulation specification section calls for. In this case reduce the insulation thickness just for the rated wall penetration. The reduction of insulation thickness shall be limited to the length of the penetration only.

B. Acceptable Manufacturers:

1. Dow Corning Fire-Stop System Foams and Sealants.
2. Nelson Electric Fire-Stop System Putty, CLK and WRP.
3. S-100 FS500/600, Thomas & Betts.
4. Carborundum Fyre Putty.
5. 3-M Fire Products.
6. Hilti Corporation.

C. Refer to Division 07 for project-wide fire stopping information.

1.22 NON-RATED WALL PENETRATIONS

- A. Each trade shall be responsible for sealing wall penetrations related to their installed work, including but not limited to ductwork, piping, conduits, etc. See individual specification sections for requirements.

1.23 SUPPORTS

- A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above.
- B. For precast panels/planks and metal decks, support mechanical/electrical work as determined by manufacturer and the Engineer. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.
- C. For finished areas without a finished ceiling system such as classrooms, offices, conference rooms, etc., where decking and structure is exposed, and ductwork/piping/conduit is exposed: All mounting brackets, channel support systems and mounting hardware for ductwork, piping, lighting, etc. shall be concealed and approved by the Architect/Engineer prior to the installation. AirCRAFT cable style hanging for ductwork is required. It is recommended that room mockups be done and receive Architect/Engineer approval prior to proceeding with installation.

- D. Equipment, piping, conduit, raceway, etc. supports shall be installed to minimize the generation and transmission of vibration.
- E. Materials and equipment shall be solely supported by the building structure and connected framing. Gypboard, ceilings, other finishes, etc. shall not be used for support of materials and equipment.

1.24 APPLIED FIREPROOFING

- A. Scope: Provide encapsulation of surfaces where applied fireproofing materials have been disturbed, removed, or left missing by the removal of hangers or upper attachments, or when new hangers or upper attachment are installed.
- B. Fire Resistance Rating: Fireproofing shall meet the original hourly rating when applied to the construction assembly where materials have been removed or disturbed, or is missing.
- C. Fire Hazard Classification: Fireproofing shall be listed in the Underwriters Laboratories Building Materials Directory with the following performance properties:
 - 1. Flame Spread: 10 or less.
 - 2. Smoke Developed: 5 or less.
- D. Product Data: Provide manufacturer's product descriptions for each required fireproofing material. Include application instructions, including primer/adhesive requirements and recommended minimum thickness and density for each required hourly rating.
- E. Fire Proofing Manufacturer:
 - 1. Retro-Guard cementitious replacement fireproofing by Grace Construction Products, or equivalent Cafco Blaze Shield, and Cafco 300 by Isolotek.
 - 2. Physical Properties:
 - a. Dry Field Density (ASTM E 605): 15 lb/cu ft minimum average.
 - b. Cohesion/Adhesion (Bond Strength) (ASTM E 736): 200 lb/sq ft minimum average.
 - c. Compressive Strength (ASTM E 761): 500 lb/sq ft minimum.
 - d. Impact (Bond Impact) Resistance (ASTM E 760): Shall not crack or delaminate.
 - e. Effect of Deflection (ASTM E 759): Shall not crack or delaminate.
 - f. Corrosion Resistance (ASTM E 937): No evidence of corrosion.
 - g. Air Erosion (ASTM E 859): Maximum 0.025 g/sq ft weight loss.

- h. Provide primer or adhesive recommended by the fireproofing manufacturer to obtain required bond strength for the specific fireproofing and substrate.
- F. Apply fireproofing prior to installation of ductwork, piping, conduits, and other suspended items. Hangers, clips and other supports for these items shall be installed before application of fireproofing.
- G. Examine the substrate and conditions under which fireproofing is to be applied. Do not proceed with the fireproofing work until unsatisfactory conditions have been corrected. Verify that hangers, clips, sleeves, and other items that will penetrate the fireproofing are in place. Check paint on substrate for compatibility with primer/fireproofing and adequacy of bond strength in accordance with fireproofing manufacturer's instructions.
- H. Surface Preparation: Remove dirt, dust, oil, grease, loose paint and rust, mill scale, and other foreign matter that may impair the bonding of the fireproofing to the substrate. Clean substrate free of contamination from chemicals and solvents.

Apply primer/adhesive where necessary to obtain bond strength of fireproofing to steel shop paint and where recommended by the fireproofing manufacturer.
- I. Apply the fireproofing in accordance with UL fire test report and the manufacturer's application instructions. Thickness and density of fireproofing shall be in accordance with the approved product data and as required to produce the hourly fire resistance rating required.

1.25 ACCESS PANELS

- A. Provide access panels for required access to respective trade's work. Location and size shall be the responsibility of each trade. Access panels provided for equipment shall provide an opening not smaller than 22 in. by 22 in. Panels shall be capable of opening a minimum of 90 degrees. Bear cost of construction changes necessary due to improper information or failure to provide proper information in ample time. Access panels over 324 square inches shall have two cam locks. Provide proper frame and door type for various wall or ceiling finishes. Access panels shall be equal to "Milcor" as manufactured by Inland Steel Products Co., Milwaukee, Wisconsin. Provide General Construction trade with a set of architectural plans with size and locations of access panels.

1.26 CONCRETE BASES

- A. Provide concrete bases for all floor mounted equipment. Provide 3,000 lb. concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases 4 in. high (unless otherwise indicated); shape and size to accommodate equipment. Provide anchor bolts in equipment bases for all equipment provided for the project, whether mounted on new concrete bases or existing concrete bases.

1.27 HVAC EQUIPMENT CONNECTIONS

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Provide final connections to all equipment as required by the equipment. Provide final connections, including domestic water piping, wiring, controls, and devices from equipment to outlets left by other trades. Provide equipment waste, drip, overflow and drain connections extended to floor drains.
- C. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, insulation, sheet metal work, controls, dampers, as required.
- D. Refer to manufacturer drawings and specifications for requirements of equipment. Verify connection requirements before bidding.

1.28 PLUMBING EQUIPMENT CONNECTIONS

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Provide roughing and final connections to all equipment. Provide loose key stops, sanitary "P" traps, tailpiece, adapters, gas or air cocks, and all necessary piping and fittings from roughing point to equipment. Provide installation of sinks, faucets, traps, tailpiece furnished by others. Provide cold water line with gate valve and backflow prevention device at locations called for. Provide continuation of piping and connection to equipment that is furnished by others. Provide relief valve discharge piping from equipment relief valves.
- C. Provide valved water outlet adjacent to equipment requiring same. Provide equipment type floor drains, or drain hubs, adjacent to equipment.
- D. Install controls and devices furnished by others.
- E. Refer to Contract Documents for roughing schedules, and equipment and lists indicating scope of connections required.
- F. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, as required.
- G. Refer to Manufacturer drawings and specifications for requirements of equipment. Verify connection requirements before bidding.

1.29 ELECTRICAL EQUIPMENT CONNECTIONS

- A. Provide complete power connections to all electrical equipment. Provide control connections to equipment. Heavy duty NEC rated disconnect ahead of each piece of equipment. Ground all equipment in accordance with NEC.
- B. Provide for Owner furnished and Contractor furnished equipment all power wiring, electric equipment, control wiring, switches, lights, receptacles, and connections as required.
- C. Refer to Manufacturer's drawings/specifications for requirements of equipment. Verify connection requirements before bidding.

1.30 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT

- A. Store Materials on dry base, at least 6 in. aboveground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.
- B. Refer to Division 01 for additional information.
- C. Division 23 shall provide airtight plastic covers over all supply and return air openings prior to the start of construction by any trade. The plastic shall be maintained airtight throughout the project construction and removed only with the approval of the Owner's Representative.
- D. Ductwork shall be delivered to the site from the fabrication shop with air tight plastic covers over all ends of the ducts. The plastic covers shall be in place during transportation and shall be removed prior to installation.

1.31 FREEZING AND WATER DAMAGE

- A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner's operating staff.

1.32 OWNER INSTRUCTIONS

- A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

1.33 OPERATION AND MAINTENANCE MANUALS

- A. Submit by email (preferred) or digital media, thru the normal project submittal process. Include a copy of each final approved Shop Drawing, wiring diagrams, piping diagrams, spare parts lists, final testing and balancing report, as-built drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, summer-winter changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of installing contractor and of supplier manufacturer Representative and service agency for all major equipment items. Provide a table of contents page and dividers based upon specification section numbers. Submit in a compiled and bookmarked PDF format as outlined below. Each item listed in the table of contents shall include a hyperlink to the associated section of the O&M Manual, in addition to the bookmarking.

- B. Provide content for Operation and Maintenance Manuals as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Engineer and Commissioning Agent will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

- C. Submit Operation and Maintenance Manuals in the following format:
 - 1. Submit by uploading to web-based project software site, or by email to Architect, as a formal project submittal in conformance with the project specific submittal procedures. Enable reviewer comments on draft submittals.
 - 2. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 3. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in the table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

- D. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing Owner training. Engineer and Commissioning Agent will comment on whether general scope and content of manual are acceptable.

- E. Final Manual Submittal: Submit O&M manual in final form prior to requesting inspection for Substantial Completion and at least 2 weeks before commencing Owner training.

Engineer and Commissioning Agent will return copy with review comments.

1. Correct or revise O&M manual to comply with Engineer's and Commissioning Agent's comments. Submit copies of each corrected manual within 2 weeks of receipt of Engineer's and Commissioning Agent's comments.

F. Refer to Division 01 for additional requirements.

1.34 RECORD DRAWINGS

- A. The Contractor shall obtain at his expense one (1) set of construction Contract Drawings, (including non-reproduction black and white prints or electronic files) for the purpose of recording as-built conditions.
- B. The Contractor shall perform all survey work required for the location and construction of the work and to record information necessary for completion of the record drawings. Record drawings shall show the actual location of the constructed facilities in the same manner as was shown on the bid drawings. All elevations and dimensions shown on the drawings shall be verified or corrected so as to provide a complete and accurate record of the facilities as constructed.
- C. It shall be the responsibility of the Contractor to mark **EACH** sheet of the contract documents in red and to record thereon in a legible manner, any and all approved field changes and conditions as they occur. A complete file of approved field sketches, diagrams, and other changes shall also be maintained. At completion of the work, the complete set of red marked contract documents, plus all approved field sketches and diagrams shall be submitted to the engineer and used in preparation of the record drawings.
- D. A complete set of red marked contract drawings shall be submitted, at one time, as the "Record" set. If there are no changes to a specific drawing, the contractor shall indicate "NO CHANGES" on that drawing. ALL drawings shall be included in the "Record" set.
- E. The complete set of red marked Contract Documents or electronic files shall be certified by the Contractor as reflecting record conditions and submitted to the engineer for review.
- F. The Contractor shall have the marked up set scanned, if they are not already electronic files, and then submit them to the Engineer as the "Record Set".
- G. Refer to Division 01 for additional requirements.

1.35 FINAL INSPECTION

- A. Upon completion of all Engineering Site Observation list items, the Contractor shall provide a copy of the Engineering Site Observation Report back to the Engineer with each item noted as completed or the current status of the item. Upon receipt, the Engineer will schedule a final review.

1.36 COMMISSIONING

- A. Refer to General Commissioning Requirements in Division 01 for additional requirements.

1.37 TEMPORARY HEATING AND COOLING

- A. Refer to the General Conditions of the Contract for Construction and Supplemental General Conditions.
- B. Systems and equipment installed as part of this project shall not be used for temporary heating or cooling.

1.38 TEMPORARY FACILITIES

- A. Refer to the Division 01 Sections, General Conditions and Supplemental General Conditions.

1.39 TEMPORARY LIGHT AND POWER

- A. Refer to the Division 01 Sections, General Conditions and Supplemental General Conditions.

1.40 CLEANING

- A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:
 - 1. Thoroughly clean entire installation, both exposed surfaces and interiors.
 - 2. Remove all debris caused by work.
 - 3. Remove tools, surplus, materials, when work is finally accepted.

1.41 SYSTEM START-UP AND TESTING

- A. Prior to commencement of work, the Division(s) effecting such system shall survey all building mechanical, plumbing, fire protection and electrical systems and components and make written notice to the Owner's Representative regarding any damage, missing items and/or incomplete systems. Prior to the conclusion of this project, the Contractor shall verify with the Owner's Representative that all building systems have been returned to their original conditions.
- B. Start-up and testing of HVAC systems shall occur while the area of work is not occupied by Owner and only after notice to the Owner's Representative is made at least 24 hours in advance. Division 23 shall be responsible for providing temporary filter media over all supply air registers and diffusers during the HVAC system start-up procedure.

Division 23 shall provide airtight plastic covers over all supply and return air openings prior to the start of construction by any contractor. The plastic shall be maintained airtight throughout the project construction and removed only with the approval of the Owner's Representative.

1.42 TRANSFER OF ELECTRONIC FILES

- A. Salas O'Brien Consulting and Engineering Group of New York, Inc. (FKA M/E Engineering) will provide electronic files for the Contractor's use in the preparation of sheet metal shop drawings, coordination drawings, or record drawings related to the project, subject to a \$50.00 charge per drawing file, \$2500.00 charge for a Revit model and the following terms and conditions:
1. The Contractor shall submit a formal request for electronic drawing files on the our website, by utilizing the following website link:
<http://www.meengineering.com/contact-pages/contractor-request>
 2. Salas O'Brien Consulting and Engineering Group of New York, Inc. (FKA M/E Engineering) makes no representation as to the compatibility of these files with the Contractor's hardware or the Contractor's software beyond the specific release of the referenced specifications.
 3. We can only provide CAD files of M/E/P/FP drawing levels for which we are the Engineer of Record. CAD files of Architectural backgrounds, reflected ceiling plans, structural plans, etc. must be obtained separately from the Architect of Record.
 4. Data contained on these electronic files is part of our instruments of service shall not be used by the Contractor or anyone else receiving data through or from the Contractor for any purpose other than as convenience in the preparation of shop drawings for the referenced project. Any other use or reuse by the Contractor or by others will be at the Contractor's sole risk and without liability or legal exposure to Salas O'Brien Consulting and Engineering Group of New York, Inc. (FKA M/E Engineering). The Contractor agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against Salas O'Brien Consulting and Engineering Group of New York, Inc. (FKA M/E Engineering), its officers, directors, employees, agents or sub-consultants which may arise out of or in connection with the Contractor's use of the electronic files.
 5. Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless, Salas O'Brien Consulting and Engineering Group of New York, Inc. (FKA M/E Engineering) from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from the Contractor's use of these electronic files.
 6. These electronic files are not contract documents. Significant difference may arise between these electronic files and corresponding hard copy contract documents due to addenda, change orders or other revisions. We make no representation regarding the accuracy or completeness of the electronic files the Contractor receives.

In the event that a conflict arises between the signed contract documents prepared by us and electronic files, the signed contract documents shall govern. The Contractor is responsible for determining if any conflicts exist. By the Contractor's use of these electronic files the Contractor is not relieved of the Contractor's duty to comply with the contract documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, field verify conditions and coordinate the Contractor's work with that of other contractors for the project.

1.43 VIDEO RECORDING OF TRAINING SESSIONS

- A. The contractor shall video record all training sessions required by their discipline. Video shall be in Windows Media Player video format saved on flash drives. Two (2) copies on flash drives are to be provided as a formal submittal. . Flash drives are to be tagged with project name, training session name(s), installing Contractor and date of training. The flash drive shall include a scanned version of the training session sign in list(s), including the presenter and the owner's participants.

1.44 ENERGY INCENTIVES

- A. The Contractor, his Subcontractors and Suppliers shall provide to the Owner all paperwork necessary to support the Owners pursuit of incentives related to energy conservation as offered by the utility company or state sponsored incentive programs. This shall include at a minimum, receipts, and quantities and data sheets for energy efficient equipment such as: lighting, motors, variable frequency drives, etc.

1.45 INFECTION CONTROL

- A. Construction procedures, temporary partitions, negative air systems, cleaning procedures, HVAC system isolation, dust control, etc. shall be in accordance with the infection control standards set forth by the Facility. A copy of the facilities standards are available from the Owner upon request.

END OF SECTION 230500

SECTION 230504 - ELECTRIC WIRING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services for the complete installation of motor control wiring and temperature control wiring as required in Contract Documents. Provide wiring and conduit, required to connect devices furnished as part of or adjunctive to the automatic temperature control system and for motor control regardless of the source of supply. Control wiring includes 120 volt and lower voltage wiring for control signals directing equipment operation. Control circuits shall be 120 volt maximum. Provide wiring in accordance with requirements specified in Division 26, "Electrical" and the National Electrical Code. Provide devices required for proper system operation, including special electrical switches, transformers, disconnect switches, relays, and circuit breaker protection.
- B. Coordinate all work with Division 26, "Electrical".

1.2 WORK NOT INCLUDED

- A. Power wiring for motors, motor starters and associated starting and control equipment, as well as the motor starters (except in the case of equipment specified to have packaged control/starters), are included in Division 26, "Electrical", unless otherwise called for.

1.3 QUALIFICATIONS

- A. Wiring shall be installed in compliance with all requirements of Division 26, "Electrical".

1.4 SUBMITTALS

- A. Provide complete wiring diagrams for equipment systems. Deliver wiring diagrams to proper trades in time for roughing of conduit, equipment connections, and avoid delay in construction schedule. Wiring diagrams and roughing information to be wired as part of the Work of Division 26, "Electrical", shall be clearly indicated.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Refer to Division 26 specifications for required wiring materials.

PART 3 - EXECUTION

3.1 GENERAL

- A. Check electrical wiring pertaining to equipment for completeness and correctness of connections. Correct any misapplied motor and/or motor starter, improper thermal overload device, or device which fails to function and resultant damage, whether due to incorrect connections or improper information on wiring diagrams.

3.2 WIRING FOR CONTROL SYSTEMS

- A. Provide motor control and temperature control wiring for equipment. All wiring shall be in conduit, unless otherwise noted below, supported on 5ft. centers. Refer to Section 260501 for type of conduit to be used in specific applications.
 - 1. Provide 18 in. length flexible conduit at motors and devices subject to vibration.
 - 2. Do not attach directly to hot surfaces, piping, or ductwork.
 - 3. Control wiring shall be in separate conduit from all other wiring.
 - 4. Where allowable by Code and contract documents, temperature control wiring may be installed without conduit. Installation and wire insulation types shall be as described by NEC, Article 725. All low voltage wiring circuits 50 volt and under shall:
 - a. Have the proper insulation and meet the requirements of NEC Article 300-22 when installed in plenums or other spaces used for environmental air.
 - b. Be adequately supported using bridle rings spaced a maximum of 3 ft. on centers or other approved method when installed horizontally above accessible ceilings or run exposed in unfinished areas.
 - c. Be run in wall cavity or surface metal raceway where no access is available to wall cavity, in finished areas.
 - d. Be installed in conduit when installed vertically in Mechanical/Utility Rooms from panels and devices up to above ceiling, or 10 ft. above finished floor if no ceiling, then run exposed.
 - e. Be installed in conduit in all cases not specifically covered by the above cases, or where subject to physical damage.
- B. Provide pushbutton stations, pilot lights, selector switches, auxiliary starter contacts, and other devices required to provide specified functions.
 - 1. Provide green grounding wire circuited from starter, and run ground wire through conduit to each remote auxiliary relay, pushbutton station, remote panel heating device, thermostat, or device with potentials in excess of 50 volts. Size ground wire as required by NEC.

3.3 EQUIPMENT WIRING

- A. Provide power and control wiring between sections of electrical radiation units, between shipping splits, and between remote panels, thermostats, disconnect switches, and their respective units. Provide control wiring from the package control system, to each respective electric heat coil, reheat coil or motor. Properly mount control package. Power wiring to and including disconnect switch shall be by Division 26 "Electrical".

3.4 FIELD WIRING IN STARTERS, CONTROLLERS AND PANELS

- A. Wiring within starters, controllers, and temperature control panels, shall be routed neatly in gutter space, away from moving and/or heat producing parts. Provide suitably rated terminal blocks. Do not place more than two wire connections on pilot device or relay terminal. Where more than two circuit connections are required, use terminal blocks. Provide nylon insulated, ring spade terminal for all control wires. Cables and wires shall be neatly bundled and lashed with nylon cable straps.

END OF SECTION 230504

SECTION 230513 - MOTORS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

1.2 SUBMITTALS

- A. Submit manufacturer's product data on all motors.
- B. Product Data: For each motor, provide dimensions; mounting arrangements; frame type, enclosure type, location for conduit entries; shipping and operating weights; and manufacturer's technical data on features, performance, electrical ratings and characteristics.
- C. Motor Performance Data: For each motor, include the following manufacturers' data:
 - 1. Motor Performance: Percent Efficiency, Power Factor, Torque, RPM, Duty Rating and Design Category.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Motor manufacturer shall be based and headquartered in the United States of America and shall design and manufacture motors in the United States.
 - 2. Motor manufacturer shall have over fifteen (15) years-experience in the motor industry and shall maintain active company-wide quality assurance program.
 - 3. Motor manufacturer shall maintain an authorized service center within 60 miles of the project site, capable of providing training, parts and emergency maintenance and repairs.
- B. Motor performance shall be warranted against material and workmanship defects by manufacturer's limited warranty and service policy for the period of at least 18 months from the day of shipment from the factory or the manufacturer's warehouse.
 - 1. Premium efficiency motors shall be warranted for 36 months.
 - 2. Severe duty motors (as applicable) shall be warranted for 60 months.
 - 3. Extended warranty shall be offered for certain products or as agreed by additional terms and specified elsewhere.

PART 2 - PRODUCTS

2.1 MOTORS

A. General Requirements:

1. Motors built for 60 Hz operation, three phase for 1/2 HP and larger; single phase for 1/3 HP and smaller.
 - a. In compliance with NEMA Standards, wound specifically for nameplate voltage, and selected for appropriate duty and environment.
 - b. 1.15 minimum service factor at rated voltage and frequency. 1.0 service factor for inverter duty motors.
 - c. Bearings: Bearings shall have a rated fatigue life of L-10 (B-10) of 150,000 hours for direct-coupled applications and 50,000 hours for belted applications minimum. Belted rating shall be based on radial loads and pulley sizes called out in NEMA MG 1-14.43. The calculation will be determined from the pulley centerline being at the end of the motor shaft.
 - d. V-belt connected motors with adjustable slide rail bases and pulleys.
 - e. Motors shall have Class F insulation system, with Class B temperature rise, insulation meeting NEMA MG 1 Part 31. Maximum allowable motor temperature rise for open drip-proof (ODP) or totally enclosed fan cooled (TEFC) type at 1.15 service factor shall be 105°C above 40°C ambient with a total temperature rating of 155°C.
 - f. NEMA locked rotor kVA code as required to match unit equipment torque characteristics.
 - g. Single-phase motors shall be capacitor start, induction run, or split phase type.
 - h. Polyphase motors shall be constant speed, squirrel cage, unless otherwise specified.
 - i. Nameplates shall have as a minimum, all information as described in NEMA Standard MG-1-20.60. Motor nameplate shall be mounted on enclosure with stainless steel fastening pins.
2. Motors for use with adjustable speed drive applications shall be premium efficiency inverter duty rated in accordance with NEMA and be capable of a 20:1 turndown.
 - a. These motors shall meet NEMA corona inception voltage requirements, withstanding peak voltages up to 1600 volts, and be manufactured in accordance with NEMA MG 1 Part 30 and 31.

- b. All motors controlled by adjustable speed drives shall be equipped with circumferential micro-fiber shaft grounding rings to provide protection from electrical bearing damage, to meet NEMA MG 1, 31.4.4.3. Provide AEGIS Bearing Protection Ring Kit (or equal), installed in accordance with the manufacturer's recommendation. For motors controlled by adjustable speed drives and 50hp or greater the motor shall have a ceramic electrically insulating bearing assembly on the opposite end of the grounding brushes.

3. EC Motors:

- a. The motor shall be DC rated with permanent magnet rotor and automatically resetting integral overload protection.
- b. The unit shall meet the scheduled voltage, phase, control and other requirements indicated.
- c. Input Control: The unit shall have the following control features as a minimum:
 - 1) Packaged Unit controls: DDC input to include start/stop/status/general trouble.
 - 2) External Control: Minimum of Modbus and/or BACnet digital start/stop, digital trouble, 0-10VDC and 4-20mA speed control input.
- d. Unit insulation shall be Class H.
- e. Electrical termination lugs shall be suitable for the intended feed circuit.
- f. Ratings shall be 90% minimum power factor and 10% maximum total harmonic distortion.
- g. Speed control suitable for 100% to 10% operational capability.
- h. Fully programmable and reviewable settings and parameters.
- i. Suitable for operation at ambient conditions of 32 to 104 degrees F.
- j. The power circuiting shall be separated from the low voltage control circuiting.
- k. Output parameters where indicated:
 - 1) Speed.
 - 2) Trouble indication.
 - 3) Overload indication.

4. Three phase motors rated 1 HP and greater shall be copper winding, re-lubable ball bearings, 1.15 service factor (1.0 service factor for inverter duty motors), premium efficiency, energy-saver type with a guaranteed NEMA nominal full-load efficiency, by IEEE Standard 112 Test Method "B". Efficiency rating shall appear on nameplate, and shall be not less than as follows; per NEMA MG 1 Part 12, Table 12-12, nominal minimum efficiencies:

MINIMUM NOMINAL FULL-LOAD MOTOR EFFICIENCY						
HP	ODP MOTORS (RPM)			TEFC MOTORS (RPM)		
	1200	1800	3600	1200	1800	3600
1.0	82.5	85.5	77.0	82.5	85.5	77.0
1.5	86.5	86.5	84.0	87.5	86.5	84.0
2.0	87.5	86.5	85.5	88.5	86.5	85.5
3.0	88.5	89.5	85.5	89.5	89.5	86.5
5.0	89.5	89.5	86.5	89.5	89.5	88.5
7.5	90.2	91.0	88.5	91.0	91.7	89.5
10	91.7	91.7	89.5	91.0	91.7	90.2
15	91.7	93.0	90.2	91.7	92.4	91.0
20	92.4	93.0	91.0	91.7	93.0	91.0
25	93.0	93.6	91.7	93.0	93.6	91.7
30	93.6	94.1	91.7	93.0	93.6	91.7
40	94.1	94.1	92.4	94.1	94.1	92.4
50	94.1	94.5	93.0	94.1	94.5	93.0
60	94.5	95.0	93.6	94.5	95.0	93.6
75	94.5	95.0	93.6	94.5	95.4	93.6
100	95.0	95.4	93.6	95.0	95.4	94.1
125	95.0	95.4	94.1	95.0	95.4	95.0
150	95.4	95.8	94.1	95.8	95.8	95.0
200	95.4	95.8	95.0	95.8	96.2	95.4

5. Nominal Motor Voltage Table:

Nominal System Voltage	Motor Nameplate
480V - 3 phase	460 volt
240V - 1 phase and 3 phase	230 volt
208V - 1 phase and 3 phase	200 volt
120V - 1 phase	115 volt

6. Motor Application; Provide the following enclosure types unless noted otherwise:

Environment/Location	Motor Enclosure Type
General Purpose	Open drip-proof, TEFC with cast iron frame, or encapsulated
Outdoors, below grade or high humidity	TEFC with cast iron frame
Hazardous	Explosion-proof
Packaged Refrigeration Compressors	Hermetic or semi-hermetic

7. Acceptable Manufacturers: Motors need not all be of the same manufacturer. Subject to the requirements of this section provide products by the following:
- a. General Electric Energy & Saver NEMA Premium Efficiency/(ODP); General Electric XSD Ultra NEMA Premium Efficiency (TEFC).
 - b. Century/A.O. Smith Speed Plus
 - c. Baldor-Reliance Super E.
 - d. Lincoln Ultimate E CTAC.
 - e. Marathon XRI.
 - f. Siemens GO100A.
 - g. Nidec Motor Co. (U.S. Motors) Premium Efficient.

PART 3 - EXECUTION

3.1 MOTORS

- A. Furnished by equipment manufacturer and specially manufactured and/or selected, mounted, and installed for intended use. Install motors accessible for maintenance and belt adjustment.

END OF SECTION 230513

SECTION 230519 - GAUGES AND THERMOMETERS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 SUBMITTALS

- A. Submit product data for gauges, thermometers and thermowells.

PART 2 - PRODUCTS

2.1 WATER PRESSURE GAUGES

- A. Construction to be Bourdon tube type; 4-1/2 in. diameter minimum, dial face, stamped stainless steel, replaceable glass lens, with snap-on rings. Phosphor bronze tube, bronze bushed rotary movement, silver brazed or soldered to brass socket and brass tip. 1/4 in. bottom connection. Accuracy, one (1.0) percent of included scale range. White dial face with black numerals, graduated in pounds; equipped with bronze pulsation dampener or snubber.
- B. Make: American, Ashcroft, Crosby, Duro, Marsh, Moeller, Terice, Weiss, Weksler, Winters.

2.2 PIPING SYSTEM THERMOMETERS

- A. Industrial type, plastic, aluminum or steel case, glass or plastic front, non-toxic organic liquid filled, red reading column, white or silver V-shaped scale, black numerals. Union flange mounted, separable socket with thermowell, extension necks where required; range as called for service. Universal adjustable type, 9 in. scale. For installation in hot water systems, graduations of 2°F., accurate to within 1°F. For installation in water systems where the maximum temperature is less than 120°F, graduations of 1°F, accurate to within 1/2°F.
- B. Make: American, Moeller, Terice, Weiss, Weksler, Winters.

2.3 PRESSURE/TEMPERATURE TEST PLUGS

- A. 1/4 in. NPT plug shall be capable of reading either a pressure or temperature. 1/8 in. o.d. dual seal core of Nordel 275°F with zero leakage from vacuum to 500 psig.
- B. Makes: Peterson Equipment Company, Sisco P/T plugs.

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide where called for in the drawings and as noted below.

- B. All gauges and thermometers shall be provided with pressure and temperature ranges appropriate for the system in which they are installed. Select to operate in the middle third of the range under normal operating conditions. Gauges and thermometers shall be suitable for the environment of their installed location, and if installed outdoors shall be acceptable for operation down to an ambient temperature of -20°F.

3.2 WATER PRESSURE GAUGES

- A. Heating water coils: 0 to 60 psi range.
- B. Provide 1/4 in. ball valve in each pump inlet and outlet tapping, or in piping adjacent to same. Range 30 in. vacuum to 100 psi.

3.3 THERMOMETERS

- A. Provide thermowells mounted in oversize tee, or elbow if necessary, to provide as little restriction as possible to fluid flow. Provide thermometer stems and thermowell depths of proper length to allow accurate reading. Locate adjacent to control sensing equipment. Install and adjust angles so as to be easily read from floor.
- B. Heating Coil: Inlet and outlet; range 0° to 220°F.

3.4 TEST PLUG

- A. Provide test plugs at locations as called for.

END OF SECTION 230519

SECTION 230523 - VALVES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services as required for the complete installation and related Work designed in Contract Documents.

1.2 SUBMITTALS

- A. Submit product data for valves and accessories.

PART 2 - PRODUCTS

2.1 VALVES

- A. General: Valves shall have following requirements:
 - 1. Working pressure stamped or cast on bodies.
 - 2. Stem packing serviceable without removing valve from line.
 - 3. Valves on insulated services shall have handle extensions so that the handle is fully beyond the insulation jacketing.
 - 4. Where possible, all valves of like type shall be of a single manufacturer.
- B. Acceptable Manufacturers:
 - 1. Gate, Globe, and Check Valves: Apollo, Hammond, Milwaukee, Nibco, Watts.
 - 2. Ball Valves: Apollo, Hammond, Jamesbury, Milwaukee, Watts, Nibco.
 - 3. Butterfly Valves: Apollo, DeZurik, Jamesbury, Keystone, Milwaukee, Watts, Nibco.
 - 4. High Performance Butterfly Valves: Keystone, Bray, Velan, Milwaukee.
 - 5. To establish a standard of quality and to identify features, certain manufacturer's numbers are given in the following paragraphs.
- C. Gate Valves:
 - 1. 2-1/2 in. and Larger: Iron body, bronze solid wedge disc. OS&Y, flanged ends, rising stem, bolted bonnet, 125 lb. SWP, Milwaukee F-2885A.
 - 2. 2 in. and Smaller: Bronze body, bronze solid wedge disc, rising stem, threaded or union bonnet, threaded ends, 125 SWP, Milwaukee 1152.

D. Check Valves:

1. 2-1/2 in. and Larger: Iron body, cast iron disc with bronze disc face rings and bronze seat ring, bolted flange cap, flanged ends, 125 SWP, Milwaukee F-2974-A.
2. 2 in. and Smaller: Bronze, swing check, threaded or soldered ends, 125 SWP, Milwaukee 1509.

E. Ball Valves for Water Service:

1. For chilled and hot water systems 3 in. and under: Bronze body with Type 316 stainless steel ball and stem, PTFE seats, full porting, 600 lb., W.O.G., adjustable packing gland, insulated handle, screwed or soldered ends, blowout proof stem. Provide handle extension on insulated services.

F. Valves for Gauges and Instruments:

1. 1/4 in., bronze body, hardened chrome plated brass ball, glass reinforced carbon impregnated seats, standard porting, 400 lb. W.O.G., adjustable packing gland, screwed ends, tee handle, Watts B6000TH.

G. Lug Type Butterfly Valves for Water Service:

1. Rated for working pressure 200 psi, bi-directional dead end service, bubble-tight.
2. Body: Lug type, cast iron ASTM A126, or ductile iron.
3. Disc: Aluminized bronze.
4. Seat: EPDM, resilient seat. Rated to 250°F.
5. Stem: 316 or 416 stainless steel. Single offset.
6. Operator: Lockable Lever for sizes through 6 in. Manual hand wheel gear actuator for sizes 8 in. and larger.
7. Milwaukee CL223E (2 in. - 6 in.), CL323E (8 in. and larger), or Watts BF-03.

H. Hose Thread Drain Valves:

1. Ball valve, bronze body, hardened chrome ball with hose thread end, cap and chain.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Provide valves of type called for and where required to service equipment.

2. Provide at major building and systems sections.
3. Provide chain wheels, guides, and chain loops for valves, where called for or in Mechanical Rooms where valves are mounted higher than 8'-0" AFF.
4. Isolating valves for individual fan convectors, room units, terminal units, or other similar apparatus may be inside cabinet or at connection to branch mains where accessible.
5. Locate valves with handles at horizontal position when 5 ft. or more above the floor, for greater visibility and easier use. Otherwise, locate valves with handles at or above horizontal position. Swing check valves in upright position only.
6. Butterfly valves may be used for water service over 2 in. unless otherwise noted.
7. Ball valves may be used for water service through 3 in., unless otherwise noted.
8. Provide hose threaded valves at low points, strainers, equipment, and as called for.

END OF SECTION 230523

SECTION 230530 - ROOF CURBS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide labor, materials, equipment and services as required for the complete installation of roof curbs as shown in Contract Documents.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 230550 - Wind Restraint for HVAC Systems.

1.3 SUBMITTALS

- A. Typical detail and schedule for equipment. Details shall include cross-sectional view illustrating clearly the type of curb being submitted, i.e. double wall insulated, with or without cant.

PART 2 - PRODUCTS

2.1 ROOF CURBS AND PIPE/DUCT/EQUIPMENT SUPPORTS

- A. Basis of Design: Subject to compliance with requirements of this section, provide Roof Products and Systems Corp. (RPS) or comparable product by one of the following:
 - 1. RPI (Roof Products Inc.)
 - 2. ThyCurb
 - 3. Greenheck
- B. Configuration: Coordinate curb type with roof deck construction and insulation thickness.
 - 1. Self-flashing without cant strip, with mounting flange (RPS Series 2A).
 - 2. Built-in cant and mounting flange (RPS Series 3A).
 - 3. Built-in raised cant and mounting flange (RPS Series 4A).
- C. Provide wind restraint in accordance with specified requirements.

2.2 FAN CURBS/DUCT CURBS

- A. Standard Curb:
 - 1. Double wall, 1-1/2 in. minimum thickness, fully insulated in the interior cavity with rigid insulation. Curb constructed of galvanized steel, 1-1/2 in. 3# density insulation with continuous welded corner seams and painted at all welds. 20 gauge up to 36 in., 18 gauge 38 to 72 in., 16 gauge over 72 in. in any dimension.

2. Curb height shall be 24 in. high or as otherwise noted on the drawings.
 3. Provide curb with adhesive backed closed cell foam gasket on the top edge to make airtight seal between curb and ventilator, fan, or air handling unit.
- B. Basis of Design: RPS - RC Roof Curbs.

PART 3 - EXECUTION

3.1 GENERAL

- A. Installation shall be in accordance with manufacturer's written instructions and in accordance with wind restraint requirements.
- B. Height as recommended by equipment manufacturer, not less than described in this specification. This Contractor shall be responsible for exact size, length, and location and shall set and secure each curb or support to the roof. Shim and level curb or support as required. Provide curb and supports for all roof-mounted equipment. All roof penetrations shall be made through an appropriate curb. All roof mounted equipment including fans, air handling units, etc, shall be set on an equipment curb or support unless otherwise noted.

END OF SECTION 230530

SECTION 230550 - WIND RESTRAINT FOR HVAC SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Support and brace mechanical and electrical systems, as called for, to resist directional wind forces (lateral, longitudinal and vertical).

1.2 APPLICABLE CODES AND STANDARDS

- A. Provide work in compliance with the following Codes and Standards based on the current edition in effect at project location:
 - 1. Building Code of New York State (Section 1609 and 1613).
 - 2. Existing Building Code of New York State
 - 3. Mechanical Code of New York State (Section 301, Item 301.15).
 - 4. American Society of Civil Engineers (ASCE) Minimum Design Loads for Buildings and Other Structures with Supplement No. 1 - Standard ASCE/SEI 7-22.

1.3 QUALITY ASSURANCE

- A. General:
 - 1. The contractor shall provide Professional Engineer stamped and signed engineering calculations and details of wind restraint systems to meet total design lateral force requirements for support and restraint of mechanical systems. Engineer shall be licensed to practice in the state in which the project is located.
 - 2. The wind restraint engineering calculations and details shall provide the quantity of attachments and size/type of attachments for the mounting of an equipment curb or support rail to the building structure, and for attachment of the equipment or system to the equipment curb or support rail. It is not the intent for manufactured equipment curbs or support rails to be certified by their respective manufacturers, nor is it the intent for them to be certified by the Professional Engineer who is providing the wind restraint calculations and connection methodology.
 - 3. Systems requiring wind restraint including, but not limited to:
 - a. Boiler flues.

1.4 SUBMITTALS

- A. Submit wind force level (F_p) calculations from applicable building code. Submit pre-approved restraint selections, installation details, and plans indicating locations of restraints.

- B. Calculations, plans, restraint selection, and installation details shall be stamped and signed by a professionally licensed engineer experienced in wind restraint design.
- C. Submit manufacturer's product data.
- D. For each piece of equipment that requires wind restraint as outlined in this section, include the following:
 - 1. Dimensioned Outline Drawings of Equipment Unit: Identify the center of gravity and locate and describe mounting and anchoring provisions.
 - 2. Anchorage: Provide detailed description of equipment anchorage devices on which the calculations are based and their installation requirements. Identify anchor bolts, studs and other mounting devices. Provide information on the size, type and spacing of mounting brackets, holes and other provisions.
- E. The Contractor shall provide photographs of the installed roof mounted equipment, showing the fully installed wind restraint anchoring, prior to the roofing material installation, as a formal submittal for verification that the work has been completed.

PART 2 - PRODUCTS

2.1 CODE INFORMATION

- A. This project is subject to the wind bracing requirements of the codes listed above. The following criteria are applicable to this project:
 - 1. Ultimate Design Wind Speed (V): 111 mph
 - 2. Risk Category: II
 - 3. Exposure Category: C
 - 4. Ground Elevation Factor (K_e): 1.0
 - 5. Topographic Factor (K_{zt}): 1.0
 - 6. Wind Directionality Factor (K_d): 0.85
 - 7. Combined Gust Factor for Rooftop Equipment (G_{Cr}): Per Section 29.4.1 of ASCE 7-2022, based on dimensions of individual rooftop equipment considered.
 - 8. Height and Exposure Adjustment Coefficient (λ): 0.94

2.2 WIND BRACING AND SUPPORT OF SYSTEMS AND COMPONENTS

- A. General:
 - 1. Design analysis shall include calculated dead loads, wind loads, and capacity of materials utilized for the connection of the equipment or system to the structure.
 - 2. Analysis shall detail anchoring methods, fastener sizes and spacing, etc.

3. All wind restraint devices shall be designed to accept without failure the forces calculated per the applicable building code and as summarized in Section 2.1.
- B. Friction from gravity loads shall not be considered resistance to wind forces.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Wind Restraint of Piping:
1. All restraint systems shall be installed in strict accordance with the wind restraint design submittal.
 2. Installation of restraints shall not cause any change in position of equipment or piping, resulting in stresses or misalignment.
- B. Wind Restraint of Ductwork and Equipment:
1. All restraint systems shall be installed in strict accordance with the wind restraint design submittal.
 2. The interaction between mechanical and electrical equipment and the supporting structures shall be designed into the restraint systems.
 3. Installation of restraints shall not cause any change in position of equipment or ductwork, resulting in stresses or misalignment.
 4. Exhaust fans with hinge kits shall have wind restraint fasteners installed on the hinged side, same as the three (3) non-hinged sides.
 5. No rigid connections between equipment and the building structure shall be made that degrade the noise and vibration-isolation system specified.
 6. Do not install any equipment or duct that makes rigid connections with the building unless isolation is not specified.
 7. Prior to installation, bring to the Architect's/Engineer's attention any discrepancies between the specifications and the field conditions, or changes required due to specific equipment selection.

3.2 INSPECTION

- A. The engineer who performs the delegated design for wind restraint shall inspect photos provided by the installing contractor to verify that the installation is in accordance with their design and applicable codes. The delegated design engineer shall coordinate with the contractor(s) who have installed the work.

- B. Upon final acceptance by the delegated design engineer of all work performed by the contractor(s), the delegated design engineer shall submit a letter to the Owner's Representative indicating that the installation of restraints complies with the requirements of their design and applicable codes.

END OF SECTION 230550

SECTION 230553 - MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

1.2 QUALIFICATION

- A. All identification devices shall comply with ANSI/ASME A13.1 for lettering size, length of color field, colors, directional arrow and viewing angles.

1.3 SUBMITTALS

- A. Submit manufacturer's technical product data and installation instructions for each identification material and device.
- B. Submit valve schedule for each piping system indicating valve number, location, and valve function.
- C. Submit schedule of pipe, equipment and name identification for review before stenciling or labeling.

1.4 MAKES

- A. Allen Systems, Inc.; Brady (W.H.) Co.; Signmark Div.; Industrial Safety Supply Co., Inc.; Seton Name Plate Corp.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide manufacturer's standard products of categories and types required for each application. In cases where this is more than one type specified for an application, selection is installer's option, but provide single selection for each product category.
- B. All adhesives used for labels in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits as called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.
- C. For work within an existing building, the mechanical identification shall meet the intent of this section, but match the Owner's existing identification symbology.

2.2 PIPING IDENTIFICATION

A. Identification Types:

1. Pressure Sensitive Type: Provide manufacturer's standard pre-printed, permanent adhesive, color coded, pressure sensitive vinyl pipe markers complying with ANSI/ASME A13.1.
 - a. Provide a 360° wrap of flow arrow tape at each end of pipe label.

O.D. Pipe or Covering	Length of Color Field	Letter Size
3/4 in. to 1-1/4 in.	8 in.	1/2 in.
1-1/2 in., 2 in.	8 in.	3/4 in.
2-1/2 in. to 6 in.	12 in.	1 1/2 in.
8 in. to 10 in.	24 in.	2 1/2 in.
Over 10 in.	32 in.	3 1/2 in.

2. Refer to HVAC symbols list for associated pipe function and labeling identification.

2.3 VALVE IDENTIFICATION

A. Valve Tags:

1. Standard brass valve tags, 2 in. diameter with 1/2 in. high numerals. Identify between heating and plumbing services with 1/4 in. letters above the valve number. Lettering to be stamped and in-filled black. Seton, or equal.
 - a. Valve-tag Fasteners: Brass wire-link or beaded chain; or S-hook.

B. Valve Chart:

1. Provide valve chart for all valves tagged as a part of this project. Frame and place under clear glass. Hang in Mechanical Room.
2. Valve chart to include as a minimum, valve #, valve size, valve type, valve service description, valve location.

2.4 EQUIPMENT LABELS

A. Metal Labels for Equipment (Outdoors):

1. Material and Thickness: Anodized aluminum, 0.032 in. minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 in. by 3/4 in.

3. Minimum Letter Size: 1/4 in. for name of units if viewing distance is less than 24 in., 1/2 in. for viewing distances up to 72 in. 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 rivets or self-tapping screws.
 5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Plastic Labels for Equipment (Indoors):
1. Material and Thickness: Multilayer, multicolor, phenolic (micarta) labels for mechanical engraving, 1/8 in. 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 F.
 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 in. by 3/4 in.
 6. Minimum Letter Size: 1/4 in. for name of units if viewing distance is less than 24 in., 1/2 in. for viewing distances up to 72 in., 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 rivets or 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.
- D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2 in. x 11 in. 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.
- E. Provide for the following equipment:
1. Air handling units
 2. Air-cooled condensing units

2.5 ABOVE CEILING EQUIPMENT LOCATOR

- A. 3/4 in. diameter adhesive stickers placed on ceiling grid. Color coded. Provide for the following:
 - 1. Fire dampers/smoke dampers - RED
 - 2. Plumbing valves - BLUE
 - 3. HVAC valves - ORANGE
 - 4. VAV boxes or reheat coils - GREEN
 - 5. Fans - YELLOW
 - 6. Pumps - BLACK

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide piping identification with directional flow arrows for all piping on project, at maximum intervals of 20 ft.
 - 1. For piping installed through floors or walls, provide at least one pipe label on each side of penetration, for each pipe function.
 - 2. For piping adjacent to 3-way diverting/mixing valves and tee/wye branches, provide at least one pipe label on each side of valve/tee.
 - 3. Label all abandoned piping if abandoned piping is allowed by Owner/Engineer. Document locations of all abandoned piping on as-builts.
- B. Provide valve tags for all valves provided on project, except for service valves at terminal equipment.
- C. Provide equipment tags for all equipment listed above.
- D. Provide above ceiling equipment locator stickers on ceiling grid for all equipment listed above.

END OF SECTION 230553

SECTION 230593 - TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for complete adjusting and balancing Work as required in Contract Documents.
- B. This Section specifies the requirements and procedures of mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.
- C. Test, adjust, and balance the following mechanical systems:
 - 1. Airside
 - a. Supply air systems, all pressure ranges; including constant volume and variable volume systems.
 - b. Return air systems.
 - 2. Hydronics
 - a. Constant flow systems.
 - b. Variable flow systems.
- D. This Section does not include:
 - 1. Testing boilers and pressure vessels for compliance with safety codes;
 - 2. Specifications for materials for patching mechanical systems;
 - 3. Specifications for materials and installation of adjusting and balancing devices. If devices must be added to achieve proper adjusting and balancing, refer to the respective system sections for materials and installation requirements.
 - 4. Requirements and procedures for piping and ductwork systems leakage tests.

1.2 SUBMITTALS

- A. Provide information in report form listing items required by specifications. Results shall be guaranteed. Contractor shall be subject to recall to site to verify report information before acceptance of the report by the Owner's Representative.
- B. Strategies and Procedures Plan: Within thirty (30) days of Contractor's Notice to Proceed, submit testing and balancing strategies and step-by-step procedures as specified in Section 3.1.B, "Preparation", and consistent with those listed in Part 3 of this specification.

- C. System Readiness Checklists: Within thirty (30) days of Contractor's Notice to Proceed, AABC agency shall provide system readiness checklists as specified in Section 3.1.C, "Preparation", to be used and filled out by the installing contractors verifying that systems are ready for Testing and Balancing.
- D. Examination Report: Provide a summary report of the examination review required in Section 3.1.D to the Engineer, documenting issues that may preclude the proper testing and balancing of the systems.
- E. Certified report format shall consist of the following:
 - 1. Title sheet with job name, contractor, engineer, date, balance contractor's name, address, telephone number and contact person's name and the balancing technician's name.
 - 2. Individual test sheets for air handlers, terminal units, air distribution, exhaust fans, duct traverses, pumps, air handling coils, reheat coils, radiation, convectors, cabinet unit heaters and unit ventilators.
 - 3. Manufacturer's pump and fan curves for equipment installed with design and actual operating conditions indicated.
 - 4. TAB Report Forms: Use standard forms from AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" or TABB's "Testing, Adjusting and Balancing Bureau".

1.3 DEFINITIONS

- A. System testing, adjusting and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes:
 - 1. The balance of air and water distribution;
 - 2. Adjustment of total system to provide design quantities;
 - 3. Electrical measurement;
 - 4. Verification of performance of all equipment and automatic controls.
- B. Test: To determine quantitative performance of equipment.
- C. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment (e.g., reduce fan speed, throttling).
- D. Balance: To proportion flows within the distribution system (submains, branches, and terminals) according to specified design quantities.
- E. Procedure: Standardized approach and execution of sequence of work operations to yield reproducible results.

- F. Report Forms: Test data sheets arranged for collecting test data in logical order for submission and review. This data should also form the permanent record to be used as the basis for required future testing, adjusting, and balancing.
- G. Terminal: The point where the controlled fluid enters or leaves the distribution system. There are supply inlets on water terminals, supply outlets on air terminals, return outlets on water terminals, and exhaust or return supply or outside air inlets or outlets on terminals such as registers, grilles, diffusers, and louvers.
- H. Main: Duct or pipe containing the system's major or entire fluid flow.
- I. Submain: Duct or pipe containing part of the systems' capacity and serving two or more branch mains.
- J. Branch Main: Duct or pipe serving two or more terminals.
- K. Branch: Duct or pipe serving a single terminal.

1.4 QUALIFICATIONS

- A. Follow procedures and methods published by one or more of the following:
 - 1. Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB) or Testing, Adjusting and Balancing Bureau (TABB).
 - 2. Individual manufacturer requirements and recommendations.
- B. Maintain qualified personnel at project for system operation and trouble shooting. TAB contractor shall change sheaves and perform mechanical adjustments in conjunction with balancing procedure.
- C. Balancing contractor shall be current member of AABC, NEBB, or TABB.
- D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in the *AABC National Standards for Total System Balance and SMACNA TAB Procedural Guide*.

1.5 GENERAL REQUIREMENTS

- A. Before concealment of systems visit the job site to verify and advise on type and location of balancing devices and test points. Make changes as required to balance facilities.
- B. Place systems in satisfactory operating condition.
 - 1. Adjusting and balancing shall be accomplished as soon as the systems are complete and before Owner takes possession.
 - 2. Initial adjustment and balancing to quantities as called for or as directed by the engineer, to satisfy job conditions.
 - 3. All outdoor conditions (Db, Wb, and a description of the weather conditions) at the time of testing shall be documented in the report.

4. Airside

- a. Prior to balancing, adjust balancing devices for full flow and replace temporary filters.
- b. Provide sheaves and belts as required to meet system performance requirements for all belt-driven fan motors 10 HP and greater. Adjust and align sheaves to obtain proper settings and operation. Verify motors are not overloading.
- c. Installing contractor shall replace dampers in new systems and identify dampers in existing systems that cannot be manipulated to satisfy balancing requirements.
- d. Traverse main ducts to determine total system air quantities after all outlets have been set prior to final adjustment if the system does not meet design requirements. A sum of room CFM's is not acceptable.
- e. If duct construction and/or installation prohibits proper traverse readings, provide coil measurements at main coils and/or fresh air intake traverse with units operating in 100% outside air mode (where applicable).

5. Hydronics

- a. Prior to balancing, adjust balancing devices for full flow; fill, vent and clean hydronic systems, replace temporary strainers.
- b. Installing contractor shall replace balancing cocks and flow balancers in new systems and identify flow balancers and balancing cocks in existing systems that cannot be manipulated to satisfy balancing requirements.

1.6 CONTRACTOR RESPONSIBILITIES

- A. Provide Testing and Balancing agency one complete set of contract documents, change orders, and approved submittals in digital and hard copy formats.
- B. Controls contractor shall provide required BAS hardware, software, personnel and assistance to Testing and Balancing agency as required to balance the systems. Controls Contractor shall also provide trending report to demonstrate that systems are complete.
- C. Coordinate meetings and assistance from suppliers and contractors as required by Testing and Balancing agency.
- D. Installing contractor shall replace or repair insulation as required by Testing and Balancing agency.

- E. Have the HVAC systems at complete operational readiness for Testing and Balancing to begin. As a minimum verify the following:
1. Airside:
 - a. Provide additional dampers, sheaves and belts as required by Testing and Balancing agency.
 - b. Flag all manual volume dampers with fluorescent or other high-visibility tape.
 - c. Provide access to all dampers, test ports, nameplates and other appurtenances as required by Testing and Balancing agency.
 - d. All ductwork is complete with all terminals installed.
 - e. All volume, smoke and fire dampers are open and functional.
 - f. Clean filters are installed.
 - g. All fans are operating, free of vibration, and rotating in correct direction.
 - h. ASD start-up is complete and all safeties are verified.
 - i. System readiness checklists are completed and returned to Testing and Balancing agency.
 2. Hydronics:
 - a. Provide additional valves as required by Testing and Balancing agency.
 - b. Provide access to all valves, test ports, nameplates and other appurtenances as required by Testing and Balancing agency.
 - c. Piping is complete with all terminals installed.
 - d. Water treatment is complete.
 - e. Systems are flushed, filled and air purged.
 - f. Strainers are pulled and cleaned.
 - g. Control valves are functioning per the sequence of operation.
 - h. All shutoff and balance valves have been verified to be 100% open.
 - i. Pumps are started, and proper rotation is verified.
 - j. Pump gauge connections are installed directly at the pump inlet and outlet flange or in discharge and suction pipe prior to any valves or strainers.

- k. ASD start-up is complete and all safeties have been verified.
 - l. System readiness checklists are completed and returned to Testing and Balancing agency.
- F. Promptly correct deficiencies identified during Testing and Balancing.
- G. Maintain a construction schedule that allows the Testing and Balancing agency to complete work prior to occupancy.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Provide tools, ladders, recording meters, gauges, thermometers, velometers, anemometers, Pitot tubes, inclined gauge manometers, magnehelic gauges, amprobes, voltmeters, psychrometers and tachometers required.
- B. Instrumentation Calibration: Calibrate instruments at least every six (6) months or more frequently if required by instrument manufacturer.
 - 1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine Bid Documents and submittals and notify Owner's Representative and Engineer of any questions regarding balancing.
 - 1. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper Testing and Balancing of systems and equipment.
 - 2. Examine the approved submittals for HVAC systems and equipment.
 - 3. Examine equipment performance data including fan and pump curves.
- B. Prepare a Testing and Balancing Strategies and Procedures Plan that includes:
 - 1. Equipment and systems to be tested.
 - 2. Strategies and step-by-step procedures for balancing the systems.
 - 3. Instrumentation to be used.
 - 4. Sample forms with specific identification for all equipment.

- C. Prepare system-readiness checklists, as described in the *AABC National Standards for Total System Balance and SMACNA TAB Procedural Guide*, for use by contractors in verifying system readiness for Testing and Balancing. These shall include, at a minimum:
1. Airside:
 - a. All ductwork is complete with all terminals installed.
 - b. All volume, smoke and fire dampers are open and functional.
 - c. Clean filters are installed.
 - d. All fans are operating, free of vibration, and rotating in correct direction.
 - e. Permanent electrical power wiring and ASD start-up is complete and all safeties are verified.
 - f. Automatic temperature-control systems are operational.
 - g. Ceilings are installed.
 - h. Windows and doors are installed.
 - i. Suitable access to balancing devices and equipment is provided.
 - j. Equipment and duct access doors are securely closed.
 2. Hydronics:
 - a. Piping is complete with all terminals installed.
 - b. Water treatment is complete.
 - c. Systems are flushed, filled and air purged.
 - d. Strainers are pulled and cleaned.
 - e. Control valves are functioning per the sequence of operation.
 - f. All shutoff and balance valves have been verified to be 100% open.
 - g. Pumps are started and proper rotation is verified.
 - h. Pump gauge connections are installed directly at the pump inlet and outlet flange or in discharge and suction pipe prior to any valves or strainers.
 - i. Permanent electrical power wiring and ASD start-up is complete and all safeties are verified.
 - j. Suitable access to balancing devices and equipment is provided.

- D. Examine construction and notify Owner's Representative and Engineer of outstanding issues related to balancing, as part of "Examination Report" submittal.
1. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, clean permanent filters are installed, and controls are ready for operation.
 2. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected, configured by the controls contractor and functioning.
 3. Airside
 - a. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas.
 - b. Examine systems for installed balancing devices, such as test ports, gage cocks, flow-control devices, and manual volume dampers prior to pressure testing. Note the locations of devices that are not accessible for testing and balancing.
 4. Hydronics
 - a. Examine strainers to verify that Mechanical Contractor has replaced startup screens with permanent screens and that all strainers have been cleaned.
 - b. Examine two-way valves for proper installation and function.
 - c. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.
 - d. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
 - e. Examine air vents to verify that mechanical contractor has removed all air from all hydronic systems.
 - f. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings and weld-o-lets prior to pressure testing. Note the locations of devices that are not accessible for testing and balancing.

3.2 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

- A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.
1. Measure and record the operating speed, airflow, and static pressure of each fan.
 2. Measure and record the operating speed, water flow, and TDH of each pump.

3. Measure motor voltage and amperage. Compare the values to motor nameplate information.
 4. Check bearings and other lubricated parts for proper lubrication.
 5. Check the refrigerant charge.
 6. Check the condition of filters.
 7. Check the condition of coils.
 8. Check the operation of the drain pan and condensate drain trap.
 9. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.
- B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished.
1. Fans are clean.
 2. Bearings and other parts are properly lubricated.
 3. New filters are installed.
 4. Coils are clean and fins combed.
 5. Drain pans are clean.
 6. Deficiencies noted in the preconstruction report are corrected.
- C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.
1. Compare the indicated airflow of the renovated work to the measured fan airflows and determine the new fan, speed, filter, and coil face velocity.
 2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
 3. If calculations increase or decrease the system flow rates by more than 5 percent, make equipment adjustments to achieve the calculated flow rates. If 5 percent or less, equipment adjustments are not required.
 4. Air balance each air outlet.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" or TABB's "SMACNA TAB Procedural Guide" and this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.
- C. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- E. Check airflow patterns from the outside-air louvers and dampers and the return and exhaust-air dampers, through the supply-fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and function.
- K. Check for proper sealing of air-handling unit components.
- L. Check for proper sealing of air duct system.

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure fan static pressures to determine actual static pressure as follows:
 - a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 - 2. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and treating equipment.
 - 3. Measure static pressures entering and leaving other devices such as sound traps, heat recovery equipment, and air washers, under final balanced conditions.
 - 4. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Compare actual system effect factors to identify where variations occur. Recommend corrective action to align design and actual conditions.
 - 5. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed. Make required adjustments to sheaves sizes, motor sizes, and electrical connections to accommodate fan-speed changes.
 - 6. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full cooling, full heating, economizer, and any other operating modes to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
 - 1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
 - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.

2. Re-measure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure terminal outlets and inlets without making adjustments.
 1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust terminal outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using volume dampers rather than extractors and the dampers at air terminals.
 1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

- A. Prepare test reports for pumps, coils and heat exchangers. Obtain approved submittals and any manufacturer-recommended testing procedures. Cross check the summation of required coil and heat exchanger gpm's with pump design flow rate.
- B. Verify that hydronic systems are ready for testing and balancing:
 1. Check liquid level in expansion tank and verify that tank is set to specified pressure for system fill and expansion.
 2. Check that makeup water has adequate pressure to highest vent.
 3. Check that control valves are in their proper positions.
 4. Check that air has been purged from the system.
 5. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
 6. Verify that motor starters are equipped with properly sized thermal protection.

3.7 PROCEDURES FOR CONSTANT-FLOW HYDRONIC SYSTEMS

- A. Adjust pumps to deliver total design gpm.
 1. Measure total water flow.
 - a. Position valves for full flow through coils.
 - b. Measure flow by main flow meter, if installed.

- c. If main flow meter is not installed, determine flow by pump total dynamic head (TDH) or exchanger pressure drop.
 2. Measure pump TDH as follows:
 - a. Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves or fittings.
 - b. Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
 - c. Convert pressure to head and correct for differences in gauge heights.
 - d. On single stage centrifugal pumps, verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
 - e. With all valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.
 3. Monitor motor performance during procedures and do not operate motor in an overloaded condition.
- B. Adjust flow measuring devices installed in mains and branches to design water flows.
 1. Measure flow in main and branch pipes.
 2. Adjust main and branch balance valves for design flow.
 3. Re-measure each main and branch after all have been adjusted.
- C. Adjust flow measuring devices installed at terminals for each space to design water flows.
 1. Measure flow at all terminals.
 2. Adjust each terminal to design flow.
 3. Re-measure each terminal after all have been adjusted.
 4. Position control valves to bypass the coil and adjust the bypass valve to maintain design flow.
 5. Perform temperature tests after all flows have been balanced.
- D. For systems with pressure-independent valves at the terminals:
 1. Measure differential pressure and verify that it is within manufacturer's specified range.
 2. Perform temperature tests after all flows have been verified.

- E. For systems without pressure-independent valves or flow measuring devices at the terminals:
 - 1. Measure and balance coils by either coil pressure drop or temperature method.
 - 2. If balanced by coil pressure drop, perform temperature tests after all flows have been verified.
- F. Verify final system conditions as follows:
 - 1. Re-measure and confirm that total water flow is within design.
 - 2. Re-measure all final pump operating data, TDH, volts, amps, static profile.
 - 3. Mark all final settings.
- G. Verify that all memory stops have been set.

3.8 PROCEDURES FOR VARIABLE-FLOW HYDRONIC SYSTEMS

- A. Adjust the variable-flow hydronic system as follows:
 - 1. Verify that the differential pressure (DP) sensor is located per the Contract Documents.
 - 2. Determine if there is diversity in the system.
- B. For systems with no diversity:
 - 1. Follow procedures outlined for constant-flow hydronic systems.
 - 2. Prior to verifying final system conditions, determine the system DP setpoint.
 - 3. If the pump discharge valve was used to set total system flow with ASD at 60 Hz, at completion open discharge valve 100% and allow ASD to control system DP setpoint. Record pump data under both conditions.
 - 4. Mark all final settings and verify that all memory stops have been set.
- C. For systems with diversity:
 - 1. Determine diversity factor.
 - 2. Simulate system diversity by closing required number of control valves, as approved by the design Engineer.
 - 3. Follow procedures outlined for constant flow hydronic systems.
 - 4. Open control valves that were shut. Close a sufficient number of control valves that were previously open to maintain diversity, and balance the terminals that were just opened.

5. Prior to verifying final system conditions, determine the system DP setpoint.
 6. If the pump discharge valve was used to set total system flow with ASD at 60 Hz, at completion open discharge valve 100% and allow ASD to control system DP setpoint. Record pump data under both conditions.
 7. Mark all final settings and verify that all memory stops have been set.
- D. For systems with pressure-independent valves at the terminals:
1. Measure differential pressure and verify that it is within manufacturer's specified range.
 2. Perform temperature tests after all flows have been verified.

3.9 TOLERANCES

- A. Set HVAC system's flow rates within the following tolerances:
1. Airside
 - a. Supply, Return, and Exhaust Fans: Zero to plus 10 percent.
 - b. Air Outlets and Inlets: Plus or minus 10 percent.
 - c. Minimum Outside Air: Zero to plus 10 percent.
 - d. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.
 2. Hydronics
 - a. Heating-Water Flow Rate: Plus or minus 10 percent.
 - b. Cooling-Water Flow Rate: Plus or minus 10 percent.

3.10 FINAL TEST AND BALANCE REPORT

- A. The report shall be a complete record of the HVAC system performance, including conditions of operation, items outstanding, and any deviations found during the Testing and Balancing process. The final report also provides a reference of actual operating conditions for the owner and/or operations personnel. All measurements and test results that appear in the reports must be made on site and dated by the technicians or Test and Balance Engineers.
- B. The report must be organized by systems and shall include the following information as a minimum:
1. Title Page:
 - a. AABC or NEBB Certified Company Name.

- b. Company Address.
- c. Company Telephone Number.
- d. Project Identification Number.
- e. Location.
- f. Project Architect.
- g. Project Engineer.
- h. Project Contractor.
- i. Project Number.
- j. Date of Report.
- k. Certification Statement.
- l. Name, Signature, and Certification Number.
- 2. Table of Contents.
- 3. National Performance Guaranty.
- 4. Report Summary:
 - a. The summary shall include a list of items that do not meet design tolerances, with information that may be considered in resolving deficiencies.
- 5. Instrument List:
 - a. Type
 - b. Manufacturer
 - c. Model
 - d. Serial Number
 - e. Calibration Date
- C. Required Airside data - Test, adjust and record the following:
 - 1. Motors:
 - a. RPM
 - b. BHP
 - c. Full load amps
 - d. Sheave sizes, number and size of belts
 - e. Shaft diameter
 - f. Complete nameplate data

2. Fans:
 - a. Cfm
 - b. RPM
 - c. Suction static pressure
 - d. Discharge static pressure
 - e. Sheave sizes, number and size of belts, key sizes, shaft, diameter
 - f. Complete nameplate data
 - g. Sketch of system's inlet and outlet connections
 - h. Location of test port
 3. Duct: Traverse Zones:
 - a. Cfm
 - b. Static Pressure
 4. AHU - (In both minimum O.A. and economizer modes):
 - a. Minimum outdoor air Cfm
 - b. Total discharge and return Cfm
 - c. Static profile thru unit
 - d. Complete nameplate data
 5. Coil:
 - a. Entering air temperature (DB/WB)
 - b. Leaving air temperature (DB/WB)
 - c. Static differential
 - d. Face velocity and area
 - e. Cfm
 - f. Complete nameplate data
 6. Registers/Grilles/Diffusers:
 - a. Cfm
 - b. Set, adjust and record air flow pattern
 7. Filter Banks:
 - a. Nameplate data
 - b. Static pressure drop
- D. Required Fluid Data: Test, adjust and record the following:
1. Heat Transfer Devices: Including, but not limited to air handlers, convectors, fin tube radiation sections, unit ventilators, fan coils, cabinet heaters, unit heaters, heat pumps, heat exchangers.
 - a. GPM (coil and bypass)
 - b. Entering water temperature
 - c. Leaving water temperature

- d. Water pressure drop
 - e. Complete nameplate data
 - f. Refrigerant suction pressure and temperature
- E. The final test and balance report shall be provided as a formal project submittal for review by the Engineer of Record.

END OF SECTION 230593

SECTION 230710 - INSULATION

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 SUBMITTAL

- A. Submit product data, product description, manufacturer's installation instructions.
- B. Submit schedule of types and thicknesses for each application, and location of materials.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 232010 - Piping Systems and Accessories.
- B. Section 233100 - Sheet Metal and Ductwork Accessories Construction.

PART 2 - PRODUCTS

2.1 GENERAL

- A. See Exhibits at the end of this section for where insulating materials shall be applied, thickness, jacketing and remarks.
- B. Provide work in compliance with the following Codes and Standards based on the current edition in effect at project location:
 - 1. Energy Conservation Code of New York State.
- C. Insulation, jackets, adhesive, and coatings shall comply with the following:
 - 1. Products shall not contain asbestos, lead, mercury, or mercury compounds.
 - 2. Insulation, including jackets, finishes and adhesives on the exterior surfaces of ducts, pipes, and equipment, shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, when tested in accordance with ASTM E84 or UL 723.
 - a. Plenums: Insulation materials shall be noncombustible or listed and labeled per ASTM E84 or UL 723.
 - b. Treatment of jackets or facing for flame and smoke safety must be permanent. Water-soluble treatments are not permitted.
 - 3. All adhesives, coatings and sealants used for insulation in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits as called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.

4. Provide materials which are the standard products of manufacturers regularly engaged in the manufacture of such products and that essentially duplicate items that have been in satisfactory use for at least two (2) years prior to bid opening. Provide insulation systems in accordance with the approved MICA or NAIMA Insulation Standards.
5. Insulation shall be clearly marked with manufacturer's name, identification of installed thermal resistance (R) value, out-of-package R value, flame spread and smoke developed indexes in accordance with Energy Code requirements.
6. Products that come into contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C 871.
7. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable in accordance with ASTM C 795.

2.2 ACCEPTABLE MANUFACTURERS

- A. Flexible Elastomeric: Armacell AP ArmaFlex/FS (Indoor: AP ArmaFlex up to 1", FS 1-1/2" to 2"; Outdoor: All sizes), Aeroflex (Indoors/Outdoors: All sizes), K-Flex Insul-Lock (Indoors: All sizes), K-Flex Titan (Indoors: Up to 1-1/2"; Indoors/Outdoors: All sizes), or approved equal.
- B. Fiberglass: Johns Manville, Knauf/Manson, Owen-Corning, or approved equal.
- C. Jacketing: Johns Manville (PVC), or approved equal.
- D. Adhesives, Coatings, Mastics, Sealants: Childers, Foster, or approved equal.

2.2 FLEXIBLE ELASTOMERIC

- A. Closed-cellular, sponge or expanded-rubber with integral vapor barrier.
- B. Tube and Sheet:
 1. Product meeting ASTM C 534, Type I/II Grade 1.
 2. 'K' Value at 75°F mean temperature
 - a. 0.245 BTU-in/ft² hr. °F (up to 1 in. wall thickness).
 - b. 0.28 BTU-in/ft² hr. °F (1-1/2 in. to 2 in. wall thickness).
- C. Sheet:
 1. Density: As required to meet specified R-value in Exhibit, unless otherwise noted.

2.3 FLEXIBLE FIBERGLASS

- A. Glass fibers bonded with a resin.

B. Blanket:

1. Product meeting ASTM C 553 Types I, II and III, and ASTM C 1290; Greenguard compliant.
2. 'K' Value: 0.27 BTU-in/ft² hr. °F at 75°F mean temperature.
3. Maximum Service Temperature (Faced): 250°F.
4. Vapor Retarder Jacket: FSK conforming to ASTM C 1136 Type II.
5. Density: As required to meet specified R-value in Exhibit, unless otherwise noted.

2.4 RIGID FIBERGLASS

A. Pre-formed glass fibers bonded with a thermosetting resin.

B. Pipe:

1. Product meeting ASTM C 547, ASTM C 585, and ASTM C 795; rigid, molded, noncombustible.
2. 'K' Value: 0.23 BTU-in/ft² hr. °F at 75°F mean temperature.
3. Maximum Service Temperature: 1000°F.
4. Vapor Retarder Jacket: Factory applied ASJ/SSL conforming to ASTM C 1136 Type I, secured with self-sealing longitudinal laps and butt strips.
5. Field applied PVC Fitting Covers with Flexible Fiberglass Insulation: Proto Corporation 25/50 or Indoor/Outdoor, UV resistant fittings, jacketing and accessories, white or colored. Fitting cover system consists of pre-molded, high-impact PVC materials with blanket type fiberglass wrap inserts. Blanket fiberglass wrap inserts shall have a thermal conductivity ('K') of 0.26 at 75°F mean temperature. Closures to be stainless steel tacks, matching PVC tape, or PVC adhesive per manufacturer's recommendations.

C. Board:

1. Product meeting ASTM C 612 Type IA and IB. Maximum Service Temperature: 450° F.
2. 'K' Value: 0.24 BTU-in/ft² hr. °F at 75°F mean temperature.
3. Vapor Retarder Jacket:
 - a. ASJ conforming to ASTM C 1136 Type I
 - b. FSK or PSK conforming to ASTM C 1136 Type II.

4. Density: As required to meet specified R-value in Exhibit, unless otherwise noted.

2.5 FIELD APPLIED JACKETS

- A. PVC: High-impact UV resistant PVC; roll stock ready for shop or field cutting and forming.
 1. Thickness: 30 mil.
 2. PVC Jacket Color: White.

2.6 ADHESIVES, COATINGS, MASTICS, SEALANTS

- A. Provide per manufacturer product requirements for associated system and application/installation location.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. All materials shall be installed by skilled labor regularly engaged in this type of work and installed in strict accordance with manufacturer's recommendations, building codes, and industry standards. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of pipe system per manufacturer requirements. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- B. Locate insulation and cover seams in the least visible location. All surface finishes shall be extended in such a manner as to protect all raw edges, ends and surfaces of insulation. No glass fibers shall be exposed to the air. Install insulation with longitudinal seams at top and bottom of horizontal runs. Install multiple layers of insulation with longitudinal and end seams staggered and with the least number of joints possible.
- C. All pipe and duct insulation shall be continuous through hangers.
- D. Provide thermal insulation on clean, dry surfaces and after piping, ductwork and equipment (as applicable) have been tested. Do not cover pipe joints with insulation until required tests are completed.
- E. All cold surfaces that may "sweat" must be insulated. Vapor barrier must be maintained; insulation shall be applied with a continuous, unbroken moisture and vapor seal. All hangers, supports, anchors, or other projections that are secured to cold surfaces shall be insulated and vapor sealed to prevent condensation.
- F. Items such as boiler manholes, handholds, clean-outs, ASME stamp, and manufacturers' nameplates, may be left uninsulated unless omitting insulation would cause a condensation problem. When such is the case, appropriate tagging shall be provided to identify the presence of these items. Provide neatly beveled edges at interruptions of insulation.

- G. Provide protective insulation as required to prevent personnel injury: Piping from zero to seven feet above all floors and access platforms including hot (above 140°F) piping and any other related hot surface.
- H. If any insulation material has become wet because of transit or job site exposure to moisture or water, the contractor shall not install such material, and shall remove it from the job site.
- I. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- J. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement. 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 in similar fashion to butt joints.
- K. 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.

3.2 PENETRATIONS

- A. Aboveground Exterior Wall and Roof Penetrations: Install insulation continuously through penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation above through 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/roof flashing at least 2-in. beyond flashing. Seal jacket to flashing with flashing sealant per roofing manufacturer requirements.
- B. Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
- C. Interior Floor, Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- D. Fire-Rated Floor, Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

3.3 PIPE INSULATION

- A. All pipes shall be individually insulated. Cover valves, fittings and similar items in each piping system with insulation as applied to adjoining pipe run. Extra care must be taken on piping appurtenances to insure a tight fit to the piping system.
- B. Piping insulation is allowed to be reduced in thickness only when a specific UL assembly detail for piping passing thru a rated wall indicates a maximum insulation thickness that is less than this specification section calls for. In this case reduce the insulation thickness just for the rated wall penetration. The reduction of insulation thickness shall be limited to the length of the penetration only.
- C. Coordinate insulation installation requirements for heat tracing that may apply.

3.4 DUCTWORK INSULATION

- A. Provide external thermal insulation for ductwork. Not required where ducts have internal acoustical insulation. Make special provisions at dampers, damper motors, thermometers, instruments, and access doors.
- B. Provide factory ASJ jacket for ductwork required to be insulated and to be painted.

3.5 EQUIPMENT INSULATION

- A. Apply insulation with joints firmly butted as close as possible to the equipment surface.

3.6 EXISTING INSULATION

- A. Patch existing insulation damaged during the course of the work.
- B. Insulate existing piping, ductwork, and equipment as called for.

EXHIBIT "I" - PIPE INSULATION MATERIALS

<u>SERVICE</u>	<u>INSULATION MATERIAL</u>	<u>THICKNESS</u>	<u>REMARKS</u>
Hot water and glycol/hot water (up to 200°F)	Rigid Fiberglass	1-1/2 in. and Larger: 2 in. 1-1/4 in. and Smaller: 1-1/2 in.	
Refrigeration Suction Line Piping (Cooling only mode; temperature up to 60°F)	Flexible Elastomeric	7/8 in. and Larger: 1 in. 3/4 in. and Smaller: 1/2 in.	
Refrigeration Liquid Line Piping (Cooling mode; temperature up to 140°F)	Flexible Elastomeric	1-1/2 in. and Larger: 1-1/2 in. 1-1/4 in. and Smaller: 1 in.	

NOTES FOR EXHIBIT "I":

- NOTE 1:** Use cork insulation tape equal to K-flex Cork Tape for cold service piping where installed inside equipment valve compartment (unit ventilator, fan coil, etc.).
- NOTE 2:** For refrigeration piping services smaller than 1-1/2 in. and located in wall partitions within conditioned spaces, reduction of these thicknesses by 1 in. shall be permitted but not to a thickness less than 1 in.
- NOTE 3:** Piping in exterior walls, spaces, overhangs, attics, or where subject to freezing shall be insulated with double the thickness called for the associated service.
- NOTE 4:** All interior exposed piping, valves, fittings, and specialties less than 8'-0" above finished floor in mechanical/electrical rooms, penthouses, and services aisles/pipe chases shall be jacketed with PVC.
- NOTE 5:** All exterior Refrigerant piping shall be jacketed with PVC.

EXHIBIT "II" - DUCT INSULATION MATERIALS

<u>SERVICE</u>	<u>INSULATION MATERIAL</u>	<u>THICKNESS</u>	<u>REMARKS</u>
Supply (concealed)	Flexible Fiberglass	2 in.	Min. installed R value of 6
Supply (within mechanical rooms or exposed at 8'-0" or less above finished floor)	Rigid Fiberglass	1-1/2 in.	Min. installed R value of 6
Supply (exposed within the conditioned space served)	Not insulated	Not insulated	Does not include the associated supply ductwork within the Mechanical Room or supply duct to the conditioned space.
Return and exhaust within heated building envelope	Not insulated	Not insulated	
Exhaust, relief or vent ducts and plenums (exposed)	Rigid Fiberglass	1-1/2 in.	Min. installed R value of 6 Insulate ducts 15 ft. from exterior opening and plenums.
Interior ductwork indicated to be lined (L); exterior ductwork indicated to be lined (2L)	Not insulated	Not insulated	

END OF SECTION 230710

SECTION 230923 - BUILDING MANAGEMENT SYSTEM - DDC LOGIC

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Drawings. Extend existing Building Management System (BMS), to perform the functions described in this Section. All new equipment shall be compatible with the existing system. Provide wiring and conduit required to connect devices furnished as a part of, or accessory to, this automatic control system. Control wiring is defined as wiring up to and including 120 volts. Install wiring in accordance with requirements of "Electrical Wiring" in Section 230504, and the National Electrical Code. Provide all required devices for proper system operation, including special electrical switches, transformers, relays, pushbutton stations, etc.
 - 1. All Actuation of valves and dampers shall be electric unless specifically called out elsewhere in the specifications or drawings.
- B. All Temperature Control Equipment for the project shall be purchased by Owner via State Contract and turned over to the Mechanical Contractor for installation.
- C. The BMS Contractor/Subcontractor shall be responsible to provide the services to develop the BMS System documentation, programming, installation of the equipment, and commissioning such that the project has a complete and workable Building Management System that is fully compliant with the requirements of this specification section.
- D. The BMS System shall have the following capabilities as described in these specifications:
 - 1. The network controllers and operator's workstations shall be connected directly to the Owner's Ethernet Network. The network controller shall also contain SNMP for integration to the Owner's Network Controllers System.
 - 2. Off site access for Owner's personnel shall be provided and shall have full workstation capability from remote location. Identical graphical displays shall be provided for offsite access to match the displays at the on-site Operator's Workstation. Connection to the site shall be via a high speed Ethernet connection.
 - 3. The Network Controller must act directly as the WEB server. It must directly generate the HTML code to the requesting user (i.e. WEB browser), eliminating the need and reliance on any PC-based WEB server hardware or software.
 - 4. All system variables in the temperature control system shall be Microsoft variables allowing them to be displayed and manipulated in other Microsoft products.
 - 5. Network controllers shall all be flash upgradeable and not require changing chips for upgrades.

6. Short term logging of historical data shall be provided for every DDC input and output in the system. Each point shall be capable of being logged for a minimum of two (2) weeks.
- E. The system shall consist of the following components:
1. Provide the necessary quantity and types of standalone controllers to meet the requirements of the project for mechanical equipment control including air handlers, central plant control, and terminal unit control. Each standalone controller shall operate completely standalone, containing all of the I/O and programs to control its associated equipment.
 2. BACnet Protocol Integration - BACnet:
 - a. The neutral protocol used between systems will be BACnet over Ethernet and comply with ASHRAE BACnet standard 135-2003.
 - b. A complete Protocol Implementation Conformance Statement shall be provided for all BACnet system devices.
 - c. The ability to command share point object data, change of state data and schedules between the host and BACnet systems shall be provided.

1.2 QUALITY ASSURANCE

- A. The complete automatic temperature control system shall be comprised of electric control devices with a microprocessor based Direct Digital Control System. All work shall be installed only by skilled mechanics employed by the BMS Contractor or Subcontractor.
- B. The BMS Contractor/Subcontractor shall have a minimum of five (5) years experience in systems of similar size, type and complexity installed within a 100 mile radius.
- C. The BMS Contractor/Subcontractor shall have a local service department (within a 50 mile radius) and have available a minimum of three (3) factory trained technicians within a 24 hour period.
- D. All components shall be fully tested and documented to operate as a complete system.
- E. Supplier must guarantee that all replacement parts will be carried in stock for a period of ten (10) years minimum from the date that the system is commissioned.
- F. Electrical standards: Provide electrical products that comply with the following agency approvals:
 1. UL 916; Energy Management Systems for Temperature Control components and ancillary equipment.
 2. UL 873; Temperature Indication and Regulating Equipment.
 3. FCC, Part 15, Subpart J, Class A Computing Devices.

- G. All products shall be labeled with the appropriate approval markings. System installation shall comply with NFPA, NEMA, Local and National codes.

1.3 ACCEPTABLE MAKES

- A. The complete Building Management System is designed and based on that manufactured by Trane.

1.4 SUBMITTALS

- A. Submit for review, a brochure containing the following:
 - 1. Detailed piping and wiring control diagrams and systems description for each system under control.
 - 2. Detailed layout and nameplate list for component control panels and DDC panels.
 - 3. Submit a valve and damper schedule showing size, pressure drop configuration, capacity, and locations. Provide apparatus bulletins and data sheets for all control system components.
 - 4. A complete listing of input and output points, control loops and/or routines, including time of day functions, and facilities management system functions for each controlled system. This listing shall include point logical names, identifiers, and alarmable ranges.
 - 5. Provide as part of a separate submittal a hard copy of all graphics showing system components, sensor locations, setpoints and fixed/variable data. Engineer shall review and approve graphic format prior to final acceptance of system.

1.5 SCOPE OF WORK

- A. Except as otherwise noted, the control system shall consist of all Ethernet Network Controllers, Standalone Digital Control Units, workstations, software, sensors, transducers, relays, valves, dampers, damper operators and other accessory equipment, along with a complete system of electrical interlocking wiring as required to fill the intent of the specification and provide for a complete and operable system.
- B. The BMS Contractor/Subcontractor shall review and study all HVAC drawings and the entire specification to familiarize themselves with the equipment and system operation and to verify the quantities and types of dampers, operators, alarms, etc. to be provided.
- C. All interlocking, wiring and installation of control devices associated with the equipment shall be provided under this Contract. The BMS Contractor/Subcontractor shall demonstrate the operation of the system to the Owner and prove that it complies with the intent of the drawings and specifications.

1.6 WORK INCIDENTAL TO TEMPERATURE CONTROL CONTRACTOR

- A. The BMS Contractor/Subcontractor shall furnish the following materials, installation by the HVAC Contractor:
 - 1. For piping work:
 - a. Control valves in piping.
 - b. Immersion sensing wells in piping systems.
 - c. Valved pressure taps.
 - 2. For sheet metal work:
 - a. All automatic dampers, the BMS Contractor/Subcontractor shall assemble multiple section dampers with required interconnecting linkages and extend required number of shafts through duct for external mounting of damper and motors.
 - b. The HVAC Contractor shall provide access doors or other means of access through ducts or ceilings and walls for service and adjustment of controllers, valves, and dampers.
- B. Control manufacturer shall furnish written details, instructions and supervision for the above trades to ensure proper installation size, and location of any equipment furnished for installation by others.
- C. BMS Contractor/Subcontractor is responsible for providing 120 volt dedicated power to all DDC panels and operator workstations.

1.7 CONTROL SYSTEM GUARANTEES

- A. Guarantee the new control system to be free from defects in material and workmanship, for a period of one (1) year after final acceptance. Guarantee system to:
 - 1. Maintain temperatures within 1°F above and below setting.
 - 2. Humidity devices shall maintain relative humidity conditions within 3% of span 0-100% RH.
- B. Provide one (1) year maintenance service of control components, to start concurrently with the guarantee specified above. Such service shall include software updates and 24 hour, 7 day emergency and seasonal inspection and adjustment of operating controls and replacement of parts or instruments found deficient and defective during this period.
- C. Provide monitoring of the DDC system as soon as the system is operating and then for a minimum of one (1) year (24 hours/day, 7 days/week) after the acceptance date. A monthly report will be sent to the Owner with a description of general system status and any alarms or off-normal conditions.

- D. Guarantee future availability of continuous, 24 hour, 7 day a week service for the systems through available maintenance contracts.

1.8 SYSTEM ADJUSTMENT AND CALIBRATION

- A. When the Work has been completed, completely adjust and calibrate the control system. Review the operation of each system input and output, control loops and/or software routings, timing functions, operator entered constants and facilities management functions and observe that they perform their intended functions. When above procedure has been completed and the control system is operating satisfactorily, submit a letter with one (1) copy of completed values and points log to the Owner's Representative advising them that the control system is 100% complete and operates in accordance with the Contract Documents.
- B. After review and approval of points log by the Engineer, the BMS Contractor shall schedule a technician on site for field review of system components, operation and graphics as part of final system appearance.

1.9 INSTRUCTIONS TO THE OWNER'S REPRESENTATIVE

- A. Provide competent control technicians to instruct the Owner's operating personnel and turn over three (3) copies of maintenance manual. Provide a total of 8 hours of instruction at the site, 4 hours during start-up and 4 hours after six (6) months. Instruction sessions shall be scheduled at the Owner's convenience and shall be limited to four (4) hours per session. The instructions shall include, but not be limited to, the following:
 - 1. System Overview.
 - 2. System Software and Operation:
 - a. System Access.
 - b. Software Features Overview.
 - c. Changing Setpoints and Other Attributes.
 - d. Scheduling.
 - e. Editing Programmed Variables.
 - f. Displaying Color Graphics.
 - g. Running Reports.
 - h. Workstation Maintenance.
 - i. Application Programming.
 - 3. Operational sequences including start-up, shutdown, adjusting and balancing.
 - 4. Equipment maintenance.

PART 2 - PRODUCTS

2.1 CONTROL DEVICES

A. Control Valves:

1. Sized by BMS Contractor/Subcontractor and guaranteed to meet the heating and cooling requirements. Water valves shall be sized on the basis of 15% of the total system pressure drop, but not more than 10 ft. of head drop. Steam valves shall be sized for no more than a 5 psig pressure drop, or 30% (max.) of design steam pressure, whichever is smaller. Pressure drop for valves shall be submitted for review, including all CV values.
2. Valves shall be equal percentage type, equipped with characteristic type throttling plug, #316, stainless steel or Monel stem, removable composition discs, and rubber diaphragms. Provide with necessary features to operate in sequence with other valves or damper operators and adjustable throttling range as required by the sequence of operations.
3. Valves in 2 in. and smaller shall be screwed bodies; 2-1/2 in. and larger shall be flanged bodies; designed for 125 psi operating pressure. Arranged to fail-safe as called for; tight closing and quiet operating.
4. Electric Operators:
 - a. Provide 24 VAC control operators which are 0-10 VDC input proportional with spring return as needed by control sequence and designed for water service valve bodies. Operator shall be synchronous motor driven with up to 150 in. lb. force and force sensor safety stop.

B. Temperature Sensors:

1. All temperature devices shall use precision thermistors accurate to $\pm 0.36^{\circ}\text{F}$ over a range of -30 to 230°F .
2. Standard space sensors shall be provided in an off white, or white, enclosure for mounting on a standard electrical box.
3. Provide manual adjustment slider with $\pm$ programmable scale. Programmable scale shall have the capability to be limited via the DDC System.
4. Provide a local LCD display for viewing the space temperature.
5. Duct temperature sensors shall incorporate a thermistor bead embedded at the tip of a stainless steel tube. Probe style duct sensors shall be used in air handling applications where the air stream temperature is consistent and is not stratified. Averaging sensors shall be employed in all mixing plenum and coil discharge applications and in any other application where the temperature might otherwise be stratified. The averaging sensor tube shall contain at least four thermistor sensors.

6. Immersion sensors shall be employed for measurement of temperature in all chilled water, hot water and glycol applications. Thermal wells shall be brass or stainless steel for non-corrosive fluids below 250°F and 300 series stainless steel for all other applications.

C. Electric Operators (Damper):

1. Provide 24 VAC control operators which are 0-10 VDC input proportional or two position with spring return as needed by control sequence and designed to operate control dampers. Operator shall be by synchronous motor driven with up to 150 in. lb. force sensor safety stop and return as required.

D. Control (Motorized) Dampers:

1. Provide control dampers as shown on the drawings and diagrams, to meet the following minimum construction standards.
2. Leakage: Class 1, 4 CFM/sq. ft. at 1 in. W.C., tested per AMCA Standard 500-D-98 and AMCA Standard 511 and bearing AMCA's Certified Ratings for both air performance and air leakage.
3. Frame: 16 gauge galvanized steel structural hot channel with tabbed corners for reinforcement to meet 13 gauge criteria.
4. Blades: 14 gauge (equivalent thickness galvanized steel) roll forward air foil type for low pressure drop and low noise generation. Blades shall be parallel for two-position dampers and opposed, for modulating dampers.
5. Blade Seals: Ruskiprene, suitable for -72°F to +275°F mechanically locked into the blade edge.
6. Jamb Seals: Flexible metal, compression type.
7. Blade Axles: 1/2 in. plated steel hexagonal positively locked into the damper blade. Linkage conceded out of the air stream.
8. Bearings: Corrosion resistant, permanently lubricated stainless steel sleeve.
9. Dampers subject to corrosive fumes or humidity shall be constructed of stainless steel.
10. Dampers over 48 in. length and height shall be made in multiple sections.
11. Where damper sizes are not specifically indicated, they shall be sized by the Temperature Control Contractor. Maximum velocity shall be 1500 fpm and maximum pressure drop 0.1 in. w.g.
12. Dampers shall be as manufactured by Ruskin CD60 Control Damper, or equivalent Tamco or Greenheck.

E. High Performance Thermally Broken and Insulated Control (Motorized) Dampers:

1. Provide high performance thermally broken and insulated control dampers as shown on the drawings and diagrams, to meet the following minimum construction standards.
2. Leakage: Shall not exceed 4 CFM/sq. ft. at 1in. W.C. (Leakage Class 1), tested per AMCA Standard 500-D-98 and AMCA Standard 511 and bearing AMCA's Certified Ratings for both air performance and air leakage. Holding torque shall not exceed 5 in. lbs./sq. ft. on opposed blade dampers, and 7 in. lbs./sq. ft. on parallel blades with a minimum torque of 40 in. lbs.
3. Frame: .125 in. extruded aluminum structural hat channel with tabbed corners for reinforcement.
4. Blade Seals: Ruskiprene II, suitable for -40°F and with locked into the blade edge extruded silicone, down to -70°F.
5. Jamb Seals: Flexible polycarbonate type.
6. Blade Axles: 1/2 in. plated steel hexagonal positively locked into the damper blade. Linkage conceded out of the air stream.
7. Bearings: Corrosion resistant, permanently lubricated molded synthetic.
8. Dampers over 48 in. length and height shall be made in multiple sections.
9. Where damper sizes are not specifically indicated, they shall be sized by the Temperature Control Contractor. Maximum velocity shall be 1500 fpm and maximum pressure drop 0.1 in. w.g.
10. Dampers shall be as manufactured by Ruskin TED50 low temperature control damper, or equivalent Tamco or Greenheck.

F. Pressure Sensors:

1. Air pressure or differential air pressure measurements in the range of 0 to 10 in. water column shall be accurate to $\pm 1\%$ of range using a solid-state sensing element. The range of the instrument selected shall be 2 times the operating pressure of the sensed variable. Acceptable manufacturer shall be Setra model C-264.
2. Liquid pressure or differential liquid pressure measurements shall be accurate to $\pm 0.25\%$ of range using a solid-state sensing element. The range of the instrument selected shall be 2 times the operating pressure of the sensed variable. Unit shall be provided with isolation and bypass manifold for start-up and maintenance operations. Acceptable manufacturer shall be Setra Model C-230.
3. Steam pressure measurements shall be accurate to $\pm 0.13\%$ of range using a solid-state sensing element. The range of the instrument selected shall be 2 times the operating pressure of the sensed variable.

Unit shall be provided with isolation and bypass manifold for start-up and maintenance operations. Acceptable manufacturer shall be Setra Model C-207.

4. Room pressure sensors shall be bi-directional, bleed airflow thermistor type. Sensor assembly shall contain three (3) individually wired, hermetically sealed bead-in-glass thermistors. The operating range shall be +3,000 FPM to -3,000 FPM, and device shall have an accuracy of $\pm 2\%$ of readings over the entire operating airflow range. Acceptable manufacturer shall be Ebtron Model GTC116-B.

G. Current Measurement Devices:

1. Measurement of three-phase power shall be accomplished with a kW/kWh transducer. The instrument shall utilize direct current transformer inputs to calculate the instantaneous value (kW) and a pulsed output proportional to the energy usage (kWh). Provide Veris Model 6000 Power Transducer or approved equal.

H. Airflow Stations (DP Type):

1. Duct Mounted Air Flow Stations:
 - a. Rectangular: 16 gauge galvanized casing, 8 in. deep, with formed 1-1/2 in. integral 90° connecting flanges.
 - b. Oval: 18 gauge galvanized casing, 8 in. long between beads with 1 in. connecting sleeve on each end (10 in. overall length). Actual O.D. dimensions are 1/4 in. less than specified duct I.D. dimensions.
 - c. Accuracy: Within 2% throughout the velocity range of 600 FPM and over, when installed in accordance with published recommendations.
 - d. Temperature: 350°F continuous operation, 400°F intermittent operation.
 - e. Humidity: 0-100% continuous operation.
 - f. Corrosion Resistance: Good salt air, excellent solvent and aromatic hydrocarbon resistance.
 - g. Element Material: 6063-T5 anodized aluminum.
 - h. Connection Fittings: 1/4 in. compression, suitable for use with thermoplastic or copper tube.
 - i. Design Equipment: Paragon Controls FE-1500.
 - j. Make: Paragon, Cambridge, Air Monitor.
2. Fan Inlet Air Flow Stations:
 - a. Material: 6063-T5 anodized aluminum, galvanized mounting brackets.

- b. Accuracy: Within 2% throughout the velocity range of 600 FPM and over, when installed in accordance with published recommendations.
 - c. Temperature: 350°F continuous operation; 400°F intermittent operation.
 - d. Humidity: 0-100% continuous operation.
 - e. Connection Fittings: 1/4 in. compression, suitable for use with thermoplastic or copper tube.
 - f. Corrosion Resistance: Good salt air and mild acid resistance, excellent solvent and aromatic hydrocarbon resistance.
 - g. Design Equipment: Paragon Controls FE-1050.
 - h. Make: Paragon, Cambridge, Air Monitor.
3. Outside Air Flow Station:
- a. Material: Element 6063-T5 anodized aluminum and casing 16 gauge G90 galvanized steel.
 - b. Accuracy: Within $\pm 0.5\%$ of actual flow through the velocity range of 200 to 12,00 fpm when installed in accordance with published recommendation and within $\pm 5\%$ at a velocity of 100 fpm. Operating velocity range 100 to 2,800 fpm.
 - c. Temperature: 350°F continuous operation and 400° intermittent operation.
 - d. Humidity: 0 to 100%.
 - e. Design Equipment: Paragon Controls mode OAFE-1500.
 - f. Make: Paragon, Ruskin.
4. Air Volume/Velocity Transducers for Duct Outside Air and Fan Inlet Airflow Stations:
- a. The transducer shall be a combination differential pressure transmitter, square rood extractor, scaling multiplier, and output filter with process indication, complete in a single package.
 - b. The measured air volume shall be locally indicated on a door mounted LED display meter scaled in CFM.
 - c. The transducer package shall be a factory calibrated for the flow-measuring element being served.
 - d. A transducer shall be provided for each individual airflow station.
 - e. Accuracy shall be plus or minus 0.25%.

- f. An output signal of 0-10 VDC or 4-20 mA shall be generated for monitoring by the DDC system.
- g. Design Equipment: Paragon Controls Microtrans.
- h. Make: Paragon, Cambridge, Air Monitor.

I. Airflow Stations (Thermal Dispersion Type):

- 1. Provide thermal dispersion airflow/temperature measurement device (ATMD) at each location indicated in specifications and control sequences.
 - a. Fan inlet measurement devices shall not be used unless indicated on drawings or schedules.
 - b. Each ATMD shall consist of one to four sensor probes and a single, remote transmitter. Each sensor probe shall consist of one to eight independent sensor nodes in a gold anodized, aluminum 6063 alloy tube with 304 stainless steel mounting brackets.
 - c. Each sensor node shall consist of two hermetically sealed bead-in-glass thermistors. Chip thermistors of any type or packaging are not acceptable.
 - d. Sensor Density Requirements:
 - 1) Sensor density (#/area) affects minimum installed distances required from disturbance types. Published sensor density data by the product manufacturer shall be submitted for approval. Sensor density shall be as follows:

<u>Duct or Plenum Area (ft²)</u>	<u>Total # Nodes / Location</u>	<u>Duct or Plenum Area (m²)</u>
<= 1	1 or 2	<= 0.093
>1 to <4	4	>0.093 to < 0.372
4 to < 8	6	0.372 to < 0.743
8 to < 12	8	0.743 to < 1.115
12 to <16	12	1.115 to < 1.486
>=16	16	>= 1.486

- 2) The number of individual sensor nodes for each rectangular location shall be maximized for performance within the placement conditions provided. In no instance shall field selected locations provide less distance between disturbances than required for maximum performance. When minimum distances allowed by the highest density of sensor distribution are exceeded, a lower density configuration that provides the same performance is acceptable.

- 3) Submittal documents shall include schedules indicating the number of sensors per location, the duct area and the equivalent density (#/area) for approval.
 - e. Each sensing node shall be individually wind tunnel calibrated at 16 points to NIST traceable airflow standards.
 - f. Each sensing node shall be individually calibrated in constant temperature oil baths at 3 points to NIST traceable temperature standards.
2. Measurement Performance:
 - a. Each sensing node shall have a temperature accuracy of $\pm 0.14^{\circ}\text{F}$ (0.08°C) over the entire operating temperature range of -20°F to 160°F (-28.9°C to 71°C).
 - b. Each sensing node shall have an airflow accuracy of $\pm 2\%$ of reading.
 - c. The ATMD shall be capable of measuring airflow rates over the full range of 0 to 5,000 FPM (25.4 m/s) between -20°F to 160°F (-28.9°C to 71°C).
 - d. A 3 year warranty shall be provided for the entire system.
3. Integral Transmitter and Communications:
 - a. The transmitter shall be powered by 24 VAC, be over-voltage and over-current protected, and have a watchdog circuit to provide continuous operation after power failures and/or brown-outs.
 - b. The transmitter shall determine the airflow rate and temperature of each sensing node prior to averaging.
 - c. The transmitter shall have two isolated and fused analog output signals and one RS-485 network connection.
 - d. Each analog output shall be field configurable as linear 0-5/1-5 VDC, 0-10/2-10 VDC or 4-20mA signals.
 - e. One analog output signal shall provide the average airflow rate.
 - f. One analog output signal shall be field configurable to output the average temperature, the velocity weighted temperature or a binary airflow alarm.
4. Listings and Certifications:
 - a. The ATMD shall be UL 973 listed.
 - b. The ATMD shall be BTL listed.

- c. The ATMD shall carry CE Mark for European shipments indicating successful satisfaction of all requirements contained in the EMC Directives, or when otherwise required in the destination country.
- 5. Design Equipment: Ebtron Model GTC116, HTA-104.
- 6. Make: Ebtron, Kurz, Sierra.
- J. Safety/Status Devices:
 - 1. Low Limit Detector: Electric type, with 20 ft. long serpentine element, with manual reset and auxiliary contacts to the DDC, set for 37°F for "freeze" protection and 55°F for fan discharge application. Provide a 20 ft. long element for every 25 sq. ft. of coil face area.
 - 2. High Limit Detector: High limit thermostats shall be located as directed, and shall be manual reset type set at 120°F in the return and 180°F in the discharge. Thermostats shall be double pole so as to provide input capability for alarm at the temperature control system.
 - 3. Pump status shall be provided through adjustable range current sensing element on pump motor.
 - 4. Fan status shall be provided through adjustable range current sensing element on the fan motor.
- K. Miscellaneous Devices:
 - 1. Provide necessary, relays, transformers, required for a complete and operable system.

2.2 CONTROL CABINETS

- A. BMS control panels shall be fully enclosed cabinet, baked enamel, steel, aluminum or composite material construction and shall meet the requirements of NEMA 1 enclosures. Panels shall have hinged door with a locking latch. Cover exposed electrical connections. Each component on front panel shall have an appropriate engraved label describing its function. Components inside the panel shall be appropriately labeled for ease of identification. Stick-on labels are not acceptable. Panels shall be either free-standing or wall-mounted. Provide support steel framing.

2.3 BUILDING MANAGEMENT SYSTEM

- A. The BMS system shall consist of Network Controllers, standalone or application specific controllers, input/output unit modules, operator workstations, and file servers to support system configurations. The BMS system shall provide control, alarm detection, scheduling, reporting and information management for the entire facility.
- B. The BMS shall be capable of being segmented, through software, into multiple local area networks per floor of building, distributed over a wide area network or sharing a single file server.

This enables workstations to manage wide area network, and/or the entire system with all devices being updated and sharing the most current database. In the case of a single workstation system, the workstation shall contain the entire database - with no need for a separate file server.

- C. For multi-workstation systems, a file server shall be utilized capable of residing directly on the Owner's Ethernet TCP/IP preferred network with no required gateways. This network may be dedicated for temperature control systems only so it does not interfere with other networks.
- D. In addition to the above local area network and wide area network, the workstation software shall be capable of managing remote systems via remote high speed network as a standard component of the software.
- E. The BMS system shall be scalable and expandable at all levels of the system using the same software interface and controllers.
 - 1. The system shall use the same application programming language for all equipment: Operator Workstation, Network Controllers, Remote Site Controllers and Standalone, or application specific, Digital Controllers.
- F. The BMS system design shall include solutions for the integration of the following "open systems" protocols: BACnet, LonTalk and digital data communication to third party microprocessors such as chiller controllers, fire panels and variable frequency drives (VFD's).
 - 1. The system shall also provide the ability to program custom ASCII communication drivers, which shall reside in the network control unit, for communication to third party systems and devices. These drivers shall provide real time monitoring and control of the third party systems.

2.4 STANDALONE CONTROLLERS

- A. Standalone Controllers shall provide control of HVAC and lighting. Each controller shall have its own control programs and shall continue to operate in the event of a failure or communication loss to its associated Network Controllers.
- B. Standalone Controllers programs shall be stored in battery backed-up RAM and EPROM. Each controller shall have a minimum of 32K bytes of user RAM memory and 128K bytes of EPROM.
- C. Standalone Controllers shall provide a communication port to the field bus. In addition, a port shall be provided for connection of a portable service tool to support local commissioning and parameter changes with or without the Network Controllers online. It shall be possible from a service port on any Standalone Controller to view, enable/disable, and modify values of any point or program on any controller on the local field bus, any Network Controller or any Standalone Controller on a different field bus.
- D. Support BACnet standard MS/TP bus protocol ASHRAE SS PC-15, Clause 9 on the control network.

- E. Each Standalone Controller shall support the addition of the following types of inputs and outputs:
 - 1. Digital Inputs for status/alarm contacts.
 - 2. Counter Inputs for summing pulses from meters.
 - 3. Thermistor Inputs for measuring temperatures in space, ducts and thermowells.
 - 4. Analog inputs for pressure, humidity, flow and position measurements.
 - 5. Digital Outputs for on/off equipment control.
 - 6. Analog Outputs for valve and damper position control, and capacity control of primary equipment.
- F. Input and output capacity shall be expandable through the use of plug-in modules. A minimum of two (2) modules shall be added to the base Standalone Controller before additional power is required.
- G. Each Standalone Controller shall be able to exchange information on a peer to peer basis with other Standalone Controllers during each field bus scan. Each Standalone Controller shall be capable of storing and referencing global variables (on the LAN) with or without any workstations online. Each Standalone Controller shall be able to have its program viewed and/or enabled/disabled either locally through a portable service tool or through a workstation connected to a Network Controller.
- H. Standalone Controllers shall have as a minimum, LED indication of CPU status, and field bus status.
- I. Standalone Controllers shall have a real time clock in either hardware or software. The accuracy shall be within 10 seconds per day. The Real Time Clock shall provide the following information: time of day, day, month, year, and day of week. Each Standalone Controller shall receive a signal over the network from the Network Controllers, which synchronizes all Standalone Controllers real time clocks.
- J. Upon restoration of power, the Standalone Controller shall automatically and without human intervention, update all monitored functions, resume operation based on current, synchronized time and status, and implement special start-up strategies as required.
- K. Each Standalone Controller shall have at least three (3) years of battery back up to maintain all volatile memory.
- L. For each system point, alarms can be created based on high/low limits or conditional expressions. All alarms shall be tested each scan of the Standalone Controllers and can result in the display of one or more alarm messages or reports.
 - 1. Up to eight (8) alarms can be configured for each point in the controller enabling the escalation of the alarm priority (urgency) based upon which alarm(s) is/are triggered.

2. Alarm messages can be sent to a local terminal or modem connected to a Network Controller or to the Operator's Workstation(s).
 3. Alarms shall be generated based on their priority. A minimum of 255 priority levels shall be provided.
 4. If communication with the Network Controller is temporarily interrupted, the alarm shall be saved in the Standalone Controller. When communications return, the alarm shall be transmitted to the Network Controller if the point is still in the alarm condition.
- M. Air Handler Controllers shall be capable of meeting the requirements of the sequence of operation intended for each system and allow for future expansion.
1. Air Handling Unit Controllers shall support all the necessary point inputs and outputs as required by the sequence and operate in a standalone fashion.
 2. Air Handling Unit Controllers shall be fully user programmable to allow for modification of the application software.
 3. An LCD display shall be optionally available for readout of point values and to allow operators to change setpoints and system parameters.
 4. A manual override switch shall be provided for all digital and analog outputs on the Air Handling Unit Controller. The position of the switch shall be monitored in software and available for operator displays and alarm notification.
- N. Air Terminal Unit Controllers:
1. Air Terminal Unit Controllers shall support, but not be limited to the control of the following configurations of Air Terminal Units to address current requirements as described in the Execution portion of this specification, and for future expansion:
 - a. Single Duct Cooling Only
 - b. Single Duct Cooling with Reheat (Electric or Hot Water)
 - c. Fan Powered (Parallel or Series)
 - d. Dual Duct (Constant or Variable Volume)
 - e. Supply/Exhaust
 2. Air Terminal Unit Controllers for single duct applications shall be provided with a built-in actuator for modulation of the air damper. The actuator shall have a minimum torque rating of 35 in.-lb., and contain an override mechanism for manual positioning of the damper during startup and service.
 3. Air Terminal Unit Controllers shall contain an integral velocity sensor accurate to $\pm 5\%$ of the full range of the box's CFM rating.
 4. Each controller shall perform the sequence of operation described in Part 3 of this specification, and have the capability for time of day scheduling, occupancy mode control, after hours operation, lighting control, alarming, and trending.

5. Air Terminal Unit Controllers shall be able to communicate with any other Standalone Controllers on the same field bus with or without communication to the Network Controllers managing the field bus. Systems that fail to provide this (true peer-to-peer) capability will be limited to a maximum of 32 Air Terminal Unit Controllers per field bus.

O. Unitary Controllers:

1. Unitary Controllers shall support, but not be limited to, the control of the following systems as described in the Execution portion of this specification, and for future expansion:
 - a. Unit Ventilators
 - b. Heat Pumps (Air to Air, Water to Water)
 - c. Packaged Rooftops
 - d. Fan Coils (2 or 4 Pipe)
2. The I/O of each Unitary Controller shall contain the sufficient quantity and types as required to meet the sequence of operation found in the Execution portion of this specification. In addition, each controller shall have the capability for time of day scheduling, occupancy mode control, after hour operation, lighting control, alarming, and trending.

2.5 SURGE SUPPRESSION (SP) RECEPTACLE

- A. Provide at each DDC panel and operator workstation locations, a surge suppression receptacle with metal oxide varister to dissipate the electrical energy of voltage spikes. 20 ampere, duplex, NEMA 5-20R configuration. Back and side wiring, high impact nylon body.
- B. Acceptable Make: Hubbell 5352-S.

2.6 GRAPHICS

- A. System Graphic:
 1. The equipment drawing will be three-dimensional. The values on the screen shall be reported in real time as well as dynamic to be updated as the value changes.
 2. All components of the drawing will show their actual field location and position. Sensors will be in the exact location in reference to piping and air stream. Icons or "library" images imported during the construction of the drawing will be accurate in depiction of the device and any interaction with other components of the drawing, i.e. don't draw piping into the motor of a pump icon.
 3. If there are size limitations or clutter from the number of components a link to a sub graphic having the same layout will be used to clarify.

B. Space Graphic:

1. Floor plan drawings will be linked to the supplying air handling unit or in some cases to the exhaust fan. Electronic floor plans to be provided by Architect/Engineer.
2. Floor plans showing areas served by more than one air handling unit will have the areas color-coded by air handling unit. If the air-handling unit serves different floors the color will be consistent for an air-handling unit for all floors.
3. If an area has control other than DDC it will be noted with text and left white in the background.
4. A temperature zone serving more than one space shall have a unique pattern, to distinguish that zone from other temperature zones. The patterns should slight enough as to not obscure the space temperature, room number and borders detail but visible enough to be able to distinguish between different zones. A different "peppering" of symbols (of + ^ * ≈) or patterns (hex, herringbone, verticals, etc.) will be used to define the zones.
5. Temperature zones dedicated to only one space will not have to be detailed.
6. Remote physical points such as differential monitors and the like shall be shown in their installed location.

C. The second level of graphics shall be all the DDC points to be installed under the contract overlaid on building floor plan and the Air Handling Unit and its associated systems. Electronic floor plans to be provided by Architect/Engineer.

D. Description of Operation:

1. The approved description of operation will appear on a text graphic in 12-point text written in paragraph form.
2. Additional notes may appear on the equipment graphic in an appropriate location.

E. Layout:

1. The subject device of equipment graphic will be centrally located on the drawing.
2. At the top center, the name of the equipment device will be displayed with its room number. Immediately below the PM# will be displayed. On a third line will be the capacity of the device in units common to that device i.e. air handling units in CFM, pumps in GPM.
3. The top right-hand corner will contain links to associated graphics. The Description of Operation, submittal graphic, space graphic and graphic index page will be typical. Other links may be required. All graphic pages will have backward link to return to the main System Graphic.

4. The top left-hand corner will contain global data. Outside Air would be the most common other values may be required when related to the device operation. If the global data functions within the program of this unit, the point referenced in the program will be displayed.
 5. The lower left-hand corner will display the operational modes of the device. Occupied, warm up, winterized and economizer would be common. Other modes will be displayed if the unit uses them.
 6. In the upper right-hand area, just below the links, the setpoints of the device will be displayed. All setpoints in the various control loops of the device, DA temp, static pressure, MA will be placed in columns as the drawing permits.
 7. The date of the last revision of the graphic will be displayed in the lower right corner.
- F. Text:
1. Text will contrast with the background for easy reading.
 2. The text will be free floating without borders or boxes unless specifically required.
- G. The graphics shall include approved schematic of the equipment, sequence of operation and all wiring interface diagrams.
- H. The graphic shall include all new and existing systems, equipment and spaces.

PART 3 - EXECUTION

3.1 GENERAL SYSTEM REQUIREMENTS

- A. The control of each system shall be guaranteed to perform as described in the Sequence of Operation on the drawings. Equipment, remote switches, in finished rooms shall be flush-mounted, if possible. Interlock supply and return fans, humidifiers with fans, condensers or cooling towers with air conditioning equipment and similar situations demanding coordinated operation.
- B. All existing DDC controllers and sensors removed from the project shall be turned over the Owner in good condition.
- C. This contract shall be responsible for decommissioning of the temperature control systems being removed and modifications to existing system graphics and software programming.

3.2 SYSTEM COMPONENTS

- A. Valves: Union or flanged connected. Locate close to apparatus controlled with pipe reducers and increasers located closest to valve. Locate, arrange, and pipe per installation diagram.

- B. Thermostats/Sensors: Room thermostats or sensors shall be mounted symmetrical with adjacent items such as light switches (nominally 44 inch to the center of the device and in accordance with ADA requirements). Verify exact room location to avoid doors, fixed and portable equipment. Install to minimize damage. Do not install adjacent to lighting dimmers or other heat generating equipment.
- C. Dampers and Damper Operators: Tag dampers for proper location. Install per manufacturer's printed instruction as to motor size and quantity, linkage arrangement, drive connection point. Adjust to close tightly. Allow for conduit sleeve or blank space for roof fan dampers. Where ducts are insulated, set damper operators at least 2 in. away from side of duct to allow for insulation.

3.3 LOW AND HIGH LIMIT SAFETY FUNCTIONS

- A. Provide for all supply fan units. Wiring to be directly to the motor starter. High limit controller (firestat) shall be located in the unit discharge, set at 180°F and prevent the fan from operating until reset. High limit shall alarm DDC system. Low limit shall be strung on the discharge face of preheat coils set at 37°F. Low limit shall: prevent fan from operating, operate coil pumps, fully close the outside air damper, fully close the relief air dampers, open return air damper, and alarm DDC system until reset.

3.4 SYSTEM TESTING AND COMMISSIONING

- A. At the time of installation, systems shall be tested for control device operation prior to the systems acceptance. A report of each systems performance shall be submitted to the Owner's Representative. The report shall include:
 - 1. Field verification and demonstration checklist of analog input calibration, analog output operation, digital input function, and digital output operation.
 - 2. Trend log of inputs and output, printed every two (2) hours, for one (1) week.
 - 3. Refer to "Instructions and Adjustments".

3.5 EXISTING CONTROL DEVICES

- A. The bid for the control work shall be based on the premise that existing control devices are operational and are not in need of repair and replacement, unless otherwise noted.
- B. This contractor shall notify the Owner's Representative of existing control devices that need to be replaced or repaired that may be noticed in the process of installation of new work.

3.6 SYSTEM DESCRIPTION - GENERAL

- A. All systems shall maintain the scheduled or otherwise noted minimum outside air ventilation rate during building occupied hours.
- B. Provide normally open hot water and normally closed cooling coil valves.

- C. Provide normally open return air damper, normally closed relief air and normally closed outside air dampers and operators.
- D. Mode of operation (occupied/unoccupied) including building warm-up and pull-down cycles, as well as all system functions shall be programmable and controlled by the BMS system.
- E. Shutdown of air handling units and fans due to a fire alarm shall be by the Electrical Contractor. The fire alarm system will send a signal to the BMS system for monitoring purposes only of each air handling unit and exhaust system. The BMS system will provide a staggered restart of the units once the alarm is cleared.
- F. All setpoints shall be adjustable.
- G. Two (2) outside air temperature sensors are to be provided as general inputs to the BMS system. The pair of readings shall be averaged for use by the system. If an individual reading is found to be out of range by comparison, then the other reading shall be used, and an alarm shall be generated.
- H. Where the normal sequence position or status of a device is allowed to be manually overridden by the building Owner/operator, the device shall be returned to its normal "system off" position, if the system is shut down by the BMS system or building fire alarm system. This includes overriding manually set and locked setpoints. Upon system restart, the device shall return to its manually over-ridden status. Returning devices to their normal "systems off" position shall be done to reduce the potential of damage to the systems.

3.7 CONTROL SEQUENCE

- A. Refer to plans for points lists.
- B. General Operation
 - 1. Scheduling:
 - a. All HVAC equipment shall operate in occupied/unoccupied modes as determined by a schedule provided by the Owner.
 - 2. Mode of operation (occupied/unoccupied) including building warm-up and pull-down cycles, as well as all system functions shall be programmable and controlled by the DDC system.
 - 3. All systems shall maintain the scheduled or otherwise noted minimum outside air ventilation rate during occupied hours.
 - 4. Provide normally open hot water control valves.
 - 5. Provide normally closed chilled water control valves.
 - 6. Provide normally closed outside air dampers and operators.

7. All setpoints shall be adjustable.
8. Set Points:
 - a. Occupied:
 - 1) Normal occupied mode - set points are set district wide at 68 Deg. F (adj.) for heating and 73 Deg. F (adj.) for cooling. Outside air is admitted to meet ventilation and cooling requirements as outlined in the individual unit sequences. Mechanical cooling, if equipped is utilized as outlined in the individual unit sequences. Each space has a system operator settable set point bias to either raise or lower the set points for occupant comfort.
 - 2) Shoulder mode – runs from school closing until 9pm Monday thru Friday adjustable by schedule. Spaces are maintained at normal or recess set points as applicable. Ventilation is off unless the occupancy schedule is set to on or occupancy is sensed by an occupancy sensor (if equipped).
 - b. Unoccupied:
 - 1) Heating set point is inversely proportional to outside air temperature based on the following schedule:
 - 2) At 55 Deg. F (adj.) outside air and above the set point is 45 Deg. F (adj.).
 - 3) At 10 Deg. F (adj.) outside air and below the set point is 65 Deg. F (adj.).
 - 4) Cooling set point is 82 Deg F.
9. Free-Cooling (Economizer):
 - a. Free Cooling shall be enabled when:
 - 1) Outside air is less than 70 Deg. F (adj.) dry bulb and less than 24 BTU/lb (adj.) or;
 - 2) Outside air temperature is less than 60 Deg. F (adj.).

C. Constant Volume Air Handling Unit: AHU-B-1 and ACCU-B-1

1. Fan Control: The supply fans and the return fan shall be started and stopped automatically by the DDC system according to building schedule anytime the operator has scheduled the selection of the unit to be enabled in system graphic. During occupied mode, the supply and return fans shall run continuously. During unoccupied mode, the supply fans shall cycle as required to maintain the unoccupied temperature setpoint. The return fan shall be off.

2. Damper Control: The air handling unit contains one (1) outside air damper, one (1) return air damper and one (1) relief air damper. The outside air damper shall be individually controlled and the return and relief air dampers will operate opposite each other to maintain building pressurization. Both outside air and relief air dampers shall be closed anytime the supply and return air fans are off.
 - a. Separate building envelope, two-position motorized dampers (outside air and relief air) shall be full-open when the fans are on and full-closed when the fans are off.
 - b. Start-up/morning warm up/cool down: both the outside air and relief air dampers shall remain closed with the return air damper full open. In morning cool-down the dampers are to operate in economizer mode if the economizer conditions are met (see economizer free cooling damper control).
 - c. Normal occupied building operation: the return air damper, relief air damper and outside air damper shall modulate to the positions as determined at balancing to provide the airflow as scheduled and as measure by the outside air and fan airflow stations.
 - d. Economizer operation - free cooling: whenever the outside air temperature is a minimum of five (5) deg F lower than the return air temperature and the outside air temperature is between 50 deg F and 65 deg F the unit shall be in the economizer mode of operation.
 - 1) The hot water control valve shall be fully closed.
 - e. The outside air damper, return air damper and relief air damper shall modulate in sequence to maintain a mixed air temperature setpoint of 55 deg F. The relief air damper and return air dampers shall modulate between minimum setpoint and full open in the same manner so that the required negative pressure within the outside air section of the air handling unit shall be maintained.
3. Hot Water Heating Coil: Anytime the air handling unit fans are instructed to run and the outdoor air temperature is below 55 deg F, the heating coil temperature control valve shall modulate to maintain space setpoint, subject to a discharge temperature high limit of 90 deg F. Anytime the outside air temperature is at or above 55 deg F or the supply fans are off, the temperature control valve shall be fully closed.
 - a. Morning Warm-Up:
 - 1) The discharge air temperature shall be increased to two (2) deg F below average room temperatures. Warm-up mode to be discontinued and begin normal operation when space average temperature is within one (1) deg F of average setpoint.
 - 2) Warm-up mode to be available between November 1 and April 1 unless changed by operator.

- b. Unoccupied Mode:
 - 1) When the outside air temperature is above 38 deg F, the control valve shall be closed. The perimeter radiation shall modulate to maintain space temperature setpoint.
 - 2) When the outside air temperature is 38 deg F or below the heating temperature control valve shall be open five (5) percent at all times for freeze protection.
- 4. DX Cooling Coil Control:
 - a. During cool down and occupied modes, the condensing unit shall modulate to maintain the discharge air temperature set point. At no time shall the heating and cooling be operating concurrently.
 - b. During the unoccupied mode, the condensing unit shall be commanded off unless required when free cooling is not available to maintain the night cooling set point.
 - c. If at any time the software low limit or the LTCO trip, the condensing unit shall be commanded off.
- 5. Unit safeties sequence of operation: there are several safeties that can shutdown and interlock the unit off until it is once again safe to operate. They are as follows: low limit temperature (freeze-stat), high temperature limit, fire alarm shutdown, smoke detection, low static limit, high static limit and general DDC safety shutdown. For all of the above mentioned safeties, on a failure, the unit fan ASD will not be allowed to operate either in automatic (remote) or hand (local) operation, until the safety has been resolved. Any time the supply is off via manual instruction, freeze stat (low limit) operation, static pressure limit or by manually/automatically disconnecting the electrical service to the unit (such as turning off or failure of the adjustable speed drive) the DDC system shall indicate an alarm on the air handling unit graphic.
 - a. Low limit protection (freeze stat): the unit should have a capillary type, manual reset freeze stat located on the inlet side of the dx cooling coil. If alternate 5 is not taken the freeze stat shall be located on the inlet side of the access section provided as part of the base bid. Freeze stat shall trip below 37 deg F (manually adjustable between 35 deg F and 42 deg F) of measured coil inlet air temperature. On a freeze trip, the n.c. contacts to the supply fan (starter or ASD) shall open in order to disable the fan. The N.O. contacts shall close for alarming to the DDC system and initiate the DDC failure mode of operation that includes commanding the equipment to its respective failsafe positions: outside air damper closed, supply fan disabled, the temperature control valve shall set to full heating position by opening the hot water control valve. The N.C. contacts are wired to the control panel and power two (2) relays within the enclosure. When in the freeze condition the first relay shall be de-energized to kill power to all damper actuators allowing them to spring return to their respective failure positions.

In the freeze condition the OA damper shall be closed (no outside air). The second relay shall de-energize and open the contacts at the supply fan starter or ASD to prevent it from running in “hand or auto mode”. When the freeze stat is in alarm, a red alarm light shall be activated on the face of the control panel. These relays are to ensure that the unit shuts down safely in the event of a freeze stat trip regardless of what the controller is trying to do. Once the freeze stat has “tripped” a user intervention is required to reset it locally at the unit.

- b. Fire alarm shutdown: the control panel shall monitor a single set of fire alarm contacts, shutdown and indicate this condition on the face of the panel. The physical shutdown shall be performed by an isolation relay to the supply fan ASD and not through the DDC controls. An alarm signal will be sent to the DDC system to notify operator that fire alarm signal has shut system down.
- c. Duct mounted smoke detector: when smoke is detected the detector will send a signal to the fire alarm control panel. See above for unit shutdown protocol.

D. Constant Volume Air Handling Unit: AHU-B-2

- 1. Fan Control:
 - a. During occupied, warmup, cooldown and purge modes, the supply fan shall run continuously, unless a safety alarm or the fire alarm have tripped.
 - b. During unoccupied mode, the supply fan shall cycle as required to maintain the unoccupied temperature set point in the space served unless a safety alarm or the fire alarm have tripped.
- 2. Damper Control:
 - a. An airflow station shall be provided in the outside air connection of the unit and shall report outside air flow at all times.
 - b. Economizer operation - free cooling: whenever the global free cooling setpoints are met, the unit shall be in the economizer mode of operation.
 - 1) The hot water heating coil shall be disabled.
 - c. If any of the safety alarms trip, the outside air damper shall be commanded closed and fan shall be commanded off.
- 3. Hot Water Heating Coil:
 - a. Anytime the air handling unit fans are instructed to run and the outdoor air temperature is below 55 deg F, the heating coil temperature control valve shall modulate to maintain space setpoint, subject to the maximum leaving air temperature listed in the unit schedule.

- b. Anytime the outside air temperature is at or above 55 deg F or the supply fans are off, the temperature control valve shall be fully closed.
- c. Unoccupied Mode:
 - 1) When the outside air temperature is above 38 deg F, the control valve shall be closed.
 - 2) When the outside air temperature is 38 deg F or below the heating temperature control valve shall be open five (5) percent at all times for freeze protection.

4. Unit Safeties:

- a. There are several safeties that can shut down and interlock the unit off until it is once again safe to operate. They are as follows: low limit temperature (freeze-stat), high temperature limit, fire alarm shutdown, smoke detection, low static limit, high static limit and general DDC safety shutdown. For all of the above-mentioned safeties, on a failure, the unit fan ASD will not be allowed to operate either in automatic (remote) or hand (local) operation, until the safety has been resolved. Any time the supply is off via manual instruction, freeze stat (low limit) operation, static pressure limit or by manually/automatically disconnecting the electrical service to the unit (such as turning off or failure of the adjustable speed drive) the DDC system shall indicate an alarm on the air handling unit graphic.
- b. Low limit protection (freeze stat): the unit should have a capillary type, manual reset freeze stat located on the inlet side of the cooling coil or outlet side of the heating coil. Freeze stat shall trip below 37 deg F (manually adjustable between 35 deg F and 42 deg F) of measured air temperature. On a freeze trip, the N.C. contacts to the supply fan (starter or ASD) shall open in order to disable the fan. The N.O. contacts shall close for alarming to the DDC system and initiate the DDC failure mode of operation that includes commanding the equipment to its respective failsafe positions: outside air damper closed, supply fan disabled, the heating coil pump (if applicable) enabled and the temperature control valve shall set to full heating position by opening the hot water control valve. The N.C. contacts are wired to the control panel and power two (2) relays within the enclosure. When in the freeze condition the first relay shall be de-energized to kill power to all damper actuators allowing them to spring return to their respective failure positions. In the freeze condition the OA damper shall be closed (no outside air). The second relay shall de-energize and open the contacts at the supply fan starter or ASD to prevent it from running in "hand or auto mode". When the freeze stat is in alarm, a red alarm light shall be activated on the face of the control panel. These relays are to ensure that the unit shuts down safely in the event of a freeze stat trip regardless of what the controller is trying to do. Once the freeze stat has "tripped" a user intervention is required to reset it locally at the unit.

- c. Fire alarm shutdown: the control panel shall monitor a single set of fire alarm contacts, shutdown and indicate this condition on the face of the panel. The physical shutdown shall be performed by an isolation relay to the supply fan ASD and not through the DDC controls. An alarm signal will be sent to the DDC system to notify operator that fire alarm signal has shut system down.
 - d. Duct mounted smoke detector (if applicable): when smoke is detected the detector will send a signal to the fire alarm control panel. See above for unit shutdown protocol.
- E. Constant Volume Makeup Air Handling Unit: MAU-B-1
 - 1. Fan Control:
 - a. During occupied, warmup, cooldown and purge modes, the supply fan shall run continuously, unless a safety alarm or the fire alarm have tripped.
 - b. During unoccupied mode, the supply fan shall cycle as required to maintain the unoccupied temperature set point in the space served unless a safety alarm or the fire alarm have tripped.
 - 2. Damper Control:
 - a. An airflow station shall be provided in the outside air connection of the unit and shall report outside air flow at all times.
 - b. Economizer operation - free cooling: whenever the global free cooling setpoints are met, the unit shall be in the economizer mode of operation.
 - 1) The hot water heating coil shall be disabled.
 - c. If any of the safety alarms trip, the outside air damper shall be commanded closed and fan shall be commanded off.
 - 3. Hot Water Heating Coil:
 - a. Anytime the air handling unit fans are instructed to run and the outdoor air temperature is below 55 deg F, the heating coil pump (HWP-B-7) shall start and the heating coil temperature control valve shall modulate to maintain space setpoint, subject to the maximum leaving air temperature listed in the unit schedule.
 - b. Anytime the outside air temperature is at or above 55 deg F or the supply fans are off, the coil pump shall be off and the temperature control valve shall be fully closed. When the outside air temperature is 38 deg F or below, the heating coil pump shall operate continuously during occupied or unoccupied periods.

c. Unoccupied Mode:

- 1) When the outside air temperature is above 38 deg F, the heating coil pump shall be off and the control valve shall be closed.
- 2) When the outside air temperature is 38 deg F or below the heating temperature control valve shall be open five (5) percent at all times for freeze protection.

4. Unit Safeties:

- a. There are several safeties that can shut down and interlock the unit off until it is once again safe to operate. They are as follows: low limit temperature (freeze-stat), high temperature limit, fire alarm shutdown, smoke detection, low static limit, high static limit and general DDC safety shutdown. For all of the above-mentioned safeties, on a failure, the unit fan ASD will not be allowed to operate either in automatic (remote) or hand (local) operation, until the safety has been resolved. Any time the supply is off via manual instruction, freeze stat (low limit) operation, static pressure limit or by manually/automatically disconnecting the electrical service to the unit (such as turning off or failure of the adjustable speed drive) the DDC system shall indicate an alarm on the air handling unit graphic.
- b. Low limit protection (freeze stat): the unit should have a capillary type, manual reset freeze stat located on the inlet side of the cooling coil or outlet side of the heating coil. Freeze stat shall trip below 37 deg F (manually adjustable between 35 deg F and 42 deg F) of measured air temperature. On a freeze trip, the N.C. contacts to the supply fan (starter or ASD) shall open in order to disable the fan. The N.O. contacts shall close for alarming to the DDC system and initiate the DDC failure mode of operation that includes commanding the equipment to its respective failsafe positions: outside air damper closed, supply fan disabled, the heating coil pump (if applicable) enabled and the temperature control valve shall set to full heating position by opening the hot water control valve. The N.C. contacts are wired to the control panel and power two (2) relays within the enclosure. When in the freeze condition the first relay shall be de-energized to kill power to all damper actuators allowing them to spring return to their respective failure positions. In the freeze condition the OA damper shall be closed (no outside air). The second relay shall de-energize and open the contacts at the supply fan starter or ASD to prevent it from running in "hand or auto mode". When the freeze stat is in alarm, a red alarm light shall be activated on the face of the control panel. These relays are to ensure that the unit shuts down safely in the event of a freeze stat trip regardless of what the controller is trying to do. Once the freeze stat has "tripped" a user intervention is required to reset it locally at the unit.
- c. Fire alarm shutdown: the control panel shall monitor a single set of fire alarm contacts, shutdown and indicate this condition on the face of the panel.

The physical shutdown shall be performed by an isolation relay to the supply fan ASD and not through the DDC controls. An alarm signal will be sent to the DDC system to notify operator that fire alarm signal has shut system down.

- d. Duct mounted smoke detector (if applicable): when smoke is detected the detector will send a signal to the fire alarm control panel. See above for unit shutdown protocol.

F. Unit Heaters: UH-MB-A/B/C

- 1. The fan shall cycle to maintain the space heating set point.

G. Gravity Relief Vent: RH-MB-A

- 1. Occupied Mode: The relief damper shall be open.
- 2. Unoccupied Mode: The relief damper shall be closed.

END OF SECTION 230923

SECTION 232010 - PIPING SYSTEMS AND ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 078413 - Penetration Firestop Systems.

1.3 SUBMITTALS

- A. Schedule of pipe materials, fittings and connections.
- B. Applicable miscellaneous materials (i.e. dielectric protection, hangers, inserts, supports, sealing elements, firestop systems, etc.).
- C. Pressed mechanical connection system.
- D. Welding certification (Refer to Part 3).
- E. Cleaning of various hydronic piping systems (Refer to Part 3)
 - 1. Submit typewritten letter to inform Owner's Representative upon completion of the work.
- F. Water Treatment (Refer to Part 3)
 - 1. Certification of successful pressure testing (Refer to Part 3).

PART 2 - PRODUCTS

2.1 GENERAL

- A. Pipe and fittings shall be new, marked with manufacturer's name and comply with applicable ASTM and ANSI Standards.
- B. All adhesives, sealants, primers and paint used for piping in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.

2.2 STEEL PIPING AND FITTINGS

- A. Pipe: ASTM A53, Schedule 40 weight; black or galvanized finish as called for; ends chamfered for welding or roll grooved for grooved mechanical connections.

B. Fittings: Same material and pressure class as adjoining pipe.

1. Welded Fittings: Factory forged, seamless construction, butt weld type, chamfered ends. Where branch connections are two or more sizes smaller than main size, use of "Weldolets", "Thredolets", or "Sockolets" are acceptable. Socket weld type, 2000 psi wp, where required.
 - a. Mitered elbows, "shaped" nipples, and fabricated reductions and fabricated branch connections are not acceptable
2. Threaded Fittings: Cast or malleable iron, black or galvanized, as required; drainage type where called for.
3. Shop Fabricated Connections and Fittings are not allowed.

C. Flanges, Unions and Couplings:

1. Threaded Connections:
 - a. Flanges: Cast iron companion type; for sizes 2-1/2 in. and larger.
 - b. Unions: Malleable iron, bronze to iron seat, 300 lb. wwp; for sizes 2 in. and smaller.
 - c. Couplings: Malleable iron, 150 or 300 lb. wwp, based on system pressure. Steel thread protectors are not acceptable as couplings.
2. Welded Connections:
 - a. Flanges: Welding neck type.
 - b. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Gauge and Instrument Connections: Nipples and plugs for adapting gauges and instruments to piping system shall be IPS brass.

E. Base Elbows:

1. Cast iron or steel type, flange connections; Crane 500 or equivalent. Made from welding elbows, with welded pipe support and steel base. Reducing elbows where necessary.

ELBOW SIZE	SUPPORT SIZE	BASE PLATE
2 in. to 3 in.	1-1/4 in.	6 in. x 6 in. x 1/4 in.
4 in. to 6 in.	2-1/2 in.	8 in. x 8 in. x 1/4 in.
8 in. and larger	6 in.	14 in. x 14 in. x 5/16 in.

2. Anchor bolt holes in each corner of base for securely bolting to floor or concrete base; minimum 3/4 in. bolts.

2.3 COPPER TUBE AND FITTINGS - SOLDER JOINT

- A. Pipe: ASTM B88; Type K, L or M, hard temper. Soft temper only where specified. Plans show copper tube sizes.
- B. Tees, Elbows, Reducers: Wrought copper, ASME B16.22 or cast bronze; ASME B16.18 solder end connections.
- C. Unions and Flanges: 2 in. and smaller use unions, solder type, cast bronze, ground joint, 150 lb. swp; 2-1/2 in. and over use flanges, cast bronze, companion type, ASME drilled, solder connection, 150 lb. swp.
- D. Solder Materials: No-lead solder, using alloys made from tin, copper, silver and nickel.
- E. Make: Harris "Stay-Safe 50" and "Bright", Engelhard "Silverbright 100", Willard Industries "Solder Safe (silver bearing), Canfield "Watersafe" or approved equal.

2.4 COPPER TUBE AND FITTINGS - PRESS FITTINGS

- A. Tubing Standard: Copper tubing shall conform to ASTM B75 or ASTM B88.
- B. Fitting Standard: Copper fittings shall conform to ASME B16.18, ASME B16.22, or ASME B16.26.
- C. Press Fitting: Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22. O-rings for copper press fittings shall be EPDM.
- D. Make: Viega Pro-Press, Nibco, Tyco Grinnell, Elkhart Apolloxpress, Mueller.

2.5 DIELECTRIC PROTECTION

- A. Description: Assembly or fitting having insulating material isolating joined dissimilar metals to prevent galvanic action and stop corrosion.
- B. Dielectric unions shall not be used due to their tendency to leak. Provide a dielectric waterway fitting or a brass nipple for dielectric protection. A brass valve is also an acceptable method of dielectric protection.
- C. Flanges: Factory-fabricated, companion-flange assembly, for 150 or 300 psig minimum pressure to suit system fluid pressures and temperatures with flange insulation kits and bolt sleeves.
- D. Waterway Fittings: 300 psi maximum working pressure at 230°F, male threaded or grooved ends, electroplated ductile iron or steel body with LTHS high temperature polyolefin polymer liner.
- E. Make: EPCO, Capitol Manufacturing, Watts, Surejoint, Victaulic, or approved equal.

- F. The use of brass valves, brass nipples (3 in. and larger) and Shurjoint epoxy coated transition coupling IPS-CTS may be used for dielectric isolation. Dielectric transition fittings shall be Shurjoint Model DE30-GG for sizes 2 in. through 8 in., which shall provide effective insulation between the steel and copper systems to avoid galvanic local cell and stray current problems. The dielectric transition fitting shall be made of ductile iron per ASTM A536 Gr. 65-45-12, electric deposition coated, with a virgin PP (propylene) lining.

2.6 HANGERS, INSERTS, AND SUPPORTS

- A. Hangers, Inserts, Clamps: B-Line, Grinnell, Michigan Hanger, PHD Manufacturing, Anvil, Hilti.
- B. Hangers:
 - 1. Adjustable, wrought malleable iron or steel with electroplated zinc or cadmium finish. Copper plated or PVC coated where in contact with copper piping. Hot-dipped galvanized finish for exterior locations.
 - 2. Adjustable ring type where piping is installed directly on hanger for piping 3 in. and smaller.
 - 3. Adjustable steel clevis type for 4 in. and larger, and where insulation passes through hanger.
 - 4. Hangers sized to permit passage of insulation through the hanger for all piping.
 - 5. Nuts, washers and rods with electroplated zinc or cadmium finish. Hot-dipped galvanized finish for exterior locations.
- C. Hanger Shields:
 - 1. Pre-Insulated Type:
 - a. Insulated pipes shall be protected at point of support by a 360° insert of high density, 100 psi waterproof calcium silicate, encased in a 180° sheet metal shield. Insulation insert to be same thickness as adjoining pipe insulation and extend 1 in. beyond sheet metal shield. Insulation shall be provided with a factory installed ASJ.
 - 2. Field-Insulated Type:
 - a. #18 USSG, galvanized steel shields, minimum 120° arc. Provide ICA-HAMFAB-BLOCK, 18# density molded fiberglass inserts, between pipe and hanger shield to maintain proper spacing for insulation. Insulation inserts shall extend 1 in. beyond the sheet metal shields. Material shall comply with ASTM E84 25/50, have a thermal conductivity of K=.30 (stable) and have a service temperature of -120°F to +650°F. Install in accordance with manufacturer's printed instructions.

3. Shield Sizing:

PIPE SIZE	SHIELD LENGTH	MINIMUM GAUGE
1/2 in. to 3-1/2 in.	9 in.	20
4 in.	9 in.	20
5 in. and 6 in.	9 in.	20
8 in. to 12 in.	12 in.	18
14 in. to 24 in.	18 in.	16

4. Hanger shield gauges listed are for use with band type hangers only. For point loading (roller support), increase shield thickness by one gauge, and length by 50%.

D. Hanger Spacing Schedules: (Based upon most stringent requirement of MCNYS and ASME B31.9)

COPPER OR PLASTIC PIPE SIZE	COPPER PIPE HANGER SPACING	PLASTIC PIPE HANGER SPACING	HANGER ROD SIZE
3/4 to 1 in.	6 ft.	3 ft.	3/8 in.
1-1/4 in.	6 ft.	4 ft.	3/8 in.
1-1/2 to 2 in.	8 ft.	4 ft.	3/8 in.
2-1/2 to 4 in.	10 ft.	4 ft.	1/2 in.
5 in. and larger	10 ft.	4 ft.	3/4 in.

STEEL PIPE SIZE	STEEL PIPE HANGER SPACING	HANGER ROD SIZE
3/4 to 1 in.	8 ft.	3/8 in.
1-1/4 in.	10 ft.	3/8 in.
1-1/2 to 2-1/2 in.	12 ft.	3/8 in.
3 to 4 in.	12 ft.	1/2 in.
5 in. and larger	12 ft.	3/4 in.

- E. Inserts: Carbon steel body and square insert nut, galvanized finish, maximum loading 1,300 lbs., for 3/8 in. to 3/4 in. rod sizes. Drill through decking for hanger rods and secure devices with integral support plate strap with sheet metal screws. Devices shall have a safety factor of four.
- F. Beam Attachments:
1. C-Clamp, locknut, electroplated finish, UL listed, FM approved, for pipe sizes 2 in. and smaller.
 2. Center load style with clamp attachments that engage both edges of beam, electroplated finish, UL listed, FM approved, for pipe sizes larger than 2 in., refer to "Supports" for additional requirements.

3. Welded beam attachments may be considered only upon the review and acceptance of the structural engineer of record with written confirmation of weld meet configuration, location and service/pipe size submitted to the Mechanical Engineer for review.

G. Supports:

1. Provide intermediate structural steel members where required for hanger attachment. Secure member to structure. Select size of members based on a minimum factor of safety of four.
2. For Weights Under 1000 lbs.: Insert, "U" shaped channel, beam clamps or other structurally reviewed support. The factor of safety shall be at least four. Follow manufacturer's recommendations.
3. For Weights Above 1000 lbs.: Drill through floor slabs and provide flush plate welded to top of rod or provide additional inserts and hangers to reduce load per hanger below 1000 lbs.
4. Make: Hilti, ITW Ramset, Phillips "Red Head", or approved equal.

H. Trapeze Hangers:

1. For use on 1-1/2 in. and smaller piping only.
2. Hangers shall be supported with rod sized with a safety factor of four.
3. May be manufactured type "U" shaped channel, or suitable angle iron or channel. Round off all sharp edges.
4. Securely fasten piping to trapeze with "U" bolt or straps, dissimilar metals shall not touch, use isolation gaskets.
5. Make: B-Line, Kindorf, Unistrut, or approved equal.

2.7 PIPING ACCESSORIES

- A. Escutcheon Plates: Provide escutcheon plates on uninsulated piping in exposed and finished areas. Steel or cast brass polished chrome, split hinge type with setscrew, high plates where required for extended sleeves.
- B. Pipe Roll Stand: Cast iron roll stand. Make: Advanced Thermal Systems, Carpenter and Patterson, ITT Grinnell, Pipe Shields.

2.8 SLEEVES

A. Standard Type:

1. Schedule 40 black steel pipe sleeves shall be used for sleeves in horizontal and vertical applications through structural surfaces. Sleeves shall extend a minimum of 1 in. beyond both sides of the structure surface being penetrated.

The sleeve shall be sized to account for the total diameter of the service, inclusive of insulation and the appropriate annular space for firestopping installation or requirements of the sealing element manufacturer.

2. Full circle water stop collar for sleeves located in below grade walls, wet wells and waterproofed surfaces. The collar shall be fabricated from steel plate and welded to the sleeve around its entire circumference.
3. Schedule 40, PVC sleeves or sheet metal sleeves for nonstructural surfaces and existing construction. Sheet metal sleeves shall be 18 gauge minimum and braced to prevent collapsing. Sleeves shall extend a minimum of 1/2 in. beyond both sides of the non-structural vertical surface being penetrated. The sleeve shall be sized to account for the total diameter of the service, inclusive of insulation and the appropriate annular space for firestopping.

B. Pre-Insulated Type:

1. Adjustable or fixed length metal cans, 24 gauge minimum sized for 1 in. spacing between insulation and can. Insulation shall consist of a 360° waterproofed calcium silicate insert sized to extend 1 in. beyond wall or floor penetration. Calcium silicate insert shall be the same thickness as adjoining pipe insulation. Spacing between shield and can packed at each end with double neoprene rope positively fastened.

2.9 FIRESTOP SYSTEM FOR OPENINGS THROUGH FIRE RATED WALL FLOOR ASSEMBLIES

- A. Materials for firestopping seals shall be listed by an approved independent testing laboratory for "Penetration Firestop Systems". The system shall meet the standard fire test for Penetration Firestop Systems designated ASTM E814. Firestop system shall be provided at locations where piping passes through fire rated wall, floor/ceiling, or ceiling/roof assembly. Minimum required fire resistant ratings of the assembly shall be maintained by the Firestop System. Installation shall conform with the manufacturer's recommendations and other requirements necessary to meet the testing laboratory's listing for the specific installation.

2.10 PIPING MATERIALS AND SCHEDULE

- A. See Exhibit "A", "Schedule of Piping Materials" at end of this Section for (HVAC) piping.

PART 3 - EXECUTION

3.1 EQUIPMENT AND SYSTEMS

- A. Provide equipment and systems in accordance with laws, codes, and provisions of each applicable section of these specifications. Accurately establish grade and elevation of piping before setting sleeves. Install piping without springing or forcing (except where specifically called for), making proper allowance for expansion and anchoring. Arrange piping at equipment with necessary offsets, union, flanges, and valves, to allow for easy part removal and maintenance.

Offset piping and change elevation as required to coordinate with other work. Avoid contact with other mechanical or electrical systems. Provide adequate means of draining and venting units, risers, circuits and systems. Install drains consisting of a tee fitting with a 3/4 in. ball valve with hose end cap and chain, at low points in hydronic piping system mains, and elsewhere as required for system drainage.

- B. Conceal piping unless otherwise called for. Copper tubing shall be cut with a wheeled tubing cutter or other approved copper tubing cutter tool. The tubing must be cut square to permit proper joining with the fittings. Ream pipes after cutting and clean before installing. Cap or plug equipment and pipe openings during construction. Install piping parallel with lines of building, properly spaced to provide clearance for insulation. Make changes in direction and branch connections with fittings unless submitted and accepted per Part 2. Do not install valves, union and flanges in inaccessible locations. Provide trap seal of adequate depth on drain pans.
- C. Provide reducers at all control valves, where control valve is smaller than pipeline size. Reducers for steam control valves shall be eccentric type. Provide unions at each side of every control valve and reducers directly adjacent to the unions.
- D. Provide reducers at all balance valves, where balance valve is smaller than pipeline size.

3.2 PIPING OVER ELECTRICAL EQUIPMENT

- A. Contractor shall route piping to avoid installation directly over electric equipment, including, but not limited to panels, transformers, disconnects, starters, motor control center, adjustable speed drives and fused switches.
- B. Piping shall not be installed in the dedicated electric and working space as defined by NEC 110. Dedicated electrical space is generally equal to the depth and width of electrical equipment, and extends 6 ft. above the electrical equipment, or to a structural ceiling. Dedicated working space is a minimum of 30 in. wide or the width of equipment (whichever is larger) a minimum of 6 ft.-6 in. tall, with a depth of 3 ft. to 9 ft. depending on the voltage.

3.3 WATER GLYCOL SYSTEMS

- A. Top connection for upfeed, bottom or side connection for downfeed. Grade off level; up in direction of flow and down toward drain.

3.4 HANGERS, INSERTS AND SUPPORTS

- A. Piping shall not be supported by wires, band iron, chains, or from other piping. Support each pipe with individual hangers from concrete inserts, welded supports, or beam clamps of proper configuration and point loading design requirements for each location including the designated safety factor. Trapeze hangers are acceptable for racking of multiple pipes of 1-1/2 in. or less in size. Follow manufacturer's safe loading recommendations. Suspend with rods of sufficient length for swing and of size as called for, using four nuts per rod. Provide additional rustproofed structural steel members, where required for proper support. Provide oversized hangers where insulation/supports must pass between pipe and hanger. Only concentric type hangers are permissible on piping larger than 2-1/2 in., "C" types are permitted for piping 2-1/2 in. and smaller.

Provide riser clamps for each riser at each floor.

- B. Provide a pipe hanger within 12 in. of pipe unions and piping connections to equipment, in order to facilitate disconnections of piping without pipe sagging.

3.5 HANGERS ATTACHED TO JOISTS

- A. Individual hangers may be suspended directly from the bottom chord panel point provided that the sum of the concentrated loads within the chord panel does not exceed 100 pounds and the attachments are concentric to the chord. (Eccentrically loaded joists using beam clamps or other attachment methods are not acceptable.)
- B. For nominal concentrated loads between panel chords, which have been accounted for in the specified uniform design load for the joists, this Contractor is to provide struts to transfer the load to a panel point on the opposite chord as reviewed and acceptable by the Structural Engineer of Record.

3.6 PIPE CONNECTIONS

- A. Solder Connections: Nonacid flux and clean off excess flux and solder.
- B. Press Connections: Copper press fittings shall be made in accordance with the manufacturer's installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool approved by the manufacturer.
- C. Brazed Connections: Make joints with silver brazing alloy in accordance with manufacturer's instructions. Remove working parts of valves before applying heat.
- D. Threaded Connections: Clean out tapering threads, made up with pipe dope; screwed until tight connection. Pipe dope must be specific for each application.
- E. Flanged Joints: Select appropriate gasket material, size, type and thickness for service applications. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- F. Dielectric Protection: Provide dielectric protection devices at ALL piping connections and ALL equipment connections, where dissimilar metals meet. Follow all applicable manufacturer's recommendations at equipment connections. Dielectric protection systems are not required for air or gas systems.

3.7 WELDING

- A. Welding shall be performed in compliance with the welding procedure specifications prepared by the National Certified Pipe Welding Bureau. Welded pipe fabricated by certified welder. Contractor shall submit proof of current certification of each welder. Use full-length pipe where possible; minimum distance between welds, 18 in. on straight runs. Welds must be at least full thickness of pipe inside smooth and remove cutting beads, slag and excess material at joints; chamfer ends.

Minimum gap 1/8 in., maximum 1/4 in., for butt welds. One internal pass and one external pass minimum required on slip-on flanges. Do not apply heat to rectify distorted pipe due to concentrated welding; replace distorted pipe. Welding is prohibited in existing building, except in following areas: Boiler Rooms, Mechanical Rooms, Crawl Spaces, or where approved by Owner. When welding galvanized pipe, apply cold galvanizing on joint after welding.

3.8 HANGER SHIELDS

- A. Provide at hangers for all piping. Pre-insulated type or field-insulated type at Contractor's option.

3.9 SLEEVES

- A. Provide for pipes passing through floors, walls or ceilings.
- B. Standard Type: Provide for all piping.
- C. Extend 1/8 in. above finished areas. In above grade mechanical and other areas with floor drains; use steel pipe sleeves 2 in. above floor. Use pipe sleeves in bearing walls, structural slabs, beams and other structural surfaces, and where called for. Sleeves shall be as small as practical, consistent with insulation, so as to preserve fire rating. Fill abandoned sleeves with concrete. Provide rubber grommet seals for pipes passing through ducts or air chambers or built-up housings.

3.10 SLEEVE PACKING

- A. Seal void space at sleeves as follows:
 - 1. Interior Locations: Firmly pack with fiberglass and caulk.
 - 2. Exterior Walls and Below Grade Cored Holes: Use sealing element.
 - 3. Fire Rated, Partitions and Floor Slabs: Use fire rated sealing elements, materials and methods. Provide per manufacturer's instructions to maintain firestop.
 - 4. Waterproofed Walls and Floors: Use waterproof sealing element, device, or compound.

3.11 ESCUTCHEON PLATES

- A. Provide polished chrome escutcheon plates for uninsulated exposed piping passing through floors, walls or ceilings in finished areas.

3.12 CLEANING HOT WATER GLYCOL SYSTEMS

- A. Provide the services of an experienced Water Treatment Subcontractor.
- B. After each closed system has been tested and thoroughly flushed, the entire piping system shall be cleaned by, or as per, the Water Treatment Subcontractor.

- C. Operate pumps and arrange control system so that all control valves are open. Fill, vent and circulate system with this solution, while rising to design temperature.
- D. Remove, clean and/or replace air vents, strainers, and check valves, which do not function properly. After cleaning strainers, circulate for additional time, then clean strainers again; repeat until strainers are found clean. Drain and refill system.
- E. Provide a batch chemical feed tank, valving and accessories as shown in the Contract Documents. Add water treatment as necessary to prevent deterioration of piping systems and equipment due to oxygen, acid, scaling, etc. Submit typewritten letter to inform Owner's Representative upon completion of the work.
- F. Pumps shall not be operated continuously until system is flushed, strainers cleaned and water treatment is complete.
- G. Water Treatment:
 - 1. After system cleaning, furnish report of water test to determine quality.
 - 2. Provide complete water treatment facilities to Owner, including water analysis, feed equipment, metering equipment, pumps, and chemical, obtained from Calgon, Vulcan, Bird Archer, Heating Economy Service, Inc., Mogul, Garratt-Callahan Company, Metropolitan, or Allen-Murray.
 - 3. Recommendations for water treatment reviewed by Owner's Representative before systems are placed into service.
 - 4. Add water treatment as necessary to prevent deterioration of piping system and equipment due to oxygen, acid, scaling, etc.
 - 5. Water treatments shall be deemed complete when circulation has been established throughout, and water runs clear and clean from deposits and discoloration. Submit typewritten letter to inform Owner's Representative upon completion of the Work.

3.13 TESTS

- A. Test piping and accessories before insulation, connection to existing piping or concealment. Repeat as many times as necessary to prove tight system. Notify Owner's Representative at least seven days in advance of each test. Isolate valves and equipment not capable of withstanding test pressures. Make leaks tight; no caulking permitted. Remove and replace defective fittings, pipe or connections. Furnish necessary pumps, gauges, equipment, piping, valving, power and labor for testing. Certify that tests have been successfully completed.
- B. Test: No change in pressure under stable temperature conditions.

C. Schedule of Test Requirements:

1. Hydronic Water: Hydrostatic, 100 psig at high point of system; two (2) hours duration.
 - a. If utilizing a pressed mechanical connection system, test at 15 to 85 psig (or at manufacturer's recommended pressure) prior to testing at a higher pressure.
2. Equipment: Test at working pressures.

3.14 PROTECTION AGAINST PHYSICAL DAMAGE

- A. In concealed locations where piping, other than cast-iron or steel, is installed through holes or notches in studs, joists, rafters or similar members less than 1-1/2 in. from the nearest edge of the member, the pipe shall be protected by shield plates. Protective steel shield plates having a minimum thickness of 0.0575 in. (No. 16 gage) shall cover the area of the pipe where the member is notched or bored, and shall extend no less than 2 in. above sole plates and below top plates.

3.15 PIPE LINE SIZING

- A. Pipe sizes called for are to be maintained. Pipe sizing changes made only as reviewed by Owner's Representative. Where discrepancy in size occurs, the larger size shall be provided.

EXHIBIT "A" - PIPING MATERIALS (HVAC)

(Notes are at end of Exhibit "A")

<u>SERVICE</u>	<u>PIPE MATERIALS</u>	<u>FITTINGS</u>	<u>CONNECTIONS</u>
Hot water heating	Schedule 40, black steel	Malleable iron and butt weld	Screwed 2 in. and smaller; Welded 2-1/2 in. and larger; (SEE NOTE 1)
Hot water heating (optional)	Type L copper	Wrought copper or cast bronze, solder end	No-lead solder for 2 in. and smaller; 95/5 for 2-1/2 in. and larger
Hot water heating (optional)	Type L copper	Wrought copper or cast bronze	Viega Pro-Press, Nibco Press, Elkhart Apolloxpress

NOTES FOR EXHIBIT "A":**NOTE 1:** Screwed piping permitted in Crawl Spaces, Mechanical Rooms and Boiler Rooms.

END OF SECTION 232010

SECTION 232110 - WATER SYSTEMS SPECIALTIES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

1.2 SUBMITTALS

- A. Submit product data on water system specialties.

1.3 GENERAL REQUIREMENTS

- A. Equipment and accessories shall be rated for a minimum of 125 psi wwp, and 250°F temperatures, unless otherwise stated.
- B. All equipment shall be installed in accordance with manufacturer's written installation instructions and schematics.

PART 2 - PRODUCTS

2.1 FLOW BALANCERS

- A. Balancing and flow meter stations suitable for use on heating and cooling systems. Constructed for 125 psi and 250°F.
 - B. 6 in. and Smaller: Calibrated balance valve with provisions for connecting a portable differential pressure meter. Flow balancer is to be suitable as a service valve. Meter connections to have built-in check valves. An integral pointer shall register degree of valve openings. Valve shall have internal seals.
1. Balance valve sizes shall be based upon gpm range rather than pipe size.

Balance Valve Size	GPM Range
1/2 in.	Up to 2.5
3/4 in.	2.5 - 4.5
1 in.	4.5 - 10
1-1/4 in.	10 - 15
1-1/2 in.	15 - 30
2 in.	30 - 60
2-1/2 in.	60 - 100
3 in.	100 - 180
4 in.	180 - 300
5 in.	300 - 450
6 in.	450 - 600

2. Design Equipment: Bell & Gossett "Circuit Setter".

3. Manufacturers: Bell & Gossett, Armstrong, Patterson, Taco, Tour & Anderson, Oventrop Hydrocontrol, Watts.
- C. 5 in. and Larger: Nickel-plated flow meter with provisions for connecting a portable differential pressure meter. Shall be individually calibrated. Provide with a butterfly valve with memory stop at each location.
1. Flow meter size shall be based upon manufacturer's recommended gpm range rather than pipe size.

Flow Meter Size	GPM Range
5 in.	300 - 500
6 in.	500 - 850
8 in.	850 - 1500
10 in.	1500 - 2500
12 in.	2500 - 3500

2. Design Equipment: Bell & Gossett "Circuit Sensor".
3. Manufacturers: Bell & Gossett, Patterson, Taco, Oventrop Hydrocontrol, Watts.

2.2 STRAINERS

- A. Cast semi-steel body or cast iron construction for steel piping and bronze body construction for copper piping; equipped with removable, monel or stainless steel water screen; maximum pressure drop 2 psi with free area at least four times area of pipe. Provided with blow-off outlet.
- B. Sizes 5 in. and Smaller, Y-Pattern Strainer: 125 psig working pressure; flanged ends for NPS 2-1/2 in. and larger, threaded connections for NPS 2 in. and smaller, bolted cover, perforated stainless steel basket and bottom drain connection.
- C. Sizes 6 in. and Larger, Basket Strainer: 125 psig working pressure; flanged end connections, bolted cover, perforated stainless steel basket and bottom drain connection.
- D. Design Equipment: Mueller.
- E. Manufacturers: Elliott, Keckley, Mueller, Webster, Watts, Spirax-Sarco.

2.3 AIR VENTS

- A. Manual air vents shall be a 3/4 in. ball valve with bronze body, nickel plated bronze ball, hose end, cap and chain, Watts B6000CC.
- B. Automatic air vents shall be float type, 35 psig rated, Armstrong No. 502CV OR float type, 150 psig rated, Armstrong No. 75 or Spirotop. Provide unit with an appropriate rating, as necessary for location.
- C. High Capacity Automatic Air Vent:
 1. Cast iron body. 150 psig rated. Stainless steel float.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Obtain detailed instructions from each manufacturer for proper method of installation.

3.2 COMPRESSION TANKS

- A. Pitch connection to heating system 1 in to 5 ft. minimum up toward tank. Provide shutoff valve in piping connection to system and 3/4 in. hose end drain valve on tank. Provide supporting steelwork, hangers, and suspension racks. Provide water make-up connection, petcocks and tank fitting.

3.3 SYSTEM FILLING

- A. After cleaning, fill each system from low point.
- B. With pumps off, vent mains, risers, run-outs, and units, working consecutively from low to high point of building. Obtain approximately 2 psi at highest point. Obtain proper air cushion in compression/expansion tanks.

3.4 AIR VENTING

- A. Provide where specifically called for in piping details and at all points in piping systems where air may collect due to changes in piping elevation.
 - 1. Manual air vent assembly consisting of 1-1/4 in. x 4 in. air collection chamber with 3/4 in. hose end ball valve with cap and chain.
 - 2. Automatic air vent with a ball valve for the purpose of isolation and service or replacement.
 - 3. Unless otherwise indicated, automatic air vents shall only be installed in Mechanical Rooms. Pipe high capacity air vent discharge down to floor.
- B. Equipment Vents:
 - 1. When equipment is above mains: Connect run-outs or risers to upper quadrant or top of mains. Install vent assembly concealed within enclosure, consisting of 1 in. diameter by 4 in. to 6 in. long air collection chamber with 1/4 in. soft copper tube to manual valve. Mount securely near bottom of enclosure, but not fastened to enclosure. For individual units, radiators, fan convectors and units with return grilled: Provide screwdriver operated manual valve, operated from discharge grille or access door. Drill enclosure and position valve for operating without removing enclosure.
 - 2. When equipment is below mains: Connect piping run-outs or risers to bottom or lower quadrant of mains. Vent assembly not required in unit. Provide means of purging and draining each unit if required. Use tees instead of ells at low point of run-outs.

3.5 STRAINERS

- A. Install strainers on supply side of each control valve (as called for in the applicable detail), pressure reducing valve, solenoid valve, in-line pump, and elsewhere as indicated. Install NPS 3/4 in. nipple and ball valve in blowdown connection of strainers NPS 2 in. and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2 in.

3.6 FLOW BALANCERS

- A. Where flow balancers are smaller than pipe line size, provide reducers directly adjacent to flow balancers.
- B. Provide on zone or riser returns, on each hydronic unit and where called for. Meter connection points shall not point downward.
- C. On terminal heating and cooling unit details where a shut-off valve is shown in conjunction with the flow balancer (3 in. and smaller), if the Armstrong "CBV" or Tour & Anderson "ST" is used, the shut-off valve may be deleted.

END OF SECTION 232110

SECTION 232123 - PUMPS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide labor, materials, equipment and services as required, for the complete installation designed in Contract Documents.

1.2 SUBMITTALS

- A. Shop drawings and performance curves, on pumps and pump accessories clearly indicate which equipment is being submitted.
- B. Provide catalog information on motors as specified in Section 230513.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Pumps shall be non-overloading over their entire performance range with motors capable of running continuously without undue noise, heating, or sparking. Impellers shall be statically and dynamically balanced. Provide mechanical seals for closed systems, constructed of carbon rings with ceramic mating seat up to 220°F. Provide packing type seals for open systems only. Provide materials suitable for water pressures, temperature and conditions for each application. Provide tapped discharges and suction connections for gauges, vent and drain. Provide factory trimmed impeller if required, to meet initial delivery requirements.
- B. Provide the services of a factory service engineer or machinist to check each pump alignment before pump is started, using laser equipment.

2.2 SELECTION CRITERIA

- A. Pumps shall be non-overloading over their entire performance ranges, with trimmed impeller as required to meet initial delivery requirements. Pump selection shall not take into account, or infringe on the service factor of the motor.
- B. Select pumps at a point within the maximum efficiency for a given impeller casing construction. Deviations within 3 percent of maximum efficiency are permissible, provided that the lesser efficiency is not less than the scheduled efficiency.
- C. Pumps may not be selected such that the impeller diameter is larger than 90 percent of the published maximum diameter for the casing using smaller equipment than the scheduled equipment.

2.3 CIRCULATOR PUMPS

- A. The pump shall be a maintenance-free, in-line, single stage, wet rotor type with the motor mounted directly to the pump volute. The pump valve shall be constructed of cast iron and rated at 150 psi working pressure.

The impeller, impeller inlet cone, rotor can, and rotor cladding shall be constructed of a stainless steel. The impeller shall be secured directly to the motor shaft by means of a stainless steel split cone. The motor shaft shall be constructed of aluminum oxide ceramic and shall be supported by two radial bearings mounted in a stainless steel bearing plate and rotor can. The pump shall not have a coupling or mechanical seal.

- B. Design Equipment: Bell & Gossett.
- C. Make: Taco, Armstrong, Bell & Gossett, Grundfos, Wilo.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install pumps to provide access for periodic maintenance including removing motors, impellers, couplings and accessories.
- B. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.
- C. In-line pumps shall be installed using continuous-thread, hanger rods and elastomeric hangers of size required to support weight of in-line pumps.

3.2 ALIGNMENT

- A. Engage a factory-authorized service representative to perform alignment services for all pumps that use a coupler attached to the device train, whether base mounted or inline mounted. Alignment shall be accomplished with a laser shaft alignment system.
- B. Comply with requirements in Hydronics Institute standards for alignment of pump and motor shaft. Add shims to the motor feet and bolt motor to base frame. Do not use grout between motor feet and base frame.
- C. Comply with pump and coupling manufacturers' written instructions.
- D. After alignment is correct, tighten foundation bolts evenly but not too firmly. Completely fill baseplate with nonshrink, nonmetallic grout while metal blocks and shims or wedges are in place. After grout has cured, fully tighten foundation bolts.
- E. Provide an alignment report indicating alignment setup data, tolerances and final results.

3.3 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Check piping connections for tightness.
 - 3. Clean strainers on suction piping.

4. Perform the following startup checks for each pump before starting:
 - a. Verify bearing lubrication.
 - b. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
 - c. Verify that pump is rotating in the correct direction.
5. Prime pump by opening suction valves and closing drains, and prepare pump for operation.
6. Start motor.
7. Open discharge valve slowly.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain hydronic pumps.

END OF SECTION 232123

SECTION 233100 - SHEET METAL AND DUCTWORK ACCESSORIES CONSTRUCTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services required for the complete installation designed in Contract Documents.

1.2 QUALITY ASSURANCE

- A. Ductwork shall be fabricated and installed in compliance with latest edition of the following standards and with the edition of the Codes in effect at the time the building permit is obtained.
 - 1. SMACNA Duct Construction Standards - Metal and Flexible Ductwork.
 - 2. SMACNA Duct Liner Application Standard.
 - 3. SMACNA HVAC Air Duct Leakage Test Manual.
 - 4. Mechanical Code of New York State.
 - 5. Energy Conservation Construction Code of New York State.
 - 6. Plans and Specifications which exceed the requirements in any of the referenced standards.
- B. All sheet metal shall be fabricated and installed by an experienced Contractor specializing in this type of work.
- C. All ductwork and fittings shall have a computer-generated label affixed to the exterior surface of each section, detailing all applicable information including the duct dimensions, gauge, reinforcement type/class and connection type by systems manufacturer. Galvanizing thickness shall be clearly stenciled on each duct section.
- D. All ductwork on the project shall meet the SMACNA Duct Cleanliness for New Construction Guidelines, "Advanced Level" of duct cleanliness for production, delivery, storage and installation of ductwork.

1.3 SUBMITTALS

- A. Submit a complete shop standard manual including miscellaneous materials, and construction details for all shop fabricated materials including, but not limited to, volume dampers, turning vanes, duct sealant, equipment flexible connections, access doors, flexible duct, acoustical duct lining, etc.

B. Ductwork Shop Drawings

1. Prepare minimum 1/4 in. scale drawings:
 - a. Detailed ductwork shop drawings shall include size, layouts and pressure classifications. Any ductwork installed without benefit of review by the Engineer of Record may be subject to replacement at the expense of the Contractor.
 - b. Constructed from actual field inspections and measurements so as to assure a complete job.
 - c. Incorporate dimensions of actual equipment proposed for use on the project.
 - d. Showing adequate sections, elevations, and plan views and indicating the bottom of ductwork elevations from the finished floor.
 - e. Indicating all volume dampers, fire dampers, smoke dampers, damper access doors and other accessories required for a completed project.
 - f. Indicate roof, wall and floor opening dimensions and locations shown on shop drawings.
 - g. Indicate the location of the duct smoke detectors, increase duct size, ensure the minimum straight ductwork upstream or/and downstream at smoke detectors, where required for proper installation, per smoke detector manufacturer's recommendations. Coordinate minimum duct size required with Division 26 "Electrical".
2. Call to the attention of the Engineer immediately, any major deviations from the Contract Drawings, which must be made. All deviations shall be documented in writing. Resubmit with corrections for final Engineer review.
3. Submit prints to each Contractor of the other trades for review for interferences and coordination with their work.

1.4 GENERAL

- A. All adhesives, sealants, primers and paint used for ductwork in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.

1.5 DUCTWORK CLASSIFICATION

- A. Duct systems are to be classified and constructed per the SMACNA Velocity-Pressure classification system as follows:
 1. All ductwork shall be constructed for a minimum pressure class of 2 in. w.g., unless stated otherwise, for the following systems, as applicable:
 - a. Supply duct downstream of terminal units.

- b. Typical low pressure supply ductwork.
 - c. Typical return ductwork.
 - d. Typical low pressure exhaust ductwork.
2. Supply duct upstream of terminal units shall be constructed for a minimum pressure class of 3 in. w.g., unless otherwise stated, or required as per below.
 3. Pressure classes above 3 in. w.g. shall be provided as follows, based upon the external static pressure as scheduled for each specific fan.

<u>Scheduled External Static Pressure</u>	<u>Pressure Class</u>
Over 3 in. up to 4 in. w.g.	4 in. w.g.
Over 4 in. up to 6 in. w.g.	6 in. w.g.
Over 6 in. up to 10 in. w.g.	10 in. w.g.

- B. Any new ductwork connected to existing systems must adhere to the requirements outlined above. Contractors are responsible for verifying the maximum static pressure of the existing systems to determine the appropriate pressure class for the new ductwork. Inform Owner's Representative and Engineer of any unknown conditions or discrepancies.

PART 2 - PRODUCTS

2.1 DUCTWORK MATERIALS

- A. See Exhibit at the end of this section for where sheetmetal materials shall be applied, and remarks.
 1. Galvanized Sheet Steel: Comply with ASTM A653 and A924, with G90/Z275 coating.
 2. Stainless Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in Exhibit "I"; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D or No. 3 as indicated in Exhibit "I".
 3. Aluminum Sheets: Comply with ASTM B 209 (ASTM B 209M) Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.
 4. Gauges per SMACNA HVAC Duct Construction Standards, Metal and Flexible.
- B. Make: Semco, United Sheet Metal, unless noted otherwise, or approved equal.

2.2 SQUARE AND RECTANGULAR DUCTWORK

- A. Transverse and longitudinal duct seams reinforcement shall conform to appropriate tables and figures per SMACNA Velocity-Pressure Classification for duct construction.
 - 1. Transverse joints shall be sealed with duct joint sealant. "Ductmate" or "Nexus" 4-bolt connection systems may be used in lieu of standard construction.
 - 2. Field assembled longitudinal seams shall be sealed with duct sealant. Factory or shop fabricated rolled or machine pressed longitudinal seams does not require sealant.
- B. Corner closures shall be required as described and illustrated by SMACNA Duct Construction Standards.
- C. Throat radius on all elbows shall not be less than the dimension of the duct plane of radius. Where this cannot be maintained, use shorter radius with internal guide vanes, or square elbow with turning vanes.
- D. Bracing and hanging of ductwork shall be per SMACNA Standards for size and system class of ductwork being used.
- E. Any transformations shall not reduce the ductwork cross-sectional area. Maximum angle in straight duct, 20° for diverging flow and 30° for contraction flow. Transformation from square to round or flat to oval seams welded or brazed.

2.3 ROUND DUCTWORK

- A. Standard Round Ductwork:
 - 1. All spiral ducts shall have locked seams so made as to eliminate leakage under pressure for which this system has been designed. Longitudinal seams duct shall have fusion-welded butt seams.
 - 2. No stovepipe will be allowed.
 - 3. Round Ductwork Fittings:
 - a. All fittings fabricated per SMACNA Standards, material to match straight pieces of ductwork.
 - b. Fittings shall have continuous, welded seams.
 - c. 90° tees shall be conical type. 90° tees and 45° laterals up to and including 12 in. diameter tap size shall have a radiused entrance into the tap, produced by machine or press forming. The entrance shall be free of any restrictions.
 - d. Round taps off the bottom of rectangular ducts down to diffusers shall be made with a 45° square to round shoe-tap.

4. Elbows:

- a. Diameters 3 in. through 8 in.: Two-section stamped and continuously welded elbows, material to match straight pieces of ductwork.
- b. Over 8 in.: Gored construction with standing seam construction and internally sealed or continuously welded. Less than 35° - two gores, 36° to 70° - three gores, over 71° - five gores.
- c. Fabricated to a centerline radius of 1.5 times the cross-section diameter.
- d. Adjustable elbows maybe used for round up to 12 in. diameter in Velocity-Pressure Classes 2 in. w.g. and below. Seal adjustable joints airtight after installation.

5. Joints:

- a. For duct construction pressure 3 in. w.g. or greater:
 - 1) Round Joints:
 - a) Unexposed Duct 3 in. - 30 in. Diameter: Connect round duct with a one piece interior slip coupling, at least two gauges heavier than duct wall, beaded at center and fastener to duct with screws. Seal joint with an approved sealant applied continuously around both end of coupler prior to assembling and after fastening.
 - b) All Exposed Duct and Unexposed Duct 30 in. - 72 in. Diameter: Install using a three piece, gasket flanged-joint consisting of two internal flanges, with integral mastic sealant, and one external closure band, which compress the gasket between the internal flanges.
 - (1) Acceptable Manufacturer: Ductmate Industries "Spiralmate" system or approved equal.
 - c) Above 72 in. Diameter: Install using companion angle flanged joints as defined in Figure 3-1 of the 2005 SMACNA Manual, "HVAC Duct Construction Standards, Metal and Flexible" Third Edition. Refer to manual for proper sizing and construction details.
 - b. Pipe-to-pipe joints in diameters up to 60 in. shall be by the use of sleeve couplings, reinforced by rolled beads.
 - c. Pipe-to-fitting joints in diameters up to 60 in. shall be by slip-fit of projecting collar of the fitting into the pipe.
 - d. Insertion length of sleeve coupling and fitting collar shall be 2 in. up to 36 in. diameter and 4 in. above 36 in. diameter.

- e. Pipe-to-pipe and pipe-to-fitting connections in ductwork above 60 in. in diameter shall be made by angle ring flanges. The flange on the pipe shall be a 2 in. x 2 in. x 3/16 in. angle attached to the pipe with a continuous weld. The fittings shall have a loose ring "Van Stone" flange. A 5/8 in. flange shall be provided to act as a gasketing surface for sealing with the angle ring being a rolled, welded ring 2 in. x 2 in. x 3/16 in. Bolt hole spacing for angle rings shall be 6 in. centers.
- f. If longitudinal seam duct greater than 60 in. in diameter is supplied in lengths greater than 4 ft., one angle ring must be welded to the duct on 4 ft. centers for support.

2.4 DUCTWORK SEALING

- A. SMACNA Duct Sealing Classification shall be used for duct systems using the following criteria:
 - 1. Ductwork and all plenums with pressure class ratings shall be constructed to Seal Class A, as required to meet the requirements of SMACNA Duct Construction Standards and with standard industry practice, including transverse joints, longitudinal seams, fitting connections, and all penetrations of the duct wall.
 - 2. Openings for rotating shafts shall be sealed with bushings or other devices that seal off air leakage. Pressure sensitive tape shall not be used.
 - 3. All connections shall be sealed, including but not limited to spin-ins, taps, other branch connections, access doors, access panels and duct connections to equipment.
 - 4. Sealing that would void product listings is not required.
 - 5. Spiral lock seams need not be sealed.
- B. Sealants and tapes shall be listed and labeled in accordance with UL 181A or UL181B and marked according to type, and per manufacturer product requirements for associated system and application/installation location.
 - 1. Duct sealant for indoor applications shall be non-fibrated, water based, Hardcast Iron-Grip IG-601, Ductmate PRO Seal, Foster 32-17 or Childers CP146, or approved equal.
 - 2. Duct sealant for outdoor applications shall be fibrated, water based, Hardcast Versa-Grip VG-102, Ductmate Fiberseal, Foster 32-17 or Childers CP148, or approved equal.

2.5 TURNING VANES

- A. Provide in mitered elbows as shown on contract drawings. Vanes 36 in. or longer shall be double wall air foil type. All turning vanes shall be installed as per the latest SMACNA Standards. Turning vane size and spacing shall be as per SMACNA. Turning vane spacing greater than SMACNA Standards is not acceptable.

- B. Turning vanes shall be Harper or equivalent double wall turning vanes fabricated from the same material as the duct.
- C. Turning vane front and back panels shall be securely locked together with adequate crimping to prevent twisting of vane. Vane shall be capable of withstanding 250 pounds of tensile load when secured according to the manufacturer's instructions.
- D. Rails for mounting turning vanes shall have self locking, friction fit tabs designed to facilitate proper alignment of vanes. Tab spacing shall be as specified in Figure 4-3 of the 2005 SMACNA Manual, "HVAC Duct Construction Standards, Metal and Flexible". Rail systems with non-compliant tab spacing shall not be accepted.
- E. Acoustical Turning Vane: Shall be used in applications that require quiet operating systems. Mounting rails shall have friction insert tabs that align the vanes automatically.
- F. Acceptable Manufacturer: Ductmate Industries PRO-Rail Turning Vane or approved equal.

2.6 DAMPERS IN DUCTWORK

- A. Blade Type Volume Dampers: Constructed per SMACNA, one gauge heavier than duct material, securely fastened to 3/8 in. sq., cold rolled steel operator rod. Provide Ventlock 639 elevated dial regulator for 2 in. insulated ductwork.
- B. Multiple Blade Type Volume Dampers: Provide multiple blade volume dampers in ductwork above 12 in. in height.
 - 1. Heavy duty, manual balancing dampers suitable for application in HVAC systems with velocities to 1,500 ft. per minute, open position and max. pressure of 3 in. w.g. close position. Ruskin MD 35 or equivalent.
 - 2. Fabrication:
 - a. Frame: 5 in. x minimum 16 gauge roll formed, galvanized steel hat-shaped channel, reinforced at corners. Structurally equivalent to 13 gauge U-channel.
 - 3. Blades:
 - a. Style: Single skin with 3 longitudinal grooves.
 - b. Action: Opposed.
 - c. Orientation: Horizontal.
 - d. Material: Minimum 16 gauge equivalent thickness, galvanized steel.
 - e. Width: Nominal 6 in.
 - 4. Bearings: Molded synthetic sleeve, turning in extruded hole in frame.
 - 5. Linkage: Concealed in frame.

6. Axles: Minimum 1/2 in. diameter, plated steel, hex-shaped, mechanically attached to blade.
7. Control Shaft: 3/8 in. square plated steel.
8. Finish: Mill galvanized.
 - a. Actuator: Hand quadrant for 3/8 in. square extended shaft.
 - b. Hand Quadrant Standoff Bracket: 2 in. standoff for insulated ductwork.
 - c. Oillite bearings.
 - d. Factory Sleeve: Minimum 20 gauge thickness, minimum 12 in. length.
- C. Automatic Air Dampers: Furnished as part of "Building Management System" Section 230923 and installed by this Contractor.

2.7 FLEXIBLE AIR DUCTS

- A. Flexible air ducts and connectors shall be constructed in compliance with NFPA Bulletin 90A, 90B and UL Standard 181 and shall be listed and labeled as Class I Air Duct.
- B. Flexible air ducts and connectors shall be tri-laminate:
 1. Consisting of corrosion resistant galvanized steel helix encapsulated by a double lamination of polyethylene or spun bond nylon.
 2. Factory applied (R 6.0) fiberglass exterior insulation, sheathed in a seamless, tri-directionally reinforced, metalized polyester, exterior vapor barrier.
 3. R-value shall be classified by Underwriters Laboratories, and certified by the Air Diffusion Council, in accordance with ADC Flexible Duct Performance and Installation Standard (1991), using ASTM C-518, at installed wall thickness, on flat insulation only. Comply with ASHRAE/IESNA 90.1.
 4. Recommended operating pressure for flexible ductwork shall be three times maximum system press but not less than 6 in. w.g. positive pressure for 4 in. - 20 in. dia., 5 in. w.g. negative pressure through 16 in. dia., 1 in. negative pressure for 18 in. and 20 in. dia. Maximum velocity of 5500 fpm.
 5. Operating temperature range - 20°F to 250°F, intermittent @1/2 in. pos. w.g. max., -20°F to 140°F, continuous at maximum pressure.
 6. Flame Spread: 25 max. smoke developed rating: 50 max.
 7. Porous inner core flexible duct shall not be used.
- C. Static pressure and thermal performance shall be tested and certified in accordance with Air Diffusion Council (ADC) Test Code FD-72-R1 under conditions of 140°F for 164 hours and 180°F for 4 hours.

- D. Acoustical performance shall be certified in accordance with ASTM E 477 and/or Air Diffusion Council Test Code FD-72-R1.

1. Minimum Acoustic Performance:

- a. The insertion loss (dB) of a 6 foot length of duct when tested in accordance with ASTM E477 at a velocity of 1000 feet per minute shall be at least:

	<u>125</u> <u>Hz</u>	<u>250</u> <u>Hz</u>	<u>500</u> <u>Hz</u>	<u>1000</u> <u>Hz</u>	<u>2000</u> <u>Hz</u>	<u>4000</u> <u>Hz</u>
8 inch dia.	26	27	27	31	32	27
12 inch dia.	22	26	24	31	31	20

- E. Friction loss and leakage for flexible duct only shall be certified in accordance with Air Diffusion Council Test Code FD-72-R1. Leakage for connections shall be accordance with UL 181 requirements.

- F. Basis-of-Design: Flexmaster 6B (R-6.0).

- G. Acceptable Manufacturers:

1. Dundas-Jafine Type SPC R6.0
2. Hart & Cooley Type F216 (R-6.0)
3. Flexible Technologies, Inc. Thermaflex Type M-KE (R-6.0)
4. Atco Rubber Products, Inc. Type 036 (R-6.0)

2.8 FLEXIBLE DUCT ELBOW SUPPORT

- A. Provide flexible duct elbow support for flexible duct connected directly to a diffuser collar.
- B. Elbow support shall be a radius forming brace designed to form flexible duct into a 90° elbow not less than one duct diameter in centerline radius.
- C. Elbow support shall be manufactured from 100% recycled copolymer polypropylene with a universal fit of 4 in. thru 16 in. and be UL listed.
- D. Basis-of-Design: Titus Flexright.

2.9 FLEXIBLE CONNECTIONS TO FANS AND EQUIPMENT

- A. Basis of Deign: Ventfabrics, Inc.
- B. Acceptable Manufacturers: Ductmate Industries, Inc., Duro Dyne Inc., Elgen Manufacturing, Ward Industries, Inc.; a division of Hart & Cooley, Inc.

- C. Materials: Flame-retardant or noncombustible fabrics, water and mildew resistant UL Standard 214.
- D. Coatings and Adhesives: Comply with UL 181, Class 1.
- E. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 in. wide attached to two (2) strips of 2-3/4-in. wide, 0.028-in. thick, galvanized sheet steel or 0.032 in. thick aluminum sheets. Provide metal compatible with connected ducts.
- F. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1. Minimum Weight: 26 oz./sq. yd.
 - 2. Tensile Strength: 480 lbf/in. in the warp and 360 lbf/in. in the filling.
 - 3. Service Temperature: Minus 40 to plus 200°F.

2.10 ACCESS DOORS

- A. General:
 - 1. Provide access doors of adequate size to allow easy access to the equipment that will require maintenance. Provide insulated or acoustically lined doors to prevent condensation where applicable.
 - 2. Manufacturer to provide an installed neoprene gasket around perimeter of access door for airtight seal.
 - 3. Systems 3 in. w.g. or less shall utilize a hinged, cam, or hinged and cam square framed access door.
 - 4. Systems 4 in. w.g. and above shall utilize a sandwich type access door. Construct doors in accordance with Figure 7-3 of the 2005 SMACNA Manual, "HVAC Duct Construction Standards, Metal & Flexible" Third Edition.
 - 5. Approved Manufacturer: Ductmate Industries "Sandwich" style door or approved equal.
 - 6. All access doors shall be continuous piano hinged type, unless noted otherwise.
 - 7. Non-hinged only allowed where clearance to ceiling does not allow a full 90° swing.
 - 8. Double panel insulated type when used in insulated duct.
 - 9. Single panel uninsulated type allowed in un-insulated duct.
 - 10. Pressure rated according to system in which being installed. Door-to-frame and frame-to-duct gasketing.

11. Provide specified Seal Class A or B ductwork sealing around frame, and hand adjust the latch tension for proper seal, on all access doors other than sandwich panel (Ductmate) style.
12. MINIMUM access door size for ducts 12 in. or less in depth is 12 in. x 8 in.
13. MINIMUM access door size for ducts 12 in. to 18 in. in depth is 18 in. x 14 in.
14. MINIMUM access door size for ducts more than 18 in. in depth is 24 in. x 18 in.
15. In ducts which require multiple section fire dampers due to duct size, provide one access door for each fire damper section.
16. Access doors for fire and smoke dampers shall be permanently labeled with 1 in. high lettering reading "SMOKE DAMPER", "FIRE DAMPER" or "FIRE/SMOKE DAMPER".

B. Door Types:

1. Low Pressure Systems (2 in. w.g. pressure class): National Controlled Air ADH-1, Ruskin ADH22, Vent Products 9701, Air Balance FSA-100, Safe Air SAH, Nailor.
2. Medium and High Pressure Systems (3 in. w.g. pressure class and higher):
 - a. Rectangular Duct: Ductmate Industries "Ultimate" Style Door, or equal.
 - b. Round Duct: Ductmate Industries Round Sandwich type, or equal. 8 in. x 4 in. for ducts 14 in. and less in diameter. Ductmate Industries Round Sandwich type 16 in. x 12 in. for ducts more than 14 in. in diameter.
 - c. Furnish and install factory supplied protector molding on cut medal edge for all Ductmate access doors.

2.11 ACOUSTIC-THERMAL DUCT LINING IN DUCTWORK

- A. General: Comply with NFPA Standard 90 and NAIMA Standard AHC-101.
- B. Materials: ASTM C 1071, Type I. Glass mineral wool insulation coated with an anti-microbial EPA registered coating that seals the airstream surface fibers into a smooth, low-friction surface acoustic ductliner shall be of thickness shown in the table. Density at 1.5 PCF. Maximum "K" value to be 0.24 btu/in. /sq. ft. /degrees F. /hr. when tested in accordance to ASTM C177. Acoustic duct liner to be suitable for use up to 6000 feet per minute air velocity and temperatures up to 250°F. The acoustic duct liner shall not accelerate the corrosion of steel, copper or aluminum. The liner shall not absorb greater than 3% by weight when tested per ASTM C1104. Acoustic duct liner shall provide the minimum sound absorption coefficients shown below when tested per ASTM C423 and ASTM E795, Mounting Type A.

OCTAVE BAND FREQUENCIES HZ							
Thickness	125	250	500	1000	2000	4000	NRC
1-1/2 in.	.23	.50	.87	.92	.93	.93	.80
2 in.	.37	.76	1.02	1.00	.98	.92	.95

- C. Thickness: Unless otherwise noted, all supply air ductwork indicated to be acoustically lined, shall have 1-1/2 in. thick liner with a minimum R value of 6. Return or exhaust ductwork, if acoustically lined, shall be of a thickness specifically noted. Note that per the symbol list (L) equals 1-1/2 in. thick. If called for on the plans, (2L) equals 2 in. thick.
- D. Fire Hazard Classification: Flame spread rating of not more than 25 and a smoke developed rating of no higher than 50, when tested in accordance with ASTM E84, UL 723, UL/ULC S102-M88 and NFPA 255.
- E. Liner Adhesive: Comply with NFPA Standard 90A, ASTM C919, and maximum VOC requirements of LEED EQ 4.1 and EQ 4.2.
- F. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct. Provide fasteners that do not damage the liner when applied as recommended by the manufacturer, that do not cause leakage in the duct, and will indefinitely sustain a 50 pound tensile dead load test perpendicular to the duct wall.
1. Fastener Pin Length: As required for thickness of insulation, and without projecting more than 1/8 inch into the airstream.
 2. Adhesive for Attachment of Mechanical Fasteners: Comply with the "Fire Hazard Classification" of duct liner system.
- G. Design Equipment: Knauf Atmosphere.
- H. Acceptable Makes: Knauf Atmosphere, Certainteed ToughGard R.
- I. For duct velocities above 4000 fpm, provide metal "build-outs" of proper height, welded to the ductwork for turning vanes and dampers.

2.12 CABLE SUSPENSION SYSTEM

- A. Ductwork not required to be exterior insulated in exposed installations may be installed using a cable suspension system.
- B. Ductwork shall be installed using load rated, stainless steel cable suspension systems. Cables shall be pre-cut lengths, type 316 stainless steel with fused ends, and pre-made end attachments.
- C. Cable grips shall be of 316 stainless steel and have an internal tamperproof cable release mechanism.
- D. Stress distribution saddles shall be prescribed in addition for the support of rectangular duct on corners as necessary.

- E. Hangers shall have a manufacturer's published safe working load and have a 5 to 1 safety factor.
- F. Hang and support ductwork as defined in the latest edition of SMACNA Manual, "HVAC Duct Construction Standards, Metal & Flexible".
- G. Adjustable steel cable hanging system consisting of spring loaded, serrated clamping mechanism shall be tested and certified in compliance with all applicable SMACNA standards for upper and lower attachment methods.
 - 1. All approved systems must be installed using matching components including steel cable, clamping mechanism and hardware approved by the manufacturer for its corresponding load rating. No Substitution of manufacturer's components is permitted.
 - 2. Approved systems must be installed per the manufacturer's specific instructions and must not exceed the stated working load rating at any point throughout the system.
- H. Supports, bar/angle reinforcements, and other products that are not part of the duct that are manufactured of uncoated mild steel shall either be painted with two (2) coats of primer or shall be manufactured of a galvanized equivalent material.
- I. Approved Manufacturer: Ductmate Industries "Clutcher" Cable Hanging System or Gripple Inc.

2.13 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B. Ventlock 699 or 699-2 based upon insulation thickness.
- C. Install duct test holes where required for duct traverse testing and balancing purposes.

PART 3 - EXECUTION

3.1 REQUIREMENTS

- A. Equipment and systems shall be installed in accordance with local and state codes and regulations having jurisdiction. Bracing and hanging of ductwork shall be per SMACNA - HVAC Duct Construction Standard.
- B. Install all ductwork concealed and tight to the structure above unless noted otherwise on shop drawings. Fabricate only after the approval of shop drawings, and in locations to avoid interferences.
 - 1. Ductwork installed without approved shop drawings, which requires removal/modification and/or reinstallation due to conflicts or improper installation shall be repaired at no cost to the Owner.

- C. Sizes given on contract drawings are inside dimensions.
- D. Keep openings continuously closed and sealed with protective plastic wrapping during construction to prevent entrance of dirt and debris.
- E. Extend access openings, damper rods and levers, to outside of external insulation make systems airtight.
- F. No piping, conduit or other obstruction to airflow is permitted in ductwork.
- G. Provide necessary openings, hanger inserts, framing, chases, and recesses, not provided by other trades.
- H. Exposed exhaust or return registers and grilles shall be flush with face of duct; exposed supply registers and grilles shall be mounted outside airstream with 45° shoe-tap extension collars.
- I. Where a return or exhaust duct is shown to be left open ended, provide hardware 0.5inch aluminum mesh screen at opening.
- J. Do not utilize flexible ductwork or connection in any way to connect single duct variable or constant volume boxes to ductwork.
- K. Penetrations:
 - 1. Provide 14 gauge sleeves for ducts passing through Mechanical Room floors. Set sleeves 4 in. above finished floor in Mechanical Rooms, seal watertight to floor.
 - 2. For duct penetrations of non-rated walls, provide sheet metal angle framing or sheet metal closure panels around the entire perimeter of each duct wall penetration on both sides of the wall, where the gap exceeds 1/4 inch. Where the gap is less than 1/4 inch, the gap may be caulked on both sides of the wall. Non-rated wall penetrations SHALL NOT be fire caulked under any circumstances.
 - 3. For duct penetrations of rated walls, see Specification Section 230500 - Basic Mechanical and Electrical Requirements.
- L. Ductwork that is called for to be welded shall be fully welded, continuous around the entire perimeter at all joints/seams, and shall be fully airtight and watertight.

3.2 TEST OF DUCTWORK

- A. Conduct duct leakage tests per SMACNA "HVAC Air Duct Leakage Test Manual" and in compliance with latest edition of the Energy Conservation Construction Code of New York State, for ductwork systems as indicated below. Positive pressure leakage testing is acceptable for negative pressure ductwork. The rate of air leakage (CL) must be less than or equal to 4.0 for rectangular ductwork and 2.0 for round ductwork, as determined by the equation in the code referenced above, which reads: $CL = F/P^{0.65}$ where F = measured leakage rate in CFM per 100 sq. ft. of duct surface, and P = static pressure of the test.

When leakage above stated limits occurs, ascertain location of leaks and rebuild, repair, or seal the ductwork as required. Repeat tests as required to obtain allowable leakage rates. Prepare a report similar to that suggested by SMACNA and submit for review. Duct testing shall be conducted in the presence of the Owner's Representative.

- B. Systems designed to operate at static pressures of 3.0 in. w.g. or greater: Representative sections totaling no less than 25% of the total duct area, per system, for the designated pressure class shall be tested as well as all associated ductwork located out-of-doors. All areas to be tested shall be coordinated with the engineer based on the approved ductwork shop drawings.
- C. Provide test reports indicating pressure tests performed. Include date, approved shop drawings with the section tested highlighted, test pressure and leakage rate.
- D. Ductwork not required to be tested for leakage, shall be checked and guaranteed to meet the standards of the specified SMACNA Duct Seal Class A. All joints and connections on this ductwork shall be sealed using the approved ductwork sealant. Air balancing and testing shall be used to determine satisfactory operation of duct systems. Balancing reports indicating excessive leakage amounts shall be required to rebuild, repair or seal ductwork having excessive leakage.

3.3 INSTALLATION OF ROUND DUCTWORK

- A. Use factory-fabricated couplings for joints.
- B. After the joint is slipped together, sheet metal screws are placed 1/2 in. from the joint bead for mechanical strength.
- C. Sealer is applied to the outside of the joint and covering the screw heads.
- D. Flanged joints shall be made with neoprene rubber gaskets.

3.4 DUCT SEALING

- A. Preparation:
 - 1. Clean surfaces of dirt, oil, grease and loose of foreign matter that could impair adhesion, using soap and water or solvent.
 - 2. Allow surfaces to dry completely before proceeding.
- B. Installation of Sealant System:
 - 1. Apply sealant system to duct joints, fasteners, and seams in accordance with manufacturer's instructions.
 - 2. Apply sealant by brush, putty knife or caulk gun, to full coverage. Remove excess adhesive immediately.
 - 3. Completely seal duct joint, fasteners and seams without voids, to a minimum 20 mil thick wet film.

4. Apply and store at ambient temperature of 40°F to 100°F; and protect from freezing until dry.
- C. Field Quality Control:
1. Allow duct sealant system to cure a minimum of 72 hours before operating the system.
 2. Do not apply external duct insulation or coatings until the joints have been inspected by the Owner's Representative.

3.5 TURNING VANES

- A. Install only in square elbows.
- B. Install as per latest SMACNA Standards.
- C. Secure vane runners to duct with spot welding, riveting or sheet metal screws.
- D. When installing in ductwork with internal insulation.
 1. Install runners in ductwork inside insulation and bolt through insulation and duct sides, welding bolts to insure rigid installation. Provide build-outs for duct Velocity-Pressure classes above 2 in. w.g.

3.6 DAMPERS AND AIR CONTROL DEVICES

- A. Provide volume dampers at all air outlets, diffusers, grilles and as noted on plans. Provide volume dampers at all low pressure supply, return and exhaust, branch ducts and as noted on the plans.
- B. Provide dampers necessary to permit proper balancing of air quantities. Comply with code requirements for smoke and fire control. Prevent introduction of uncontrolled outside air into building through roof and wall openings.
- C. When dampers are installed in acoustically lined ductwork, install with insulated "build-outs" per SMACNA.
- D. Install fire dampers in accordance with "Fire Dampers" Section and applicable codes.
- E. Install all dampers furnished as part of "Building Management System" Section.

3.7 FLEXIBLE AIR DUCTS

- A. "Air duct" applies to conduit or passageway for conveying air to or from heating, cooling, air conditioning or ventilating equipment but not including the plenum as defined in NFPA 90A. "Air connector" applies to conduit for transferring air between an air duct or plenum and an air terminal device or an air inlet or an air outlet as defined by the NFPA 90A.
- B. For round to oval connections, provide round-oval flexible adapter.

- C. Flexible air ducts and connectors shall be provided in fully extended condition, free from kinks.
- D. Flexible air ducts and connectors shall not be used in systems with entering air temperatures in excess of 250°F.
- E. Flexible air ducts and connectors shall use only the minimum length required to make the connection and shall be installed in the horizontal or vertical position. Flexible elbows are not acceptable. Do not exceed a maximum length of 48 in., fully extended.
- F. Flexible air ducts and connectors shall use minimum 1/2 in. wide positive locking, steel worm drive clamp, or nylon plenum rated straps for joints and connections. One clamp or strap for the inside core liner and one clamp or strap for the outer jacketing. When non-metallic (nylon) straps are used, they should be listed and labeled to standard UL 181B. Fastener package should be marked UL 181 B-C.
- G. Collars to which flexible duct is attached shall be beaded and a minimum of 2 in. in length. Wrap twice with UL 181 tape and secure with clamp or strap. Sleeves used for joining two sections of flexible duct shall be beaded and a minimum of 4 in. in length. The draw band shall be positioned behind the bead on the metal collar.
- H. Outer vapor barrier and insulation shall be slid over inner core and collar, wrapped twice with UL 151 tape and secured with a clamp or strap.
- I. Connections shall be per SMACNA "HVAC Duct Construction Standards - Metal and Flexible", Air Diffusion Council "Flexible Duct Performance and Installation Standards" and NAIMA Installation Standards.
- J. Flexible duct shall be supported at manufacturer's recommended intervals, but no greater distance than 2'-6" on center and prior to all 90 degree bends. Maximum permissible sag shall be 1/2 in. per foot of support spacing. Provide a minimum of one hanger on each run of flexible duct.
- K. A connection to rigid duct or equipment shall be considered a support joint. Long horizontal duct runs with sharp bends shall have additional supports before and after the bend approximately one duct diameter from the centerline of the bend.
- L. Hanger or saddle material in contact with the flexible duct shall be of sufficient width to prevent any restriction of the internal diameter of the duct when the weight of the supported section rests on the hanger or saddle material. In no case shall the material contacting the flexible duct be less than 1-1/2 in. wide. Factory installed suspension systems integral to the flexible duct are an acceptable alternative hanging method when the manufacturer's recommended procedures are followed.
- M. The hanger shall be strapped around the flexible duct and secured to the structure above. Hangers shall not be attached to other mechanical or electrical objects. Hangers may be attached to an approved trapeze. Ceiling grid shall not be used to fabricate a trapeze. Support hangers shall be installed horizontal. Screws shall not be used to penetrate the flexible duct to attach to the hanger.

- N. Provide flexible duct connections and splices in accordance with manufacturer's recommended installation instructions.
- O. Seal flexible duct connections with sealing materials listed and labeled in accordance with UL 181B. Mechanically secure connections with approved clamping materials.

3.8 FLEXIBLE CONNECTIONS TO FANS AND EQUIPMENT

- A. Provide flexible connections for the intake and discharge connections of duct connected to fans and air handling equipment.
- B. Round connections are to be made with adhesive and metal drawbands with ends tightly bolted.
- C. Rectangular connections shall be made with material securely held in grooved seam between flanges. Attach with adhesive and mechanical fasteners on 6 in. centers.
- D. Connections shall be made with a minimum of 2 in. space between duct and equipment collars, installed in line, and with 1 in. excess material folded so as not to interfere with airflow through connection.
- E. Mechanically fastened and sealed, with specified duct sealant, at duct and equipment connections.

3.9 DUCT CLEANLINESS AND CLEANING AFTER INSTALLATION

- A. Duct Cleanliness:
 - 1. All ductwork on the project shall meet the SMACNA Duct Cleanliness For New Construction Guidelines, "Advanced Level" of duct cleanliness for production, delivery, storage and installation of ductwork.
 - 2. Prior to shipment to the jobsite, all duct ends and openings must be covered with a heavy duty, dual-ply, clear polyethylene protective film. Open ends are to be kept covered during transport, storage, and installation. As ductwork is installed at the job site, open ends are to be covered to maintain cleanliness. All air outlets shall also be covered until the end of construction.
 - 3. The film must be securely affixed to protect against dirt and debris and must be translucent to facilitate inspection of interior surfaces without removing the film. The film shall have a elongation rating of 600% and a break strength of 13.1 lbs./in. The film shall contain no VOC's, and shall leave no residue on duct after removal.
 - 4. Manufacturer: Ductmate Industries ProGuard (heavy duty grade clear).

B. Cleaning After Installation:

1. Interior surfaces shall be free of dust and debris prior to initial startup. Protect equipment which may be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes. Any cleaning of duct systems shall comply with recommendations of NAIMA and NADCA.
2. Clean external surfaces of foreign substances that might cause corrosion, deterioration of the metal, or where ductwork is to be painted.
3. Clean debris from system before fans are turned on.
4. Keep openings continuously closed during the construction period.
5. Pay damages resulting from dirt blown on painted or other finished surfaces.
6. Repair or replace damaged fan wheels, dampers, or other system parts damaged as a result of debris.
7. Clean system as many times as required until the entire system is dirt free.

3.10 ACCESS DOORS

- A. Provide for access to upstream side of duct mounted reheat coils, dampers, damper motors, fire dampers, smoke dampers, smoke detectors, control devices, fan bearings, and equipment requiring periodic inspection or service. Provide labels for fire and smoke dampers as called for in Part 2 - Products.
- B. For ducts that are too small to install an access door of the minimum specified size, provide a 12 in. long section of removable ductwork for maintenance and inspection access. Removable ductwork shall be fastened between device requiring access and next duct section with duct flanges or Donaldson Torit clamp with PVC foam seal. For ducts that are required to be insulated, provisions shall be made to allow insulation to be easily removed and re-installed.

3.11 ACOUSTIC-THERMAL DUCT LINING

- A. Increase metal duct dimensions to accommodate lining. Adhere lining to interior side of duct; minimum 90% coverage of Benjamin Foster 85-20 fire retardant adhesive, UL approved. Stapling method of attaching will not be permitted. Mechanical fasteners shall not pierce the sheet metal. Installing fasteners with spacing as per SMACNA Standards. Multiple layers of liner to achieve indicated thickness is prohibited.
- B. Abutting edges of acoustic linings shall be sealed with a fire resistant neoprene coating, and exposed edges of acoustic linings shall be installed with sheet metal nosing to prevent erosion.
- C. Lining shall not impart odor to the air, delaminate or be loosened by the airstream under normal operating conditions. Lining which is damaged during fabrication or shipment shall not be installed.

- D. Supply ductwork downstream of terminal units shall have 1-1/2 in. thick acoustical lining for a minimum of 10 feet. All air outlets shall be installed downstream of this minimum distance.
- E. Provide 1-1/2 in. thick acoustical lining for a minimum of 10 feet downstream of all supply and return fans.

3.12 DUCT SUPPORTS

- A. Provide per SMACNA, same material as duct. Hanger bands to extend down sides and turn under bottom 2 in. Minimum two metal screws per hanger. Angle iron on larger duct spaced per building structural system but not greater than 8 ft. Provide extra support angles as required.
- B. Provide additional supports as required to support reheat coils, air terminal units, filter enclosures, and any other duct mounted equipment independent from the associated ductwork system.

3.13 SMOKE DETECTION

- A. Smoke detectors shall be furnished by Division 26 "Electrical". This Contractor shall install detectors located in ductwork. Clearly indicate locations of smoke detectors on the sheet metal shop drawings.
- B. Increase duct size, ensure the minimum straight ductwork upstream or/and downstream at smoke detectors, where required for proper installation, per smoke detector manufacturer's recommendations. Coordinate minimum duct size required with Division 26 "Electrical".

EXHIBIT "I" - DUCTWORK MATERIALS

<u>SERVICE</u>	<u>MATERIAL</u>	<u>SPECIAL REQUIREMENTS</u>
Supply, return, vent, relief, outside and exhaust	Lock forming quality, galvanized steel ASTM A653 and A924, galvaneal/paint grip if not insulated and exposed	Joints and features as called for
Accessories, dampers and air turns	Same material and gauge as parent duct	-----

END OF SECTION 233100

SECTION 233101 - MECHANICAL CLEANING OF HVAC SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services required for the complete installation designed in Contract Documents.
- B. Requirements for mechanical cleaning of complete existing air conveyance systems (ACS) and other mechanical components including (but not limited to) the following:
 - 1. Air Handling Unit(s):
 - a. Unit enclosure.
 - b. Heating and cooling coils.
 - c. Fan assembly.
 - d. Condensate pan.
 - e. Washable filters (replacement of existing disposable filters) and/or filter section.
 - f. Outside air and return air plenum(s).
 - g. Outside air intake(s).
 - 2. Supply and return ductwork, lined and unlined, including ductwork plenums, branches, risers, and similar components.
 - 3. Air terminal devices, i.e. supply diffusers, return registers, and similar components.
 - 4. Reheat coils (hot water).
 - 5. Exhaust duct system and all associated registers.
 - 6. Exhaust and return fans.
 - 7. Fire and fire/smoke dampers.

1.2 QUALITY ASSURANCE

- A. Ductwork shall be cleaned in compliance with latest edition of the following standards:
 - 1. Assessment Cleaning and Restoration of HVAC Systems - 2006 ACR-2006 National Air Duct Cleaners Association (NADCA).
 - 2. Plans and Specifications which exceed the requirements in any of the reference standards.

- B. All sheet metal shall be fabricated and installed by an experienced Contractor specializing in this type of Work.
- C. The Duct Cleaning Contractor or subcontractor must provide a full time project supervisor, dedicated to this project, who is certified as an Air Systems Cleaning Specialist (ASCS) by the National Air Duct Cleaners Association (NADCA). Contractor must have a minimum of two ASCS personnel on staff, and have at least three (3) years of experience in commercial duct cleaning for projects similar in scope and complexity. If coating of internally lined fiberglass ductwork is included in the scope, specific project references should be supplied.
- D. One of the above certified staff or another individual employed by the contractor shall have the additional certification: *Ventilation System Mold Remediator* (VSMR) by the National Air Duct Cleaners Association.

1.3 SUBMITTALS TO THE ARCHITECT/ENGINEER

- A. Shop drawings locating all proposed duct access door locations and ceiling access holes in plaster ceilings.
- B. Provide MSDS sheets on all solvents, coatings, cleaners and disinfectants to be used on project.
- C. Access door submittals.
- D. Provide current NADCA membership certificate, plus certification certificates (ASCS) for two individuals that are currently employed by the Contractor.
- E. Provide a detailed description of cleaning methods, systems, and procedures. Include cut sheets of agitation equipment that can clean and coat up to a minimum of 50 lineal feet of ductwork per access point, in each direction, per Section 3.2 E.
- F. Provide a Reference List of similar projects in scope and complexity. Include Project Name, date, point of contact, and phone number.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MATERIALS

- A. Sanitizer: Sanitizing agents shall only be applied if active fungal growth is reasonably expected, or where unacceptable levels of fungal contamination have been confirmed through testing. Only an EPA registered sanitizer that is specifically registered for application inside HVAC/ductwork systems will be applied. Sanitizer to be applied in accordance with label instructions. Sanitizers shall not be applied to porous surfaces, such as fiberglass lining. Similar to as "BBJ" microbiocide as manufactured by BBJ Chemical Compounds.
- B. Insulation Repair Coating: Quick-setting water-based duct liner adhesive and coating designed for field application to faced or unfaced fiberglass duct liner insulation or to unfaced fiberboard or ductboard insulation that dries to form effective air erosion preventive coating, sealing and reinforcing surface.

Coating resistant to fire, water, oil, grease, bacteria and fungus. Coating material must not affect thermal or acoustic properties or insulation, and conform to NFPA Standards 90A and 90B. Similar to "Tough Coat" by Vac System Industries, Inc.

- C. Coil Cleaning Solution: Shall be a neutral PH solution (non acid, non alkaline) so as to not damage or further deteriorate coil fin surfaces. The solution shall be an aqueous enzymatic concentrate for the cleaning and digestion of biological debris and common soil present on air-conditioning coils. Application must be in compliance with label instructions. Similar to AerisGuard, as manufactured by Aeris USA.
- D. Ductwork Access Doors shall be "sandwich type" access doors, as manufactured by Ductmate Industries. Access doors with sheet metal screw fasteners are not acceptable. Access doors shall be a minimum size of 16 in. x 12 in. and installed in locations as shown on drawings.

PART 3 - EXECUTION

3.1 PRE-CLEANING PREPARATIONS

- A. Prior to start of work, the HVAC system is to be carefully inspected and checked for all conditions affecting the cleaning. Defects are to be reported in writing to the Project Engineer and work will not proceed until all defects have been documented. Commencement of work will constitute acceptance of the conditions of the area to which the cleaning work is to be performed and all defects in work resulting from such accepted service will be corrected by this trade without additional expense to the Owner.
- B. Disassemble all removable items as required for access to work area. Store the removables in a Project Engineer approved storage area until the completion of the cleaning work.
- C. Fire protection devices (such as smoke detectors, panel, etc.) shall be protected prior to cleaning procedures. They are to be cleaned and tested at the conclusion of work.
- D. The Contractor shall coordinate the shutdown and reactivating of the fire alarm system with the Owner to avoid accidental alarms during the cleaning process and related work.
- E. The Contractor shall coordinate the shutdown of the air handling equipment with the Owner before starting work, and shall conform to OSHA requirements regarding fan motor disconnect lock-out/tag-out.

3.2 GENERAL REQUIREMENTS

- A. Containment: Debris removed during cleaning shall be collected and precautions must be taken to ensure that debris is not otherwise dispersed outside the ACS during the cleaning process. After ACS cleaning, any areas which could be affected by the cleaning Contractor's work must be as clean as their condition prior to the commencement of the cleaning operation.
- B. Particulate Collection: Where the Particulate Collection Equipment is exhausting inside the building, HEPA filtration with 99.97% collection efficiency for 0.3 micron size particles shall be used.

Mechanical cleaning operations shall be undertaken only with Particulate Collection Equipment in place, including adequate filtration to control debris removed from the ductwork or ceiling plenum. When the Particulate Collection Equipment is exhausting outside the building, precautions shall be taken to ensure that air does not re-enter the building.

- C. Contact Vacuuming: Where contact vacuuming is required, the vacuum equipment must be HEPA filtered. Cleaning shall be performed by the application of the vacuum in combination with a brush attachment directly to the contaminated surface.
- D. Mechanical Agitation for Ductwork Cleaning:
 - 1. The Contractor is required to remove all debris from the inside surface areas, e.g. the top, bottom and sides of rectangular duct and the entire inside circumference of round and flat oval ductwork by creating the least amount of access openings possible. No cleaning method should be used that can potentially damage components of the ductwork or negatively alter the integrity of the system. The following restrictions for agitation tools shall be adhered to.
 - 2. High power/volume vacuum alone is not an acceptable method of agitation.
 - 3. The agitation equipment shall be the Collom Duct Cleaning System or approved equal.
 - 4. Approved equal agitation systems shall be accepted only if the following conditions are met:
 - a. The system is capable of thoroughly cleaning (and sanitizing) up to 50 lineal feet of ductwork in each direction per access point. Exceptions to this requirement will apply when the removal of debris requires more aggressive agitation.
 - b. A minimum of 85 cubic feet per minute (cfm) of compressed air to 110 pounds per square inch (psi) must be supplied to the air tool or nozzle in order to effectively dislodge the built-up debris.
 - c. The air tool or nozzle shall be able to follow the contours of the ductwork, i.e. the tool must be able to come in contact with all sides/surfaces of the interior of the duct.
 - d. The air tool or nozzle shall be capable of dispensing coatings and sanitizing solutions to cover the entire interior surface areas of the ductwork without creating additional access openings in order to maintain the integrity of the ductwork.
 - 5. Where ductwork is large enough and able to support the weight of a worker, hand tools and HEPA vacuums may be used. If workers enter the inside of the duct they must follow the OSHA confined space requirements (OSHA 29 CFR 1910.146). Collection equipment must be used during this process to assure capture of any residual or airborne debris, if determined necessary by Project Engineer.

- E. Cleaning of HVAC Unit Components and Other System Components:
 - 1. Includes all A/C and heating coils, drain pans, humidifiers, fans, grilles, registers, and diffusers. Cleaning methods shall be employed such that all HVAC system components must be visibly clean as defined in Section 3.4. Upon completion of cleaning all components must be returned to those settings recorded just prior to cleaning operations.
- F. Coating Equipment for Fiberglass Lined Ductwork - must be applied in the ductwork by creating the least number of access openings possible. The coating application equipment must be capable of thoroughly coating up to 40 linear feet of ductwork in each direction per access opening.
- G. Controlling Odors: All reasonable measures shall be taken to control offensive odors and/or mist vapors during the cleaning process.
- H. Volume Control Devices: Dampers and any air-directional mechanical devices, including volume, fire and zone dampers inside the ductwork must have their position marked prior to cleaning, and upon completion, must be restored to their marked position. After cleaning, the dampers shall be repaired as necessary to insure proper operation and returned to original settings. Contractor shall indicate locations of damaged and/or repaired dampers.
- I. Access Openings: Any access openings cut for the cleaning process must be repaired so that they shall not significantly alter the airflow. All openings made to facilitate the cleaning must be sealed in accordance with industry standards and local codes, using materials acceptable, under those standards and codes. (See Specification Section 233100 and SMACNA's HVAC Duct Construction Standards - Metal and Flexible, 1985).

3.3 HEALTH AND SAFETY

- A. Cleaning Contractors shall comply with all applicable federal, state and local requirements for protecting the safety of the contractor's employees, building occupants, and the environment. In particular, all applicable standards of the Occupational Safety and Health Administration (OSHA) should be followed when working in accordance with this standard.
- B. No processes or materials shall be employed in such a manner that they will create adverse health effects to the building occupants, cleaning contractors, or general public.
- C. Disposal of Debris. All debris removed from the ACS shall be disposed of in accordance with all applicable federal, state and local requirements.

3.4 VERIFICATION

- A. Cleanliness verification shall be performed after an HVAC system component has been cleaned and prior to the application of any treatment and/or the component being used in operation, as per section 13 of ACR 2006. A visual inspection must be used to assess that the HVAC system is visually clean. An interior surface is considered visibly clean when it is free from non-adhered substances and debris.

If a component is visibly clean then no further cleanliness verification is required. In the event there is disagreement concerning whether a surface is visibly clean, contractor will conduct Surface Comparison Testing, as per section 13.2 of ACR 2006.

- B. Photographs of representative areas of the ductwork and unit components of the cleaning project shall be provided in a report. Photographs must contain captions that identify both HVAC unit number and occupied space that the component serves. See Section 3.6 Post Project Report.

3.5 SEQUENCE OF WORK

- A. Since the systems must be operational during the normal work hours. The Contractor shall submit to the Owner a procedure for cleaning the ductwork and installing filters which will minimize contamination of already cleaned areas. This sequence must be approved by the Owner and Project Engineer prior to starting work.

3.6 POST PROJECT REPORT

- A. The Contractor will submit three (3) copies of the final report to the Project Engineer/Owner indicating the following:
 - 1. Success of the cleaning project, as verified through visual inspection.
 - 2. The report shall contain photographic or video documentation of representative areas cleaned as part of the project. This documentation shall show both before and after pictures that verify visual inspection.
 - 3. Areas of the system found to be damaged, in need of repair, and/or requiring more aggressive cleaning.

END OF SECTION 233101

SECTION 233313 - FIRE DAMPERS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide labor, materials, equipment and services required for the complete installation as shown on the Contract Documents.

1.2 SUBMITTALS

- A. Submit product data, types, schedule of sizes, locations, and installation arrangements of all dampers.
- B. Submit manufacturer's UL listed installation details for each mounting arrangement.

1.3 QUALIFICATIONS

- A. Provide work in compliance with the following Codes and Standards based on the current edition in effect at project location:
 - 1. Mechanical Code of New York State.
 - 2. UL 555, UL 555S and UL555C.
 - a. Fire dampers shall be Underwriter's Laboratories classified and labeled.

PART 2 - PRODUCTS

2.1 FIRE DAMPERS

- A. Curtain type damper of galvanized steel (304 stainless steel for ductwork containing shower room exhaust, wet location exhaust, and corrosive fume exhaust) construction with fusible link, 20 gauge frame and 24 gauge blades. UL listed and labeled.
 - 1. 100% free area with welded head for velocities above 2000 fpm.
 - 2. Square, rectangular, round or oval duct connection as required by duct connections.
 - 3. 1-1/2 hour rated dampers for walls or floors rated less than three hours. Three-hour rated dampers for three and four hour walls or floors.
 - 4. With factory fabricated sleeve with fixed and slip flanges.
 - 5. Fusible link temperature rating of 165°F.
- B. Design Equipment: Ruskin Model IBD2 Style B.
- C. Make: Ruskin, Air Balance, National Controlled Air, Prefco, Venco, Greenheck, Nailor, Pottorff.

PART 3 - EXECUTION

3.1 LOCATIONS

- A. Provide fire dampers in all one, two and three hour rated wall and floor penetrations.

3.2 INSTALLATION

- A. Dampers shall be installed in accordance with the manufacturer's written instructions and as required to meet specified listings.
- B. Provide sleeve, angles, and access doors for installation in accordance with the latest requirements of SMACNA, NFPA, UL and damper manufacturer.
- C. Provide sheet metal access doors with labels, as called for in Specification Section 233100 in ductwork for dampers and accessories.
- D. Install dampers square and free from racking.
- E. Do not compress or stretch the damper frame into the duct or opening.
- F. Provide bracing for multiple section assemblies to support assembly weight and to hold against system pressure. Attach multiple damper section assemblies together in accordance with manufacturer's instructions. Install support mullions as reinforcement between assemblies as required.
- G. Provide insulation end seal fittings for double wall ductwork where same connects to damper assembly.

3.3 CERTIFICATION

- A. Contractor shall certify that dampers are accessible for servicing, are installed properly, and are operational. Submit three (3) copies of signed certification to the Owner's Representative for review.

3.4 IDENTIFICATION

- A. Provide damper tags and charts.
 - 1. Fasten tag to ductwork adjacent to the dampers.
 - 2. Number each damper and make chart listing.
 - a. Number.
 - b. Location.
 - c. Air system in which they are installed.
- B. Submit three (3) copies of chart to the Owner's Representative for review.

END OF SECTION 233313

SECTION 233713 - REGISTERS AND DIFFUSERS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services required for the complete installation designed in Contract Documents.

1.2 SUBMITTALS

- A. Registers/Grilles/Diffusers: Submit product data including room schedule listing size, CFM, throw, direction of throw, accessories, finish, material type, color chart, pressure drop and noise criteria.

1.3 GENERAL REQUIREMENTS

- A. Each manufacturer shall check noise level ratings for registers and diffusers to insure that the sizes selected will not produce noise to exceed N.C. - 24, measured at occupant level; notify Owner's Representative of problems prior to submittal.
- B. Pressure drop, airflow and noise criteria selection is based on design equipment. Manufacturers not submitting design makes must provide written certification in front of submittal that equipment submitted has been checked against and performs equal to the design make.
- C. Borders and frames shall be coordinated with materials and ceiling systems to integrate with architectural ceiling details and finishes scheduled.
- D. Locations of ceiling mounted air terminal devices shall be coordinated with locations shown on architectural reflected ceiling plans.
- E. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw and pressure drop. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

1.4 REQUIREMENTS FOR REGISTERS

- A. General:
 - 1. A register is defined as a grille plus a volume damper.
 - 2. Registers shall be installed "sight-proof" where possible, i.e.: High wall register with horizontal blades inclined up, or along a wall with blades facing the wall.
 - 3. Borders and frames shall be of the same material as register face unless specified otherwise.

B. Mounting Frames:

1. Provide with screw holes in register face punched and countersunk at factory, and mounting frame drilled and tapped to suit. Sponge rubber gasket between frame and wall or ceiling for all surface mounted frames.
2. Frame shall be overlap type and shall be suitable for type of ceiling where register is to be installed.

C. Finishes:

1. Baked enamel (of colors as selected from the manufacturer's standard color chart).

D. Design Equipment: As indicated in schedule.

E. Manufacturers: Greenheck, Anemostat, Carnes, Krueger, Titus, Price, Tuttle and Bailey, Nailor.

PART 2 - PRODUCTS

2.1 SUPPLY TYPES

A. Type 1 - (Supply Air Grille):

1. Aluminum frame construction with double deflection capability and the front blades shall be parallel to the long dimension. Solid extruded aluminum air foil blades mounted in friction pivots for individual blade adjustment, spaced on 3/4 in. centers.
2. 1-1/4 in. wide flange with sponge rubber gasket.
3. Model: As indicated in schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install equipment in strict accordance with manufacturer's instructions. Rough in or install per reflected ceiling plan or in location instructed by Owner's Representative.
- B. Provide approved air extractors behind all duct mounted supply registers in exposed ductwork.
- C. When the final connection to an exhaust or return grille is made, a 12 in. minimum height plenum box must be supplied to all grilles. Plenum dimensions shall match grille size. Paint inside of plenum box flat black.
- D. Seal all supply and return registers, grilles and diffusers during construction operations to limit dust entering HVAC systems and ductwork. Seals may be removed just prior to testing and balancing, but not without the approval of the Owner's Representative.

END OF SECTION 233713

SECTION 233723.16 – LOUVERS AND PENTHOUSES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide labor, materials, equipment and services required for the complete installation designed in Contract Documents.

1.2 SUBMITTALS TO THE ARCHITECT/ENGINEER

- A. Louvers including all blade types, finishes, and arrangements.
- B. Penthouses including materials, finishes and accessories.
- C. Provide original color charts for selection of finish.

PART 2 - PRODUCTS

2.1 LOUVERS

- A. Factory constructed high performance drainable, fixed, extruded aluminum louvers.
- B. Provide mullions where blade lengths exceed 60 in.
- C. Sill extension and sill style as required by job conditions.
- D. Louver to be flanged or un-flanged as required for the wall type in which it will be installed.
- E. Heads, sills and jambs to be one piece structural members of 6063-T6 alloy with integral caulking slot and retaining beads.
- F. Mullions shall be sliding interlock with internal drain(s).
- G. Blades to be one piece extrusions with gutter(s) designed to catch and direct water to jamb and mullion drains.
- H. Minimum extrusion thicknesses shall be as follows: Heads, Sills, jambs and mullions: 0.081". Fixed Blades: 0.068"
- I. Closed cell PVC compression gaskets shall be provided between bottom of the mullion or jamb and the top of the sill to insure leak tight connections.
- J. All fasteners to be aluminum or stainless steel.
- K. All louvers to be furnished with 5/8 in. flattened expanded mesh, aluminum bird screen with a .055 in. thick extruded aluminum frame. Screens and screen frames to be standard mill finish.
- L. All louvers shall be finished with powder coating of a color to be selected at the time of submittal review.

Coating to be 1.5 to 3 mil. thick full strength 100% resin Fluoropolymer coating. Finish to adhere to a 4H Hardness rating. The louver manufacturer shall supply an industry standard 20-year limited warranty against failure or excessive fading of the Fluoropolymer powder coat finish.

- M. Design Equipment: As indicated in schedule.
- N. Makes: Construction Specialties, Inc., American Warming & Ventilating Inc., Arrow United Industries, Louvers & Dampers, Inc., Ruskin, Nailor, Greenheck.

2.2 PENTHOUSES (HOODED TYPE)

- A. Housings shall be minimum 20 gauge galvanized steel bolted to a minimum 12 gauge galvanized steel support structure.
- B. The aluminum base shall be of bolted and welded construction.
- C. Provide a curb as per Specification Section 230530.
- D. Provide aluminum bird screen.
- E. Design Equipment: Greenheck.
- F. Makes: PennBarry, Carnes, Greenheck, Arrow, Cook.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install louvers and penthouses as per manufacturer's recommendations.

3.2 LOUVERS

- A. Size called for is approximate wall/or masonry opening size. Adjust slightly to suit construction or coursing (review architectural drawings or field conditions for rough opening sizes.) Slope ductwork, and plenum to louver weephole or provide drain.
- B. Structural supports shall be designed and furnished by the louver manufacturer to carry a wind load in accordance with the 2025 Building Code of New York State.

END OF SECTION 233723.16

SECTION 235100 - PREFABRICATED FLUE GAS VENTING SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

1.2 QUALITY ASSURANCE

- A. All flue gas venting system sections, lining, fittings, supports, etc., shall be manufactured from U.L. tested and listed components.
- B. The system shall be in compliance with the requirements of the New York State Uniform Fire Prevention and Building Code, NFPA 54 and NFPA 211.
- C. The flue gas venting system materials must be furnished by the manufacturer of the boiler or water heater, if the efficiency is greater than 85%, or the unit uses a "flue within a flue" design, as per the requirements of NFPA 85 and 211.
- D. The flue gas venting system shall have a warranty of ten (10) years (minimum).

1.3 SUBMITTALS

- A. Submit a fully dimensioned, scaled shop drawing, showing plan and elevational views of the entire flue gas venting system. The detailed drawing shall indicate all section sizes and the specific fittings to be installed. The drawing shall include all supports (vertical and horizontal) applicable to the project. The drawing shall be prepared and approved by the system manufacturer.
- B. Submit product data showing complete material and construction details for flue gas venting system and accessories.
- C. Submit Drawings showing floor and roof openings, which shall indicate exact sizes and locations.
- D. Provide documentation of a product warranty of 10 years or more.

PART 2 - PRODUCTS

2.1 BUILDING HEATING APPLIANCE CHIMNEY

- A. General:
 - 1. Suitable to serve heating appliances (hot water boilers, hot water heaters and furnaces) utilizing #2 oil.
 - 2. Factory built all metal flue gas vent system with modular components. Suitable for outdoor installation and up to 1000°F constant (1400°F intermittent) flue temperature.

3. Designed to handle negative or neutral internal pressures.
 4. Double wall with minimum 1/2 in. air space between the walls.
 5. Adjustable lengths with closely fitting sliding internal section with graphited mineral fiber packing gland and a sliding outer section to absorb thermal expansion.
 6. Double wall shall be used for all parts of the system. Single wall vent connectors are not acceptable.
- B. Outer Jacket:
1. 430 stainless steel 0.025 in. thick.
- C. Inner Gas Pipe:
1. Type 430 stainless steel 0.015 in. thick.
- D. Accessories:
1. Rain cap.
 2. Wall support assembly, wall guide assembly and plate support assembly.
 3. Fittings to suit job conditions.
 4. Drained tee cap, tee connection, sealant, inside V bands, ventilated roof thimble, external channel bands and other necessary hardware as required for complete installation.
- E. Design Equipment: Jeremias Exhaust Systems.
- F. Manufacturers: Metalbestos, Metal-Fab, Hart and Cooley, Van-Packer, Schebler.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

- A. Provide flue gas venting systems of sizes as shown on Drawings. Sizes are clear inside dimensions. Maintain minimum clearances between vent system and existing construction.
- B. Install in strict accordance with NFPA 54, NFPA 211 and manufacturers recommendations.
- C. Provide adjustable lengths between two fixed points to permit thermal expansion.
- D. Seal joints with sealant suitable for temperature in excess of specified intermittent flue temperature ratings.

- E. Support as recommended by the manufacturer. Provide all necessary braces, guides, guy wires, tensioners and supports. Fasteners shall penetrate wall and terminate on inside of wall with steel bearing plates.
- F. Provide threaded hose end ball valve with cap and chain, at base of drained tee fitting.
- G. Install barometric dampers where recommended by the manufacturer(s) of the connected equipment.
- H. All non-stainless steel material exposed to the outer atmosphere shall be protected by a minimum of one base coat and one finish coat of heat resistant paint as manufactured by Rust-Oleum, or equal. Color selection shall be by the Architect.
- I. Individual flues that penetrate the roof shall terminate a minimum of 4 ft. apart, or as per the manufacturer's recommendations.
- J. Horizontal runs of a flue gas venting system shall be installed at a slope of not less than 1/4 in. per foot, to allow for proper drainage of condensate back to the boiler or water heater condensate disposal system.

END OF SECTION 235100

SECTION 236213 - AIR-COOLED CONDENSING UNITS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services as required for the complete installation designed in the Contract Documents.

1.2 SUBMITTALS

- A. Air-cooled condensing unit, complete with accessories.
- B. Complete wiring and piping diagrams showing all piping and control interconnection.
- C. Installation Manuals.

1.3 GENERAL REQUIREMENTS

- A. Equipment Manufacturer shall be responsible for the following:
 - 1. Furnish complete installation Drawings, templates, wiring diagrams and instruction manuals for the equipment. Manufacturer's "Installation Instructions", "Start-Up and Service Instruction" and catalog for wiring and piping shall become a part of the Contract Documents.
 - 2. Provide additional copies of above data for O&M Manual.
 - 3. Provide refrigerant piping diagram prior to installation showing exact location and arrangement of piping and all devices required: Sight glass, solenoid valves, thermal expansion valves, filter dryers, shut off valves, charging valves, etc.
 - 4. Supervise and check installation for compliance with manufacturer's recommendations.
 - 5. Furnish vibration mounting equipment to prevent transmission of machine vibration to the building structure.
 - 6. Complete start-up for each unit shall be performed under the direction of the manufacturers authorized representative.
- B. Contractor shall:
 - 1. Provide piping, valves and accessories to connect the condensing units to their respective units, including miscellaneous devices to make a complete and operable refrigeration system.
 - 2. Provide one (1) year, guarantee from date of final acceptance.
- C. Electrical Wiring:
 - 1. Division 26 will provide power wiring to condensing unit.

2. Division 23 will provide control wiring interlocks at units and interlocks to air handling units as required.
- D. Start-Up, Testing and Instructions:
1. Provide complete installation, testing, wiring, start-up, and instructions to Owner's Representative.

PART 2 - PRODUCTS

2.1 AIR-COOLED CONDENSING UNITS

- A. General:
1. Factory assembled air-cooled condensing units with galvanized steel casings and baked enamel finish. Units selected for operation in conjunction with respective air handling units.
 2. Units constructed in accordance with ANSI B9.1 and NEC.
 3. Unit performance shall be certified in accordance with ARI Standard 460, latest edition.
 4. Condensing unit capacities as scheduled.
- B. Compressors:
1. Condensing unit with internally isolated refrigeration hermetic scroll compressor provided with overload and inherent winding thermostat protection, and crankcase heaters.
 2. Single/multiple compressors, no less than as scheduled.
 3. Five (5) year compressor parts and labor warranty from date of shipment.
- C. Condenser Coils:
1. Condenser coils of aluminum fins mechanically bonded to seamless copper or aluminum tubing, pressure tested for 425 psi working pressure.
 2. Tubes cleaned, dehydrated, sealed and leak tested at 150 psig.
- D. Refrigeration Circuits:
1. Refrigeration circuits with sub-cooling coils, service valves gauge ports, and dryers.
 2. Single/multiple refrigeration circuits, no less than as scheduled.

E. Controls:

1. High and low pressure cut-outs incorporating automatic reset, remote control transformer, positive acting timer to prevent short cycling of compressor, and hot gas bypass package where called for. If multiple compressors, provide control to prevent simultaneous starting of all compressors upon startup or following a power failure.
2. Condenser fan control shall permit operation of the system to 40°F ambient.
3. Operating controls for the units shall be integrated with the temperature control system.

F. Condenser Fans and Motors:

1. Direct driven propeller fans, vertical discharge, with fan guards.
2. Motors to be permanent split capacitor, resiliently mounted and pre-lubricated, with built-in overload protection and equipped with corrosion protected fan shafts.
3. Fans statically and dynamically balanced, steel or aluminum blades and zinc plated steel hubs.

G. Casings:

1. Zinc-coated steel, phosphatized casings coated with epoxy resin primer and finished with baked enamel.
2. With full face louvers to protect coils from hail damper.
3. Equipped with unit mounting rails and drain holes.

H. Shipping Preparation:

1. Unit shall be assembled and shipped to the job site with holding charge of dry nitrogen.

I. Design Equipment: Trane.

J. Make: Carrier, Daikin Applied, Trane, York.

2.2 REFRIGERATION ACCESSORIES

A. Filter Dryers:

1. Liquid lines dryer ahead of solenoid valves in each system.
2. Replaceable cartridge type.
3. Make: Ansul, McIntire, Mueller, Sporlan.

- B. Sight Glass:
 - 1. In each liquid line close to evaporator, after filter dryer.
 - 2. Make: Ansul Super Dry-Ey, Henry; with elements to act as moisture indicator; Sporlan.
- C. Thermal Expansion Valve:
 - 1. In each liquid line at evaporator coil.
 - 2. Make: Sporlan.
- D. Solenoid Valve:
 - 1. In each liquid line at the evaporator coil ahead of the expansion valve.
 - 2. Make: Alco, Sporlan.
- E. Shut-Off Valves:
 - 1. To isolate equipment components, packless type.
 - 2. Make: Henry, Mueller, Superior.
- F. Charging Valve:
 - 1. Locate and install at a point to facilitate charging of the system.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Connect services to the unit where called for in complete accordance with the manufacturer's installation instructions. Furnish Division 26 with wiring diagrams and electrical data to permit power wiring connections to the unit. Provide control wiring serving air handling unit associated condensing unit, and the auxiliary control panel in accordance with Section "Electric Wiring". Charge system with refrigerant and proper quality of oil, after evacuating and leak testing, and in accordance with manufacturer's installation instructions.

END OF SECTION 236213

SECTION 237313 - AIR HANDLING UNITS INDOOR

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide labor, materials, equipment and services as required for the complete installation as shown on the Contract Documents.

1.2 SUBMITTALS

- A. Submit unit performance including capacity, nominal and operating performance.
- B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.
- C. Submit shop drawings indicating overall dimensions as well as installation, operation and service clearances. Indicate lift points and recommendations. Indicate unit shipping split locations, and split dimensions, installation and operating weights including dimensions.
- D. Provide fan curves with specified operating point clearly plotted.
- E. Submit data on electrical requirements. Include safety and start-up instructions.
- F. Submit sound data certified to ARI 260.

1.3 DELIVERY STORAGE AND HANDLING

- A. Units may be shipped fully assembled or disassembled to the minimum module size in accordance with shipping or jobsite requirements.
- B. The units must be rigged and lifted in strict accordance with the manufacturer's recommendations.
- C. All unit openings must be sealed to prevent the entrance of construction dust.
- D. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters in place, bearings lubricated (if applicable), condensate properly trapped, piping connections verified and leak-tested, belts aligned and tensioned, all shipping braces removed, bearing set screws torqued, and fan has been test run under observation.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. The units shall consist of the AHU modules as shown on the plans.
- B. Air handling units to fit intended use and location as called for. Capacity, size and arrangement, static pressure, brake horsepower, component parts and accessories as called for and as necessary to obtain required results and allow for proper maintenance. Ratings based on standard Test Code for Centrifugal Fans, adopted jointly by AMCA and ASHRAE.

Each size fan to be supplied shall be tested in the manufacturer's laboratory under simulated installation conditions. Ratings based on test, not on interpolated or extrapolated calculation. Guaranteed full capacity delivery through duct systems finally installed and under conditions listed. Guaranteed sound power level ratings not exceeding those of design equipment or as scheduled.

- C. Source Limitations: Obtain modular indoor air-handling units through one source from a single manufacturer.
- D. ARI Certification: Air-handling units and their components shall be factory tested according to the applicable ARI Standard and shall be listed and labeled by ARI.
- E. More than one manufacturer is listed as make, Contractor must be certain that equipment submitted fits properly into indicated space conditions, same as design equipment.
- F. Motors shall conform to the requirements of Specification Section 230513, "Motors".
- G. Drives:
 - 1. All motors and drives shall be factory-installed and run tested. All motors shall be installed on a slide base to permit adjustment of belt tension. Slide base shall be designed to accept all motor sizes offered by the air-handler manufacturer for that fan size to allow a motor change in the future, should airflow requirements change. Fan sections without factory-installed motors shall have motors field installed by the contractor. The contractor shall be responsible for all costs associated with installation of motor and drive, alignment of sheaves and belts, run testing of the motor, and balancing of the assembly.
 - 2. Equipment manufacturer furnish V-belt drives as recommended by drive manufacturer, unless otherwise indicated.
 - a. 150% of motor horsepower on motors less than 10 HP.
 - b. Motors 5 HP and Larger: Minimum of two (2) belts, matched belt sets for multiple belt drives.
 - c. Cast iron or cast steel pulleys, test holes in belt guards for speed checks. Provide shaft guards where shafts extend beyond belt guard.
 - 3. Motor pulleys:
 - a. Fixed sheave-type only.
 - b. 5 HP and Smaller: "A" section, 2.6 in. minimum pitch diameter.
 - c. 7-1/2 HP to 20 HP: "B" section, 4/6 in. minimum pitch diameter.
 - d. 25 HP and Larger: "C" section, 7.0 in minimum pitch diameter.
 - e. Drive ratio not over 4:1.

2.2 AIR HANDLING UNITS

A. Unit Base:

1. Indoor Units: Provide factory-installed external support kit on the base of the unit. External support kit shall be used for ceiling suspension, external isolation, or with housekeeping pad. The external support kit for a floor mounted unit shall be 6 in. (minimum) height factory base rail. Unit mounting devices not constructed of galvanized steel shall be chemically cleaned and coated with both a rust-inhibiting primer and finished coat of rust-inhibiting enamel.

B. Casing:

1. Indoor Units:
 - a. Unit shall be constructed of a complete structural frame with removable panels. Unit manufacturer shall ship separate segments so unit can be broken down for ease of installation in tight spaces. The entire air handler shall be constructed of galvanized steel. Casing finished to meet ASTM B 117 250-hour salt-spray test. The removal of side panels shall not affect the structural integrity of the unit. All removable panels shall be gasketed to minimize air leakage. All doors shall have gasketing around full perimeter to prevent air leakage. Contractor shall be responsible to provide connection flanges and all other framework that is needed to properly support the unit.
 - b. Indoor Units: Construct casing sections capable of operating from -4 in. w.g. to +6 in. w.g.
 - c. Access panels and/or access doors shall be available on both sides of the unit in all sections to allow easy access to drain pan, coil(s), motor, drive components and bearings for cleaning, inspection, and maintenance. If panels are not removable, then manufacturer shall provide access sections with doors between all internal components to ensure access and cleanability of the air handler.
 - d. Access doors shall be double wall construction to prevent damage to insulation during routine maintenance.
 - e. Access panels and doors shall be fully removable without the use of specialized tools to allow complete access of all interior surfaces.
 - f. Door hardware shall be surface mounted to minimize penetrations in the door casing that could lead to air leakage paths.
 - g. All joints between exterior panels and structural frames, as well as joints between module frames, shall be properly sealed and gasketed to provide an air seal.
 - h. Insulation shall be encased in double-wall casing between exterior and interior solid panel such that no insulation can erode to the airstream.

Foil facing on insulation is not an acceptable alternate to double wall construction. Insulation shall have a minimum R-Value of 8 and shall be UL listed. The installation shall comply with NFPA 90A and B requirements.

C. Fan Section(s):

1. Provide supply fan section(s) as shown on the plans.
2. Fan types shall be as indicated. Fans shall be designed and suitable for class of service indicated in the unit schedule. Fan shaft to be properly sized and protectively coated with lubricating oil. Fan shafts shall be solid and properly designed so that fan shaft does not pass through first critical speed as unit comes up to rated RPM. Fans shall be statically and dynamically tested as an assembly at the required RPM to meet design specifications. Key fan wheels to fan shaft to prevent slipping.
3. Mount fans on isolation bases. Internally mount motors on same isolation bases and internally isolate fans and motors with vibration isolators. Install flexible canvas ducts between fan and casings to ensure complete isolation. Flexible canvas ducts shall comply with NFPA 90A.
4. Fan sections shall have full height, double wall, hinged doors on drive side for inspection and maintenance of internal components.
5. For fan sections controlled by variable frequency drives, balance at speeds between 25% and 100% of design RPM.
6. Belts shall be enclosed as required by OSHA standard 29 CFR 1910 to protect worker from accidental contact with the belts and sheaves.

D. Filter Section:

1. Provide factory-fabricated filter section of the same construction and finish as unit casings. Filter section shall have filter guides and access doors extending the full height of the casing to facilitate filter removal. Provide filter block-offs as required to prevent air bypass around filters. Filters shall be removable from both sides of filter sections.
2. Filter type, efficiency, and arrangement shall be provided as defined in project plans and schedule. Filters shall be removable from both sides of filter section(s).
3. Provide high efficiency final filter sections and 2 in. pleated pre-filters in order to provide proper filtration.
4. Manufacturer shall provide one set of startup filters and an additional set of operational filters.
5. Provide magnehelic gauge across the filter bank.

E. Coils:

1. Install coils such that headers and return bends are enclosed by unit casing to ensure that if condensate forms on the header or return bends, it is captured by the drainpan under the coil.
2. Coils shall be manufactured with plate fins to minimize water carryover and maximize airside thermal efficiency. Fin tube holes shall have drawn and belled collars to maintain consistent fin spacing to ensure performance and air pressure drop across the coil as scheduled. Tubes shall be mechanically expanded and bonded to fin collars for maximum thermal conductivity. Use of soldering or tinning during the fin-to-tube bonding process is not acceptable due to the inherent thermal stress and possible loss of bonding at that joint.
3. Construct coil casings of galvanized steel. End supports and tube sheets shall have belled tube holes to minimize wear of the tube wall during thermal expansion and contraction of the tube.
4. All coils shall be completely cleaned prior to installation into the air-handling unit. Complete fin bundle in direction of airflow shall be degreased and steam cleaned to remove any lubricants used in the manufacturing of the fins, or dirt that may have accumulated, in order to minimize the chance for water carryover.
5. On stacked cooling coils, intermediate drain pans shall be installed between the coils. Intermediate drain pans shall have drop tubes to guide condensate to the main drain pan, thus preventing flooding of lower coils that would result in moisture carryover.
6. Hydronic Coils:
 - a. Supply and return header connections shall be clearly labeled on outside of units such that direction of coil water-flow is counter to direction of unit airflow.
 - b. Coils shall be proof tested to 450 psig and leak tested to 300 psig air pressure under water.
 - c. Headers shall be constructed of round copper pipe or cast iron. Tubes shall be copper. Fins shall be aluminum.
7. Refrigerant Cooling Coils:
 - a. Refrigerant suction and liquid connections shall be clearly labeled on outside of units.
 - b. Coils shall be proof tested to 450 psig and leak tested to 300 psig air pressure under water. After testing, insides of tubes shall be air dried, charged with dry nitrogen, and sealed to prevent contamination.

- c. Refrigerant suction and liquid headers shall be constructed of copper tubing. Suction and liquid connections shall penetrate unit casings to allow for sweat connections to refrigerant lines.
- d. Tubes shall be copper. Fins shall be aluminum.
- e. Coils shall have equalizing type vertical distributors sized in conjunction with capacities of coils.

F. IAQ Drain Pans:

- 1. Insulation shall be encased between exterior and interior walls. Units with cooling coils shall have drain pans under complete cooling coil section that extend beyond the air-leaving side of the coil to ensure capture of all condensate in section. Cooling coil drain pans shall be sloped in 2 planes, pitched toward drain connections to ensure complete condensate drainage when unit is installed level and trapped per manufacturer's requirements.
- 2. Units with heating coils shall have a drain pan under complete heating coil section sloped in 2 planes and pitched toward drain connections to ensure proper drainage during cleaning and to capture water in the event of a coil failure.
- 3. All drain pan connections supplied by unit manufacturer including, piping, and piping connections extending from stainless steel drain pans shall be constructed of stainless steel. The contractor is responsible to ensure the unit is installed level, trapped in accordance with the manufacturer's requirements, and visually inspected to ensure proper drainage of condensate.
- 4. Flat drain pans shall be acceptable in sections that may have incidental, but not continuous contact with moisture. Flat drain pans shall be accessible for cleaning.

G. Dampers

- 1. All dampers shall be internally mounted. Dampers shall be premium ultra low leak and located as scheduled. Dampers shall be Ruskin CD60 double-skin airfoil design or equivalent for minimal air leakage and pressure drop. Leakage rate shall not exceed 5 CFM/square foot at one-inch water gauge and 9 CFM/square foot at 4 in. water gauge. All leakage testing and pressure ratings shall be based on AMCA Publication 500. Manufacturer shall submit brand and model of damper(s) being furnished.
- 2. Provide dampers to modulate the volume of outside air and return air as shown. Damper blades shall be galvanized steel, housed in a galvanized steel frame and mechanically fastened to an axle rod rotating on bearings. Blade seals are required to assure tight closure. All dampers shall be rated for a maximum leakage rate of less than 1 percent of nominal CFM at one-inch w.g.
- 3. Provide a factory-mounted ASHRAE Standard 62 airflow monitoring and control station in the outdoor air opening of the mixing box.

The monitor shall track a variable outside air quantity for ventilation demand flow control and ventilation flow documentation. The airflow monitoring station shall be factory-mounted, factory-calibrated, and installed per the airflow monitor manufacturer's recommendations. The air-handling unit mixing box shall also include a modulating outside air damper mounted in series with the airflow monitor. All linkages, crank arms, jackshafts and mounting hardware shall be provided. The airflow monitoring station shall be calibrated to measure a variable airflow from 15% of nominal air handler cfm up to 100% of design airflow, maintaining an accuracy of plus or minus five (5%) percent of actual cfm, for air measuring between -40F up to +158F. Monitoring station shall compensate for outside air temperature fluctuations that affect mass flow rate of air. The airflow monitoring station shall provide a proportional output velocity signal (2-10 vdc). The velocity sensor shall have an automatic zeroing function and shall be programmed to recalibrate the device's transducer a minimum of once per day to ensure continuous accuracy of airflow measurements. The monitor manufacturer shall provide to the Building Automation System (BAS) contractor a certified conversion table for the signal provided.

H. Access Sections:

1. Access for inspection and cleaning of the unit drain pan, coils and fans sections shall be provided. The unit shall be installed for proper access. Procedure for proper access, inspection and cleaning of the unit shall be included in the maintenance manual. Access section shall have double wall, hinged, removable access doors on one sides of sections.

I. Miscellaneous Sections:

1. Air Blender: The blender shall be of the rotary design with radial blades. Blender shall have the proper distances upstream and downstream as recommended by the blender manufacturer. Minimum mixing effectiveness shall be 75 percent when mixing 50 percent outside air and 50 percent return air at 50°F initial inlet temperature differential. Construct blender of .080 aluminum.
2. Moisture Eliminator: Provide moisture eliminator with galvanized sine wave fins and drain pan in the casing. Provide IAQ drain pan.
3. Diffuser Section: On units provided with coils or filters immediately downstream of double inlet housed centrifugal fans, provide a factory mounted diffuser section as shown on the drawings to promote equal air distribution.
4. Turning and Discharge Plenum Modules: Shall be provided as shown to efficiently turn air and provide sound attenuation.

J. Factory-Installed Variable Frequency Drive/Line Break Switch:

1. Combination Variable Frequency Drive with Bypass/line break switches shall be properly sized, mounted, wired to the fan motor, and commissioned by the AHU manufacturer. Combination VFD / line break switches shall include the VFD, a circuit breaker disconnect, bypass circuitry, a Drive-Bypass switch, an H-O-A switch, a manual speed control dial, and a control transformer.

Factory mounting will facilitate temporary heating, cooling, ventilation, and / or timely completion of the project.

2. Variable Frequency Drives: The VFD shall be a high performance pulse width modulated (PWM) AC drive that generates a sine-code, variable voltage / frequency, three phase output for optimum speed control. The inverter section shall utilize only intelligent power modules (IPM's) to generate an 8 kHz PWM output to ensure a low audible magnetic motor noise (@ 60 Hz) of less than 2 dB (@ 1 meter) above across the line operation. Power electronics shall provide at least 96% efficiency. The VFD shall be digitally based using a common microprocessor control logic circuit board for the horsepower ratings. All programming shall be maintained in non-volatile RAM memory so the program will be maintained when power is removed. A digital operator keypad and display shall provide local control and readout for: run/stop, speed, reset, volts, amps, kilowatts, and diagnostics. Output current overload should be rated at 110% of motor FLA for one minute. The VFD shall have the following minimal protective features: current limited stall prevention, auto restart after momentary power loss, speed search for starting into rotating motor, anti-windmill w/DC injection before start, phase-to-phase short circuit protection, and ground fault protection. Ambient service temperature rating of -10 to 50 degrees C, and humidity rating to 95% non-condensing. The VFD shall be UL508C listed and CSA certified and shall conform to applicable NEMA, ICS, NFPA, IEC, and ISO 9001 standards.
3. Enclosure: VFD/Line Break Switch shall have full metal enclosures. Enclosures shall be weather tight and completely recessed inside the standard unit casing. The door should be identical construction to the access doors on the air handler. A manual shut down switch shall be located on the outside of the access door.
4. Factory Mounting: VFD/Disconnect shall be factory-mounted on the drive side of the air handling unit fan section. Ensure 4 ft. of clearance to access panel.
5. Factory Wiring: VFD / disconnects shall be wired to fan motor per required NEC, UL, and NFPA 90 requirements. Units with factory-mounted controls shall also include power wiring from the VFD control transformer to the control system transformers. Also a binary start-stop signal and an analog speed signal shall be wired complete from the direct digital controller to the VFD.
6. Factory Commissioning: Trained factory personnel shall ensure proper operation of the VFD by a thorough factory test. Testing shall include "Hypot" test of unit wiring to insure that no weaknesses exist in VFD, wiring, or motor. VFD should be energized and fan run at 22 Hz, 40 Hz, and 60 Hz to insure VFD will operate throughout usable range of drive and that the fan rotation is correct. If VFD has bypass, fan will additionally be tested in bypass position to insure bypass is operational.

K. Design Equipment:

1. Indoor Style Units: Trane.
2. Makes: Daikin Applied, Trane, York by Johnson Controls, Carrier.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide equipment in accordance with manufacturer's recommendations and compatible with intent of the respective system performance requirements.
- B. Provide vibration isolators in accordance with manufacturer's recommendations, and as called for. Provide necessary steel supporting framework for equipment requiring same. Braced against swaying.
- C. Change pulley sizes as many times as necessary, as part of Contract, to make systems deliver specified quantities of air.
- D. Provide 6 in. high concrete pads for all floor mounted air-handling units.
- E. Install piping adjacent to machine to allow service and maintenance. Do not block access doors or coil pull-space with piping.
- F. Pan Drains:
 - 1. Connect condensate drain pans with full-size piping.
 - 2. Construct trap with offset dimension and seal depth per manufacturer's recommendations. Install cleanouts at changes in direction.
 - 3. Indoor Units: Extend to nearest equipment or floor drain.
- G. Start-Test-Check:
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.
 - 2. Engage a factory-authorized service representative to perform startup service.
 - 3. Verify that shipping, blocking, and bracing are removed.
 - 4. Verify that unit is secure on mountings and supporting devices and that connection to piping, ducts, and electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - 5. Leak Test: After installation, fill water and steam coils with water and test coils and connections for leaks. Repair leaks and retest until no leaks exist.
 - 6. Charge refrigerant coils with refrigerant and test for leaks. Repair leaks and retest until no leaks exist.
 - 7. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.

8. Verify that specified filters are installed. Check for leakage around filters.
9. HEPA Filter Operational Test: Pressurize housing to a minimum of 3 in. wg or to designed operating pressure, whichever is higher; test housing joints, door seals, and sealing edges of filter with soapy water to check for air leaks.
10. Verify that cooling coil drain pans have a positive slope to drain.
11. Verify that the cooling coil condensate drain trap maintains an air seal.
12. Clean air-handling units internally, on completion of installation, according to manufacturer's written instructions. Clean fan interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheels, cabinets, and coils entering air face.
13. After completing system installation and testing, adjusting, and balancing modular indoor air handling and air-distribution systems, clean filter housings and install new filters.

END OF SECTION 237313

SECTION 238239 - UNIT HEATERS (HYDRONIC)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide labor, materials, equipment and services as required for the complete installation and related work as shown on the Contract Documents.

1.2 SUBMITTALS

- A. Submit product data for unit heaters and cabinet unit heaters.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Free from expansion and contraction noises and strains. Fan speed shown on Schedule shall not be exceeded. Each piece of equipment shall be factory-boxed and tagged by room number. Cabinet unit heaters and unit heaters shall have baked enamel finish with color selected by the Architect from manufacturer's standard colors. Rating in accordance with standard test codes adopted jointly by IUGA and ASHRAE.

2.2 UNIT HEATERS

- A. General:
 - 1. Wall hung or ceiling suspended.
 - 2. Access for servicing the heating element, motors, and controls.
 - 3. Horizontal discharge units with adjustable horizontal and/or vertical outlet vanes.
 - 4. Vertical units with adjustable outlet louvers or diffusers.
- B. Fan and Motor:
 - 1. Statically and dynamically balanced.
 - 2. Motor shall be totally enclosed and designed for continuous operation. Lubrication shall be sealed-in, permanent type.
- C. Heating Element (Hydronic):
 - 1. Serpentine coil, copper tube, aluminum fins, back or side connections to fit headroom requirements.
 - 2. Aquastat on return side to prevent fan operation when heat is not available.
- D. Hydronic:
 - 1. Design Equipment: Trane

2. Acceptable Makes: Daikin Applied, Airtherm, Dunham-Bush, Sterling, Trane, Vulcan.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

- A. Provide equipment in accordance with manufacturer's printed instructions. Report untrue walls before installation. Report cases where clearance below suspended heaters is less than 7-1/2 ft. Provide clearance for piping or conduit. Support units independent of piping or conduit. Support units from building structure, with screws or bolts; no nailing allowed.

3.2 INSTALLATION - HYDRONIC

- A. Provide valves and accessories and arrange to permit servicing. Coordinate correct end connections and coil arrangements.
- B. Vertical cabinet heaters that are mounted on an existing wall shall be provided with continuous wood blocking that is painted to match the wall to infill any gaps created by the baseboard.

END OF SECTION 238239

SECTION 260500 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work, complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these contract documents. All materials and equipment shall be installed in accordance with the manufacturer's recommendations.

1.2 LICENSING

- A. The Contractor shall hold a license to perform the work as issued by the authority having jurisdiction.
- B. Plumbing contract work shall be performed by, or under, the direct supervision of a licensed master plumber.
- C. Electrical contract work shall be performed by, or under, the direct supervision of a licensed electrician.

1.3 PERMITS

- A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges. Provide certificate of approval from the Authorities Having Jurisdiction prior to request for final payment.
- B. Provide electrical inspection certificate of approval from Middle Department Inspection Agency, Commonwealth Inspection Agency, or an Engineer approved Inspection Agency prior to request for final payment.

1.4 CODE COMPLIANCE

- A. Provide work in compliance with the following Codes and Standards based on the current edition in effect at project location:
 - 1. Building, Code of New York State.
 - 2. Existing Building Code of New York State.
 - 3. Fire Code of New York State.
 - 4. Plumbing Code of New York State.
 - 5. Mechanical Code of New York State.
 - 6. Fuel Gas Code of New York State.

7. Property Maintenance Code of New York State.
8. Energy Conservation Code of New York State
9. Accessible and Usable Buildings and Facilities, ICC A117.1.
10. New York State Department of Labor Rules and Regulations.
11. New York State Department of Health.
12. National Electrical Code (NEC).
13. Occupational Safety and Health Administration (OSHA).
14. Local Codes and Ordinances.
15. Life Safety Code, NFPA 101.
16. New York State Education Department Manual of Planning Standards.

1.5 GLOSSARY

ACI	American Concrete Institute
AGA	American Gas Association
AGCA	Associated General Contractors of America, Inc.
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AFBMA	Anti-Friction Bearing Manufacturer's Association
AMCA	Air Moving and Conditioning Association, Inc.
ANSI	American National Standards Institute
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASTM	American Society for Testing Materials
AWSC	American Welding Society Code
AWWA	American Water Works Association
FM	Factory Mutual Insurance Company
IBR	Institute of Boiler & Radiation Manufacturers
IEEE	Institute of Electrical and Electronics Engineers
IRI	Industrial Risk Insurers

NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NYS/DEC	New York State Department of Environmental Conservation
SBI	Steel Boiler Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UFPO	Underground Facilities Protective Organization
UL	Underwriter's Laboratories, Inc.
OSHA	Occupational Safety and Health Administration
XL - GAP	XL Global Asset Protection Services

1.6 DEFINITIONS

Acceptance	Owner acceptance of the project from Contractor upon certification by Owner's Representative.
As Specified	Materials, equipment including the execution specified/shown in the contract documents.
Basis of Design	Equipment, materials, installation, etc. on which the design is based. (Refer to the article, Equipment Arrangements, and the article, Substitutions.)
Code Requirements	Minimum requirements.
Concealed	Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
Coordination Drawings	Show the relationship and integration of different construction elements and trades that require careful coordination during fabrication or installation, to fit in the space provided or to function as intended.
Delegated-Design Services	Performance and Design criteria for Contractor provided professional services. Where professional design services or certifications by a design professional are specifically required of a Contractor, by the Contract Documents. Provide products and systems with the specific design criteria indicated. If criteria indicated is insufficient to perform services or certification required, submit a written request for additional information to the Engineer. Submit wet signed and sealed certification by the licensed design professional for each product and system specifically assigned to the Contractor to be designed or certified by a design professional. Examples: structural maintenance ladders, stairs and platforms, pipe anchors, seismic compliant system, wind, structural supports for material equipment, sprinkler hydraulic calculations.

Equal, Equivalent, Equal To, Equivalent To, As Directed and As Required	Shall all be interpreted and should be taken to mean "to the satisfaction of the Engineer".
Exposed	Work not identified as concealed.
Extract	Carefully dismantle and store where directed by Owner's Representative and/or reinstall as indicated on drawings or as described in specifications.
Furnish	Purchase and deliver to job site, location as directed by the Owner's Representative.
Inspection	Visual observations by Owner's site Representative.
Install	Store at job site if required, proper placement within building construction including miscellaneous items needed to affect placement as required and protect during construction. Take responsibility to mount, connect, start-up and make fully functional.
Labeled	Refers to classification by a standards agency.
Manufacturers	Refer to the article, Equipment Arrangements, and the article, Substitutions.
Prime Professional	Architect or Engineer having a contract directly with the Owner for professional services.
Product Data	Illustrations, standard schedules, performance charts, instructions, brochures, wiring diagrams, finishes, or other information furnished by the Contractor to illustrate materials or equipment for some portion of the work.
Provide (Furnish and Install)	Contractor shall furnish all labor, materials, equipment and supplies necessary to install and place in operating condition, unless otherwise specifically stated.
Relocate	Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.
Remove	Dismantle and take away from premises without added cost to Owner, and dispose of in a legal manner.
Review and Reviewed	Should be taken to mean to be followed by "for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents".
Roughing	Pipe, duct, conduit, equipment layout and installation.
Samples	Physical full scale examples which illustrate materials, finishes, coatings, equipment or workmanship, and establishes standards by which work will be judged.
Satisfactory	As specified in contract documents.
Shop Drawings	Fabrication drawings, diagrams, schedules and other instruments, specifically prepared for the work by the Contractor or a Sub-contractor, manufacturer, supplier or distributor to illustrate some portion of the work.
Site Representative	Owner's Inspector or "Clerk of Works" at the work site.

Submittals Defined
(Technical)

Any item required to be delivered to the Engineer for review as requirement of the Contract Documents.

The purpose of technical submittals is to demonstrate for those portions of the work for which a submittal is required, the manner in which the Contractor proposes to conform to the information given and design concepts expressed and required by the Contract Documents.

1.7 EXISTING CONDITIONS

- A. Contractor shall review all available record documents of existing construction or other existing conditions and hazardous material information. Owner does not guarantee that existing conditions are the same as those indicated in these documents. Contractor shall record existing conditions via measured drawings and preconstruction photographs or video. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage, removal or construction operations.
- B. Owner will occupy portions of the building immediately adjacent to the area(s) of removals. Conduct removals so Owner's operations are not disrupted. Contractor shall locate, identify, disconnect and seal or cap mechanical, plumbing, fire protection and/or electrical systems serving areas of removals, unless noted otherwise in the contract documents. Contractor shall arrange shut-down of systems with the Owner's Representative. Piping and ductwork indicated to be removed shall be removed and capped or plugged with compatible materials. If services/systems are required to be removed, relocated or abandoned, provide temporary services/systems the bypass area(s) of removals to maintain continuity of services/systems to other parts of the building, as required.

1.8 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

- A. Provide submittals on all items of equipment and materials to be furnished and installed. Submittals shall be accompanied by a transmittal letter, stating name of project and contractor, name of vendor supplying equipment, number of drawings, titles, specification sections (name and number) and other pertinent data called for in individual sections. Submittals shall have individual cover sheets that shall be dated and contain: Name of project; name of prime professional; name of prime contractor; description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed. Individual piecemeal or incomplete submittals will not be accepted. Similar items, (all types specified) shall be submitted at under one cover sheet per specification section (e.g. lighting fixtures, valves, plumbing fixtures, etc.). Submittals shall include all required documentation for each product listed in the specification section at the same time as a complete package. Number each submittal by trade. Indicate deviations from contract requirements on Letter of Transmittal. Submittals will be given a general review only. Corrections or comments made on the Submittals during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for: confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. If submitting hard copies, submit four (4) copies for review.

- B. If submittals are to be submitted electronically, all requirements in Item A apply. Submittals shall be emailed in PDF format to specific email address provided by the Construction Manager, General Contractor, Architect or Project Manager. Name of project shall be in subject line of email. Send emails to mee.merochsubmittalclerk@salasobrien.com.
- C. If submittals are to be submitted electronically through **AUTODESK**, all requirements in Item A apply. Submittals shall be emailed in PDF format to specific email address provided by the Construction Manager, General Contractor, Architect or Project Manager. Name of project shall be in subject line of email. Send emails to the following people:
- Tessa Rath** - tessa.rath@salasobrien.com
Katie Godfrey - katie.godfrey@salasobrien.com
Rachael Potocki - rachael.potocki@salasobrien.com
Erin Lovejoy - erin.lovejoy@salasobrien.com
Alyssa Thompson - alyssa.thompson@salasobrien.com
- D. Refer to Division 01 for additional requirements.

1.9 PROTECTION OF PERSONS AND PROPERTY

- A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

1.10 EQUIPMENT ARRANGEMENTS

- A. The contract documents are prepared using one manufacturer as the Basis of Design, even though other manufacturers' names are listed. If Contractor elects to use one of the listed manufacturers other than Basis of Design or if the physical size, performance or electrical characteristics for the Basis of Design equipment differs from what is indicated in the contract documents, submit detailed drawings, indicating proposed installation of equipment. Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in the work of other trades, at no increase in any contract. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace doorframes, access doors, walls, ceilings, or floors required to install. If revised arrangement submittal is rejected, revise and resubmit specified Basis of Design item which conforms to Contract Documents.

1.11 SUBSTITUTIONS

- A. If Contractor desires to bid on any other kind, type, brand, or manufacture of material or equipment than those named in specifications, secure prior approval. To request such approval, Contractor shall submit complete information comparing (item-for-item) material or equipment offered with design material or equipment.

Include sufficient information to permit quick and thorough comparison, and include performance curves on same basis, capacities, power requirements, controls, materials, metal gauges, finishes, dimensions, weights, etc., of major parts. If accepted, an addendum will be issued to this effect ahead of bid date. Unless such addendum is issued, substitution offered may not be used.

- B. Refer to Division 01 for additional requirements.

1.12 CONTINUITY OF SERVICES

- A. The building will be in use during construction operations. Maintain existing systems in operation within all rooms of building at all times. Refer to "General Conditions of the Contract for Construction" for temporary facilities for additional contract requirements. Schedules for various phases of contract work shall be coordinated with all other trades and with Owner's Representative. Provide, as part of contract, temporary mechanical and electrical connections and relocations as required to accomplish the above. Obtain approval in writing as to date, time, and location for shutdown of existing mechanical/electrical facilities or services.

1.13 ROUGHING

- A. The Contract Drawings have been prepared in order to convey design intent and are diagrammatic only. Drawings shall not be interpreted to be fully coordinated for construction.
- B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of a contract to accommodate work to avoid obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. **DO NOT SCALE** plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Owner's Representative for review. Obtain written approval for all major changes before installing.
- C. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Provide new materials, including new piping and insulation for relocated work.
- D. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Owner's Representative exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and electrical drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, speakers, and other items. Do not rough-in contract work without reflected ceiling location plans.

- E. Before roughing for equipment furnished by Owner or in other Divisions, obtain from Owner and other Divisions, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to ensure proper location and size of connections to ensure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:
1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.
 2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Owner's Representative.

1.14 REMOVAL WORK

- A. Where existing equipment removals are called for, submit complete list to Owner's Representative. All items that Owner wishes to retain that do not contain asbestos or PCB material shall be delivered to location directed by Owner. Items that Owner does not wish to retain shall be removed from site and legally disposed of. Removal and disposal of material containing asbestos, lead paint, mercury and PCB's shall be in accordance with Federal, State and Local law requirements. Where equipment is called for to be relocated, contractor shall carefully remove, clean and recondition, then reinstall. Remove all abandoned piping, wiring, equipment, lighting, ductwork, tubing, supports, fixtures, etc. Visit each room, crawl spaces, and roofs to determine total Scope of Work. The disturbance or dislocation of asbestos-containing materials causes asbestos fibers to be released into the building's atmosphere, thereby creating a health hazard to workmen and building occupants. Consistent with Industrial Code Rule 56 and the content of recognized asbestos-control work, the Contractor shall apprise all of his workers, supervisory personnel, subcontractors, Owner and Consultants who will be at the job site of the seriousness of the hazard and of proper safeguards and work procedures which must be followed, as described in New York State Department of Labor Industrial Code Rule 56.
- B. For materials indicated to contain lead, that are being affected by demolition or construction, the contractor shall comply with all Federal, State and Local law requirements regarding worker exposure to lead disturbance and abatement procedures.
- C. Refer to the Owner's Lead Paint Survey. The Survey identifies the surfaces within the buildings that were tested for lead by collecting paint samples and performing laboratory analysis. If any unidentified surfaces are to be impacted the lead content shall be tested by analytical determinations conducted by a qualified laboratory approved by the Owner. The contractor shall review the current owner's lead paint reports on file before starting any work which may disturb existing surfaces.
- D. Refer to Division 02 for additional information regarding hazardous materials.

1.15 REFRIGERANT RECOVERY

- A. Existing equipment to be removed, as shown on the plans may contain refrigerant and refrigerant oils. This refrigerant and refrigerant oil must be handled in accordance with Federal, State and Local law requirements.
- B. Removal and recovery of refrigerant shall be in accordance with the current edition of Section 608 of the Clean Air Act of 1990, including all final regulations.
- C. Refrigerant recovery must be performed by a technician, certified by an EPA-approved certification program, using refrigerant recovery and recycling equipment certified by an EPA-approved testing organization.
- D. Owner "reserves the right of first refusal" on ownership of recovered refrigerant. Should Owner choose to maintain ownership of refrigerant, refrigerant shall be reclaimed, cleaned by this Contractor to ARI 700-1993 Standard of Purity, by an EPA certified refrigerant reclaimer. Refrigerant shall be turned over to the Owner in suitable marked containers to be stored on site, at a place of the Owner's choosing.

1.16 EQUIPMENT AND MATERIAL REQUIREMENTS

- A. Provide materials that meet the following minimum requirements:
 - 1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
 - 2. All equipment and material for which there is a listing service shall bear a UL label.
 - 3. Potable water systems and equipment shall be built according to AWWA Standards.
 - 4. Gas-fired equipment and system shall meet AGA Regulations and shall have AGA label.
 - 5. All electrical equipment and systems, as a whole, shall be tested and listed by an OSHA approved Nationally Recognized Testing Laboratory (NRTL) for the intended use in accordance with the applicable standards and have a physical label indicating such.
 - 6. Fire protection equipment shall be UL listed and FM approved.
- B. Exterior and wet locations shall utilize materials, equipment supports, mounting, etc. suitable for the intended locations. Metals shall be stainless steel, galvanized or with baked enamel finish as a minimum. Finishes and coatings shall be continuous and any surface damaged or cut ends shall be field corrected in accordance with the manufacturer's recommendations. Hardware (screws, bolts, nuts, washers, supports, fasteners, etc.) shall be:
 - 1. Stainless steel where the associated system or equipment material is stainless steel or aluminum.

2. Hot dipped galvanized or stainless steel where the associated system or equipment is steel, galvanized steel or other.

1.17 CUTTING AND PATCHING

- A. Each trade shall include their required cutting and patching work unless shown as part of the General Construction Contract. Refer to General Conditions of the Contract for Construction, for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch cut or abandoned holes left by removals of equipment or fixtures. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

1.18 PAINTING

- A. Refer to Division 9 - Finishes, for additional information.

1.19 CONCEALMENT

- A. **Conceal all contract work** above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after their review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

1.20 CHASES

- A. New Construction:
 1. Certain chases, recesses, openings, shafts, and wall pockets will be provided as part of General Construction Trade. Mechanical and Electrical trades shall provide all other openings required for their contract work.
 2. Check Architectural and Structural Design and Shop Drawings to verify correct size and location for all openings, recesses and chases in general building construction work.
 3. Assume responsibility for correct and final location and size of such openings.
 4. Rectify improperly sized, improperly located or omitted chases or openings due to faulty or late information or failure to check final location.
 5. Provide 18 gauge galvanized sleeves and inserts. Extend all sleeves 2 in. above finished floor. Set sleeves and inserts in place ahead of new construction, securely fastened during concrete pouring. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Firestop all unused sleeves.
 6. Provide angle iron frame where openings are required for contract work, unless provided by General Construction trade.

B. In Existing Buildings:

1. Drill holes for floor and/or roof slab openings.
2. Multiple pipes smaller than 1 in. properly spaced and supported may pass through one 6 in. or smaller diameter opening.
3. Seal voids in fire rated assemblies with a fire-stopping seal system to maintain the fire resistance of the assembly. Provide 18 gauge galvanized sleeves at fire rated assemblies. Extend sleeves 2 in. above floors.
4. In wall openings, drill or cut holes to suit. Provide 18 gauge galvanized sleeves at shafts and fire rated assemblies. Provide fire-stopping seal between sleeves and wall in drywall construction. Provide fire stopping similar to that for floor openings.

1.21 PENETRATION FIRESTOPPING

A. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:

1. Provide materials and products listed or classified by an approved independent testing laboratory for "Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Penetrations Fire-Stops" designated ASTM E814.
2. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
4. The methods used shall incorporate qualities which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion, and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.
5. Plastic pipe/conduit materials shall be installed utilizing intumescent collars.
6. Provide a submittal including products intended for use, manufacturer's installation instructions, and the UL details for all applicable types of wall and floor penetrations.
7. Fire-stopping products shall not be used for sealing of penetrations of non-rated walls or floors.

8. Piping insulation is allowed to be reduced in thickness only when a specific UL assembly detail for piping passing thru a rated wall indicates a maximum insulation thickness that is less than the insulation specification section calls for. In this case reduce the insulation thickness just for the rated wall penetration. The reduction of insulation thickness shall be limited to the length of the penetration only.

B. Acceptable Manufacturers:

1. Dow Corning Fire-Stop System Foams and Sealants.
2. Nelson Electric Fire-Stop System Putty, CLK and WRP.
3. S-100 FS500/600, Thomas & Betts.
4. Carborundum Fyre Putty.
5. 3-M Fire Products.
6. Hilti Corporation.

C. Refer to Division 07 for project-wide fire stopping information.

1.22 NON-RATED WALL PENETRATIONS

- A. Each trade shall be responsible for sealing wall penetrations related to their installed work, including but not limited to ductwork, piping, conduits, etc. See individual specification sections for requirements.

1.23 SUPPORTS

- A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above.
- B. For precast panels/planks and metal decks, support mechanical/electrical work as determined by manufacturer and the Engineer. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.
- C. For finished areas without a finished ceiling system such as classrooms, offices, conference rooms, etc., where decking and structure is exposed, and ductwork/piping/conduit is exposed: All mounting brackets, channel support systems and mounting hardware for ductwork, piping, lighting, etc. shall be concealed and approved by the Architect/Engineer prior to the installation. AirCraft cable style hanging for ductwork is required. It is recommended that room mockups be done and receive Architect/Engineer approval prior to proceeding with installation.

- D. Equipment, piping, conduit, raceway, etc. supports shall be installed to minimize the generation and transmission of vibration.
- E. Materials and equipment shall be solely supported by the building structure and connected framing. Gypboard, ceilings, other finishes, etc. shall not be used for support of materials and equipment.

1.24 APPLIED FIREPROOFING

- A. Scope: Provide encapsulation of surfaces where applied fireproofing materials have been disturbed, removed, or left missing by the removal of hangers or upper attachments, or when new hangers or upper attachment are installed.
- B. Fire Resistance Rating: Fireproofing shall meet the original hourly rating when applied to the construction assembly where materials have been removed or disturbed, or is missing.
- C. Fire Hazard Classification: Fireproofing shall be listed in the Underwriters Laboratories Building Materials Directory with the following performance properties:
 - 1. Flame Spread: 10 or less.
 - 2. Smoke Developed: 5 or less.
- D. Product Data: Provide manufacturer's product descriptions for each required fireproofing material. Include application instructions, including primer/adhesive requirements and recommended minimum thickness and density for each required hourly rating.
- E. Fire Proofing Manufacturer:
 - 1. Retro-Guard cementitious replacement fireproofing by Grace Construction Products, or equivalent Cafco Blaze Shield, and Cafco 300 by Isolotek.
 - 2. Physical Properties:
 - a. Dry Field Density (ASTM E 605): 15 lb/cu ft minimum average.
 - b. Cohesion/Adhesion (Bond Strength) (ASTM E 736): 200 lb/sq ft minimum average.
 - c. Compressive Strength (ASTM E 761): 500 lb/sq ft minimum.
 - d. Impact (Bond Impact) Resistance (ASTM E 760): Shall not crack or delaminate.
 - e. Effect of Deflection (ASTM E 759): Shall not crack or delaminate.
 - f. Corrosion Resistance (ASTM E 937): No evidence of corrosion.
 - g. Air Erosion (ASTM E 859): Maximum 0.025 g/sq ft weight loss.

- h. Provide primer or adhesive recommended by the fireproofing manufacturer to obtain required bond strength for the specific fireproofing and substrate.
- F. Apply fireproofing prior to installation of ductwork, piping, conduits, and other suspended items. Hangers, clips and other supports for these items shall be installed before application of fireproofing.
- G. Examine the substrate and conditions under which fireproofing is to be applied. Do not proceed with the fireproofing work until unsatisfactory conditions have been corrected. Verify that hangers, clips, sleeves, and other items that will penetrate the fireproofing are in place. Check paint on substrate for compatibility with primer/fireproofing and adequacy of bond strength in accordance with fireproofing manufacturer's instructions.
- H. Surface Preparation: Remove dirt, dust, oil, grease, loose paint and rust, mill scale, and other foreign matter that may impair the bonding of the fireproofing to the substrate. Clean substrate free of contamination from chemicals and solvents.

Apply primer/adhesive where necessary to obtain bond strength of fireproofing to steel shop paint and where recommended by the fireproofing manufacturer.
- I. Apply the fireproofing in accordance with UL fire test report and the manufacturer's application instructions. Thickness and density of fireproofing shall be in accordance with the approved product data and as required to produce the hourly fire resistance rating required.

1.25 ACCESS PANELS

- A. Provide access panels for required access to respective trade's work. Location and size shall be the responsibility of each trade. Access panels provided for equipment shall provide an opening not smaller than 22 in. by 22 in. Panels shall be capable of opening a minimum of 90 degrees. Bear cost of construction changes necessary due to improper information or failure to provide proper information in ample time. Access panels over 324 square inches shall have two cam locks. Provide proper frame and door type for various wall or ceiling finishes. Access panels shall be equal to "Milcor" as manufactured by Inland Steel Products Co., Milwaukee, Wisconsin. Provide General Construction trade with a set of architectural plans with size and locations of access panels.

1.26 CONCRETE BASES

- A. Provide concrete bases for all floor mounted equipment. Provide 3,000 lb. concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases 4 in. high (unless otherwise indicated); shape and size to accommodate equipment. Provide anchor bolts in equipment bases for all equipment provided for the project, whether mounted on new concrete bases or existing concrete bases.

1.27 HVAC EQUIPMENT CONNECTIONS

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Provide final connections to all equipment as required by the equipment. Provide final connections, including domestic water piping, wiring, controls, and devices from equipment to outlets left by other trades. Provide equipment waste, drip, overflow and drain connections extended to floor drains.
- C. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, insulation, sheet metal work, controls, dampers, as required.
- D. Refer to manufacturer drawings and specifications for requirements of equipment. Verify connection requirements before bidding.

1.28 PLUMBING EQUIPMENT CONNECTIONS

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Provide roughing and final connections to all equipment. Provide loose key stops, sanitary "P" traps, tailpiece, adapters, gas or air cocks, and all necessary piping and fittings from roughing point to equipment. Provide installation of sinks, faucets, traps, tailpiece furnished by others. Provide cold water line with gate valve and backflow prevention device at locations called for. Provide continuation of piping and connection to equipment that is furnished by others. Provide relief valve discharge piping from equipment relief valves.
- C. Provide valved water outlet adjacent to equipment requiring same. Provide equipment type floor drains, or drain hubs, adjacent to equipment.
- D. Install controls and devices furnished by others.
- E. Refer to Contract Documents for roughing schedules, and equipment and lists indicating scope of connections required.
- F. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, as required.
- G. Refer to Manufacturer drawings and specifications for requirements of equipment. Verify connection requirements before bidding.

1.29 ELECTRICAL EQUIPMENT CONNECTIONS

- A. Provide complete power connections to all electrical equipment. Provide control connections to equipment. Heavy duty NEC rated disconnect ahead of each piece of equipment. Ground all equipment in accordance with NEC.
- B. Provide for Owner furnished and Contractor furnished equipment all power wiring, electric equipment, control wiring, switches, lights, receptacles, and connections as required.
- C. Refer to Manufacturer's drawings/specifications for requirements of equipment. Verify connection requirements before bidding.

1.30 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT

- A. Store Materials on dry base, at least 6 in. aboveground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.
- B. Refer to Division 01 for additional information.
- C. Division 23 shall provide airtight plastic covers over all supply and return air openings prior to the start of construction by any trade. The plastic shall be maintained airtight throughout the project construction and removed only with the approval of the Owner's Representative.
- D. Ductwork shall be delivered to the site from the fabrication shop with air tight plastic covers over all ends of the ducts. The plastic covers shall be in place during transportation and shall be removed prior to installation.

1.31 FREEZING AND WATER DAMAGE

- A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner's operating staff.

1.32 OWNER INSTRUCTIONS

- A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

1.33 OPERATION AND MAINTENANCE MANUALS

- A. Submit by email (preferred) or digital media, thru the normal project submittal process. Include a copy of each final approved Shop Drawing, wiring diagrams, piping diagrams, spare parts lists, final testing and balancing report, as-built drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, summer-winter changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of installing contractor and of supplier manufacturer Representative and service agency for all major equipment items. Provide a table of contents page and dividers based upon specification section numbers. Submit in a compiled and bookmarked PDF format as outlined below. Each item listed in the table of contents shall include a hyperlink to the associated section of the O&M Manual, in addition to the bookmarking.
- B. Provide content for Operation and Maintenance Manuals as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Engineer and Commissioning Agent will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- C. Submit Operation and Maintenance Manuals in the following format:
 - 1. Submit by uploading to web-based project software site, or by email to Architect, as a formal project submittal in conformance with the project specific submittal procedures. Enable reviewer comments on draft submittals.
 - 2. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 3. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in the table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- D. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing Owner training. Engineer and Commissioning Agent will comment on whether general scope and content of manual are acceptable.
- E. Final Manual Submittal: Submit O&M manual in final form prior to requesting inspection for Substantial Completion and at least 2 weeks before commencing Owner training.

Engineer and Commissioning Agent will return copy with review comments.

1. Correct or revise O&M manual to comply with Engineer's and Commissioning Agent's comments. Submit copies of each corrected manual within 2 weeks of receipt of Engineer's and Commissioning Agent's comments.

F. Refer to Division 01 for additional requirements.

1.34 RECORD DRAWINGS

- A. The Contractor shall obtain at his expense one (1) set of construction Contract Drawings, (including non-reproduction black and white prints or electronic files) for the purpose of recording as-built conditions.
- B. The Contractor shall perform all survey work required for the location and construction of the work and to record information necessary for completion of the record drawings. Record drawings shall show the actual location of the constructed facilities in the same manner as was shown on the bid drawings. All elevations and dimensions shown on the drawings shall be verified or corrected so as to provide a complete and accurate record of the facilities as constructed.
- C. It shall be the responsibility of the Contractor to mark **EACH** sheet of the contract documents in red and to record thereon in a legible manner, any and all approved field changes and conditions as they occur. A complete file of approved field sketches, diagrams, and other changes shall also be maintained. At completion of the work, the complete set of red marked contract documents, plus all approved field sketches and diagrams shall be submitted to the engineer and used in preparation of the record drawings.
- D. A complete set of red marked contract drawings shall be submitted, at one time, as the "Record" set. If there are no changes to a specific drawing, the contractor shall indicate "NO CHANGES" on that drawing. ALL drawings shall be included in the "Record" set.
- E. The complete set of red marked Contract Documents or electronic files shall be certified by the Contractor as reflecting record conditions and submitted to the engineer for review.
- F. The Contractor shall have the marked up set scanned, if they are not already electronic files, and then submit them to the Engineer as the "Record Set".
- G. Refer to Division 01 for additional requirements.

1.35 FINAL INSPECTION

- A. Upon completion of all Engineering Site Observation list items, the Contractor shall provide a copy of the Engineering Site Observation Report back to the Engineer with each item noted as completed or the current status of the item. Upon receipt, the Engineer will schedule a final review.

1.36 COMMISSIONING

- A. Refer to General Commissioning Requirements in Division 01 for additional requirements.

1.37 TEMPORARY HEATING AND COOLING

- A. Refer to the General Conditions of the Contract for Construction and Supplemental General Conditions.
- B. Systems and equipment installed as part of this project shall not be used for temporary heating or cooling.

1.38 TEMPORARY FACILITIES

- A. Refer to the Division 01 Sections, General Conditions and Supplemental General Conditions.

1.39 TEMPORARY LIGHT AND POWER

- A. Refer to the Division 01 Sections, General Conditions and Supplemental General Conditions.

1.40 CLEANING

- A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations.

The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:

1. Thoroughly clean entire installation, both exposed surfaces and interiors.
2. Remove all debris caused by work.
3. Remove tools, surplus, materials, when work is finally accepted.

1.41 SYSTEM START-UP AND TESTING

- A. Prior to commencement of work, the Division(s) effecting such system shall survey all building mechanical, plumbing, fire protection and electrical systems and components and make written notice to the Owner's Representative regarding any damage, missing items and/or incomplete systems. Prior to the conclusion of this project, the Contractor shall verify with the Owner's Representative that all building systems have been returned to their original conditions.
- B. Start-up and testing of HVAC systems shall occur while the area of work is not occupied by Owner and only after notice to the Owner's Representative is made at least 24 hours in advance. Division 23 shall be responsible for providing temporary filter media over all supply air registers and diffusers during the HVAC system start-up procedure.

Division 23 shall provide airtight plastic covers over all supply and return air openings prior to the start of construction by any contractor. The plastic shall be maintained airtight throughout the project construction and removed only with the approval of the Owner's Representative.

1.42 TRANSFER OF ELECTRONIC FILES

- A. Salas O'Brien Consulting and Engineering Group of New York, Inc. (FKA M/E Engineering) will provide electronic files for the Contractor's use in the preparation of sheet metal shop drawings, coordination drawings, or record drawings related to the project, subject to a \$50.00 charge per drawing file, \$2500.00 charge for a Revit model and the following terms and conditions:
1. The Contractor shall submit a formal request for electronic drawing files on the our website, by utilizing the following website link:
<http://www.meengineering.com/contact-pages/contractor-request>
 2. Salas O'Brien Consulting and Engineering Group of New York, Inc. (FKA M/E Engineering) makes no representation as to the compatibility of these files with the Contractor's hardware or the Contractor's software beyond the specific release of the referenced specifications.
 3. We can only provide CAD files of M/E/P/FP drawing levels for which we are the Engineer of Record. CAD files of Architectural backgrounds, reflected ceiling plans, structural plans, etc. must be obtained separately from the Architect of Record.
 4. Data contained on these electronic files is part of our instruments of service shall not be used by the Contractor or anyone else receiving data through or from the Contractor for any purpose other than as convenience in the preparation of shop drawings for the referenced project. Any other use or reuse by the Contractor or by others will be at the Contractor's sole risk and without liability or legal exposure to Salas O'Brien Consulting and Engineering Group of New York, Inc. (FKA M/E Engineering). The Contractor agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against Salas O'Brien Consulting and Engineering Group of New York, Inc. (FKA M/E Engineering), its officers, directors, employees, agents or sub-consultants which may arise out of or in connection with the Contractor's use of the electronic files.
 5. Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless, Salas O'Brien Consulting and Engineering Group of New York, Inc. (FKA M/E Engineering) from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from the Contractor's use of these electronic files.
 6. These electronic files are not contract documents. Significant difference may arise between these electronic files and corresponding hard copy contract documents due to addenda, change orders or other revisions. We make no representation regarding the accuracy or completeness of the electronic files the Contractor receives.

In the event that a conflict arises between the signed contract documents prepared by us and electronic files, the signed contract documents shall govern. The Contractor is responsible for determining if any conflicts exist. By the Contractor's use of these electronic files the Contractor is not relieved of the Contractor's duty to comply with the contract documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, field verify conditions and coordinate the Contractor's work with that of other contractors for the project.

1.43 VIDEO RECORDING OF TRAINING SESSIONS

- A. The contractor shall video record all training sessions required by their discipline. Video shall be in Windows Media Player video format saved on flash drives. Two (2) copies on flash drives are to be provided as a formal submittal. . Flash drives are to be tagged with project name, training session name(s), installing Contractor and date of training. The flash drive shall include a scanned version of the training session sign in list(s), including the presenter and the owner's participants.

1.44 ENERGY INCENTIVES

- A. The Contractor, his Subcontractors and Suppliers shall provide to the Owner all paperwork necessary to support the Owners pursuit of incentives related to energy conservation as offered by the utility company or state sponsored incentive programs. This shall include at a minimum, receipts, and quantities and data sheets for energy efficient equipment such as: lighting, motors, variable frequency drives, etc.

1.45 INFECTION CONTROL

- A. Construction procedures, temporary partitions, negative air systems, cleaning procedures, HVAC system isolation, dust control, etc. shall be in accordance with the infection control standards set forth by the Facility. A copy of the facilities standards are available from the Owner upon request.

END OF SECTION 260500

SECTION 260501 - BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The drawings are diagrammatic, unless detailed dimensioned drawings are included, and show only approximate locations of equipment, fixtures, panelboards, conduits, and wiring devices. Exact locations are subject to the approval of the Owner's Representative. The general run of electrical feeders, branch circuits, and conduits, indicated on the drawings, is not intended to be the exact routing. Exact routings of conduit shall suit the job conditions.
- B. Circuit designations, in the form of "Home Runs" on branches, indicate the designation of the branch circuit, the size and the quantity of branch circuit conductors, and the panel board or interconnection box from which the branch circuit is served.
- C. Make measurements at the site and in the building during construction for all systems installed as the work progresses in such a manner that the equipment, piping, vents, ducts, conduit, and boxes will fit in the space available. Maintain headroom and if in unfinished areas, be as neatly installed, as obscure and "out-of-the-way" as physically possible. Where more than one trade is involved in an area, space or chase, all shall cooperate and install their own work to utilize the space equally between them in proportion to their individual requirements. In general, ductwork shall be given preference except where grading of piping becomes a problem, followed by piping then electrical wiring. If, after installation of any equipment, piping, ducts, conduit, and boxes, it is determined that ample maintenance and passage space has not been provided, rearrange work and /or furnish other equipment as required for ample maintenance space.
- D. Any changes in the size or location of the material or equipment supplied, which may be necessary in order to meet field conditions or in order to avoid conflicts between trades, shall be brought to the immediate attention of the Owner's Representative and approval received before such alterations are made.

1.2 QUALITY ASSURANCE

- A. Electric equipment shall be installed in a neat and workmanlike manner. All methods of construction, details of workmanship, that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative.
- B. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc., correspond to the nomenclature dictated by those manufacturers. Where "or equal" is stated, equipment shall be equal in every way to that of the equipment specified and subject to approval. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.

1.3 SUBMITTALS

- A. Submit product data and information for the following equipment, materials and products, including all fittings and accessories:
 - 1. Conduit
 - 2. Surface Raceway
 - 3. Expansion Fittings
 - 4. Wireway and Wire Trough
 - 5. Channel Support Systems
 - 6. Conductors
 - 7. Wiring Devices
 - 8. Water Proofing Seals
 - 9. Flashing, Sealing, Firestopping Materials
 - 10. Salvageable Materials
 - 11. Testing reports prior to energizing equipment and materials.

2.1 MATERIALS

- A. Conduit, Raceway and Tubing:
 - 1. Rigid Metal Conduit (RMC) shall be hot-dipped galvanized or electro-galvanized steel, UL listed "rigid metal conduit."
 - a. Acceptable Manufacturers:
 - 1) Nucor Tubular Products
 - 2) Allied Tube and Conduit
 - 3) Wheatland Tube
 - 4) Approved equal
 - 2. Electrical Metallic Tubing (EMT) shall be electro-galvanized steel with corrosion resistant zinc coating; UL listed.
 - a. Acceptable Manufacturers:
 - 1) Nucor Tubular Products
 - 2) Allied Tube and Conduit
 - 3) Wheatland Tube
 - 4) Approved equal
 - 3. Flexible Metal Conduit (FMC) shall be constructed of one continuous length of electro-galvanized, spirally wound steel strip with interlocking convolutions and interior surfaces free from burrs and sharp edges; UL listed.
 - a. Acceptable Manufacturers:
 - 1) AFC (American Flexible Conduit) Cable Systems
 - 2) Anaconda Sealtite by ANAMET Electrical, Inc.
 - 3) Southwire

4. Liquidtight Flexible Metal Conduit (LFMC) shall be constructed of one continuous length of electro-galvanized, spirally wound steel strip with interlocking convolutions, interior surfaces free from burrs and sharp edges, and an outer liquidtight, nonmetallic, sunlight-resistant jacket; UL listed.

- a. Acceptable Manufacturers:

- 1) AFC (American Flexible Conduit) Cable Systems
- 2) Anaconda Sealtite by ANAMET Electrical, Inc.
- 3) Southwire

5. Surface Metal Raceway shall be .040 in. steel UL listed "Surface Metal Raceway". Use manufacturer's standard fittings designed to be used with the specific raceway.

- a. One-Piece Raceway:

- 1) Buff or ivory finish.
- 2) Acceptable Manufacturers:
 - a) Wiremold "700" Series (Design Make)
 - b) Mono Systems
 - c) Approved equal

B. Conduit Fittings:

1. Fittings for rigid metal conduit shall be fully threaded and shall be of the same material as the respective raceway system. Fittings for electrical metallic tubing shall be single screw indenter fittings for conduits up to 2 in. and double screw indenter fittings for conduits 2 in. and larger. Connectors shall also have insulated throat or plastic insulating bushing up to and including 1 in. size. For sizes 1-1/4 in. and larger, provide plastic insulating bushing. Die-cast, pressure cast fittings shall not be used. Fittings for rigid non-metallic conduit shall be solvent cemented in accordance with the manufacturer's instructions.

- a. Acceptable Manufacturers:

- 1) O.Z. Gedney
- 2) Steel City
- 3) Thomas & Betts
- 4) Crouse-Hinds
- 5) Carlon

2. Expansion Fittings shall be watertight, combination expansion and deflection type designed to compensate for movement in any direction. Fittings shall have flexible copper braid bonding jumpers, neoprene sleeve and stainless steel bands, use aluminum body fittings for rigid aluminum conduit.

- a. Acceptable Manufacturers:

- 1) Crouse-Hinds, Type "XD"
- 2) O.Z./Gedney, Type "DX"
- 3) Approved equal

3. Explosion-proof conduit sealing fittings shall be threaded, cast iron alloy construction with integral bushings. Seal with "A" sealing compound after wiring installation. The fittings shall be UL Listed for Class I, Division 1 and 2, Groups B, C, D; Class II, Division 1 and 2, Groups E, F, G; Class III.

- a. Acceptable Manufacturer's:

- 1) Crouse-Hinds EYS Series
- 2) Emerson/O.S./Gedney EYS Series
- 3) Emerson/Appleton EYS Series

C. Wireway, Wire Trough, and Auxiliary Gutters:

1. Wireway and Wire Trough shall be hinged cover type wireway with provisions for full lay-in along the entire length of run. Wireway shall be steel, enclosed with gray enamel finish. Provide NEMA 1 units for interior/dry/clean locations and NEMA 12 for interior dry maintenance/shop/utility locations. Size to meet NEC fill requirements or larger as noted on Contract Documents. Provide knockouts along runs. Recess in wall where required for flush mounted equipment. Hinge shall be on the bottom of front face for horizontal mounting. Provide all covers, couplings, offsets, elbows, expansion joints, adapters, hold down straps, end caps, tees, pullboxes, hangers, reducers, supports, and other fittings to match and mate with wireways as required for complete system.

- a. Acceptable Manufacturers:

- 1) Square D "Square Duct"
- 2) General Electric
- 3) Hoffman
- 4) Meco

D. Strut-Type Channel Raceways and Fittings:

1. Strut-Type Channel Raceways and Fittings shall be provided for racking of conduit, trapeze suspensions, equipment support, cable racks and panel racks. Channel shall be steel with electroplated zinc finish for interior dry locations. Provide necessary accessories such as bolts, screws, anchors, connection plates, and straps as required to perform the necessary functions. Wet location and exterior channel support systems shall be steel with hot dipped galvanized finish and stainless steel hardware as a minimum.

Cut ends shall be touched up with suitable matching finish.

a. Acceptable Manufacturers:

- 1) Unistrut
- 2) Globe
- 3) Kindorf
- 4) B-Line

E. Low Voltage (600V or less) Conductors and Cables:

1. Conductors shall be insulated for 600 volts, unless otherwise noted, and shall be standard AWG and kcmil sizes. Conductors shall be 98% copper, thermal plastic or cross-linked polymer insulated, heat and moisture resistant. Conductor sizes No. 18 AWG and smaller shall be a solid single strand; No. 16 AWG and larger shall be multiple stranded. Minimum conductor size shall be #12 AWG except smaller sizes may be used for communications and special systems. Conductor sizes shall be as called for. Conductors shall be labeled with UL seal and be permanently marked with the manufacturer's name, wire size and insulation type. Insulation for all 600 volt conductors shall be Type THHN/THWN-2 or Type XHHW-2, unless otherwise noted. All exterior and underground conductors shall be XHHW-2. Luminaire fixture wire shall conform to the latest Underwriters Laboratories requirements. Flexible cords and cables for general portable use shall be Type SO or SOOW or as noted. Cables for special use shall be of the type specified for the application.

a. Color Coding:

- 1) All circuits shall be color coded according to the following schedule.

	Three Phase 120/208V 240V	Three Phase 277/480V	Single Phase 120/240V
Ground	Green	Green	Green
Neutral	White	Gray	White
A or L1	Black	Brown	Black
B or L2	Red	Orange	Red
C or L3	Blue	Yellow	---

b. Acceptable Manufacturers:

- 1) General Cable (Brand of Prysmian Group)
- 2) Southwire
- 3) The Okonite Company
- 4) Service Wire Co.
- 5) Encore Wire

2. Metal Clad, Type "MC" Cable shall consist of thermal plastic insulated copper conductors of size and quantity indicated, protected by a positive interlocked armor of galvanized steel. The conductors shall be twisted together and shall have an overall moisture and fire resistant fibrous covering. The cable shall have an integral green insulated full size equipment grounding conductor running its entire length. Where dimming is called for the cable is allowed to include dimming control wiring with a voltage rating to match the power. The cable shall meet the requirements of the NEC for "Type MC" Metal Clad Cable and shall bear the UL Label.

- a. Acceptable Manufacturers:

- 1) Southwire
- 2) AFC Cable
- 3) Service Wire Co.
- 4) Encore Wire

3. Terminal Lugs and Connectors:

- a. The lug shall be capable of continuous operation at the current rating of the cable it is used on. The lug shall be UL listed per UL 486A, using industry standard crimping tools and dies. Terminal lugs shall be solderless, pressure type with UL label for "CU/AL" conductor terminations. The lug shall be a closed-end compression (crimp) type, constructed of seamless, alloy suitable for copper and/or aluminum conductors to match the conductor. The lug shall be made with a chamfered inside end, for ease of conductor insertion. Both one and two hole lugs shall be NEMA sized for standard stud sizes and spacing. The lug shall be designed for use at the system voltage.

- 1) Acceptable Manufacturers:

- a) 3M Scotchlok 30,000 and 31,000 Series
- b) Burndy
- c) O.Z./Gedney
- d) Thomas and Betts

- b. The conductor connection shall be capable of continuous operation at the current rating of the cables it is used on. The connection shall be UL listed per UL 486A, using industry standard crimping tools and dies. The connector shall be an inline compression (crimp) type, constructed of seamless, tin-plated copper. The connector shall be constructed with chamfered inside-ends and with center cable stops. The connector shall be designed for use at the system voltage.

- 1) Acceptable Manufacturers:

- a) 3M Scotchlok 10,000 and 11,000 Series
- b) Burndy
- c) O.Z./Gedney
- d) Thomas and Betts

c. "Split-bolt" Connectors shall be solderless type.

1) Acceptable Manufacturers:

- a) Burndy
- b) Kearney
- c) O.Z./Gedney
- d) Thomas and Betts
- e) Anderson

d. "TWIST ON" Connectors shall be spiral steel spring type and insulated with vinyl cap and skirt.

1) Acceptable Manufacturers:

- a) 3-M Company "Scotch-Lok"
- b) Ideal "Wing-Nuts"
- c) Approved equal

F. Outlet Boxes, Device Boxes, Rings, and Covers:

1. Outlet Boxes having pryout openings, knockouts, threaded entries, or hubs in either the sides of the back, or both, for entrance of conduit or cable fittings, or cables, with provisions for mounting outlet box cover. Outlet boxes shall be galvanized steel, not less than 2-1/2 in. deep, unless restricted by the surroundings, 4 in. square or octagonal. Boxes and associated fittings, plates and devices shall be mechanically fastened (screwed), friction fitting is not acceptable. Outlet boxes exposed to moisture, surface mounted, exterior, wet or damp locations shall be cadmium cast alloy complete with external threaded hubs and gasketed screw fastened covers. Minimum box size shall be as indicated in the NEC for the conductors and devices installed. Boxes shall be approved for the environmental condition where they will be installed.
2. Conduit bodies providing access to interior of conduit or tubing system through one or more removable covers at junction or terminal point and listed in accordance with outlet box requirements.
3. Extension ring intended to extend sides of outlet box or device box to increase box, volume, or both
 - a. Acceptable Manufacturers:
 - 1) Steel City
 - 2) Raco
 - 3) Appleton
 - 4) Crouse Hinds
4. Pull and junction boxes shall be constructed of not less than 14 gauge galvanized steel with trim for flush or surface mounting in accordance with the location to be installed. Provide screw-on type covers.

Boxes installed in damp or wet locations shall be of raintight construction with gasketed cover and threaded conduit hubs. In no case shall boxes be sized smaller than as indicated NEC for conduit and conductor sizes installed. Boxes shall be approved for the environmental condition of the location where they will be installed.

a. Acceptable Manufacturers:

- 1) Hoffman
- 2) Keystone
- 3) Approved equal

5. Corrosion Resistant Boxes:

- a. Provide corrosion resistant boxes for sewage pump stations, natatoriums, etc. and where indicated.
- b. Plastic Coated Outlet Boxes: threaded hub type, malleable iron boxes coated with 40mils thick polyvinylchloride coating, Ocal/T&B Ocal Blue System, PCD Corp. KorKap XL or Robroy Industry Plastibond or Perma-Cote.
- c. Nonmetallic Boxes: Glass fiber reinforced polyester, Carlon Himeline Series, Crouse-Hinds Krydon or Robroy Industry Stahlin.

G. Wiring Devices:

1. Wiring Devices (toggle switches, key switches, receptacles, dimmers, occupancy sensors, etc.) shall be specification grade as a minimum. Switch handle and receptacle face shall be ivory. Provide device cover plates of satin finish type 302 stainless steel in finished areas and rounded raised (Steel City 450/460 series) only for surface mounted locations in unfinished areas. Provide neoprene gasketed cast aluminum/zinc box with hinged (for receptacle) rain tight cast aluminum/zinc lockable while in use cover with stainless steel hardware for devices designated "WP".

a. Acceptable Manufacturers:

- 1) Pass and Seymour
- 2) Hubbell
- 3) Leviton

2. Toggle/Snap Switches:

- a. Units shall be quiet operation, quick make/quick break, rated for 20A/120-277V/1hp at 120/277V, side/back wired, with nylon/polycarbonate toggle, self grounding mounting screw clip plate (not staple), ground terminal and silver alloy contacts. Units shall meet latest Federal Specification WS-896, NEMA WD-1 and UL Test 20. Single pole units shall be Hubbell 1221, P&S 20AC1 or Leviton 1221-2.

Provide two pole, three way, four way, illuminated handle, keyed, etc. type of the same quality and model.

3. Receptacles:

- a. Provide receptacles where indicated on the drawings and where called for. Provide type receptacle as indicated and if not indicated then utilize general receptacle.
- b. General Receptacle: Units shall be NEMA 5-20R, duplex, 20A, 125V, side/back wired, #14 to 10AWG screw terminals with nylon face, indented brass contacts for three point connection, self grounding stainless steel mounting screw clip plate and green ground terminal. Shall meet requirements of Federal Specification W-C-596, NEMA WD-6 and UL 498.
 - 1) Units shall have 0.032" thick brass contacts, 0.031" brass mounting strap and be: Hubbell HBL5352, P&S PS5362 or Leviton 5362.
- c. Ground Fault Interrupting Receptacles: Units shall be as specified above for General Receptacle and have 5mA interrupting ground fault level, test/reset front buttons, full through feed capability, power off on reverse wired sensing, 10kA short circuit current rating, be tamper/weather resistant and in compliance with UL 943. Unit shall self-test function to periodically test the components automatically and indicate a failure condition utilizing an LED. Receptacles indicated as "WP" shall be a ground fault interrupting receptacle. Shall be Hubbell GFR5362, P&S 2097TRWR or Leviton GFWR2.
- d. Special Receptacles: provide other type receptacles as indicated herein or on the drawings. Such receptacles shall be Hubbell, P&S or Leviton highest grade available.

4. Emergency Shutdown Pushbutton:

- a. Where called for provide emergency shutdown/emergency power off push button. Unit shall be Square D Class 9001 Type K NEMA 13 oil tight pushbutton with the following:
 - 1) Red mushroom head 1-1/2 in. button, hinged protective flip up cover, push to operate, pull to reset.
 - 2) Maintained contact operation with one normally open and one normally closed 10A 120V contacts. Provide relay for additional contacts.
 - 3) Red pilot light.
 - 4) Engraved legend plate indicating "XX - Emergency Stop" with XX = the system name.

H. Waterproofing Seals:

1. Provide expanding link type seal, for installation between duct/conduit, and sleeve or core-drilled hole in concrete.
2. Make: Link Seal, manufactured by Thunderline Corp., or approved equal.

I. Flashing, Sealing, Fire-stopping:

1. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:
 - a. Provide materials and products listed or classified by an approved independent testing laboratory for "Through-Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Through-Penetration Fire-Stops" designated ASTM E814.
 - b. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
 - c. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
 - d. The methods used shall incorporate qualities, which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.
2. Acceptable Manufacturers:
 - a. Dow Corning Fire-Stop System Foams and Sealants
 - b. Nelson Electric Fire-Stop System Putty, CLK and WRP
 - c. S-100 FS500/600, Thomas & Betts
 - d. Carborundum Fyre Putty
 - e. 3-M Fire Products

2.2 WIRE GUARD

- A. Where specified herein or shown on the drawings provide a wire guard for devices or equipment. Units shall be custom as needed for the application.
- B. Wire guard shall be a minimum #6 wire gage of zinc plated steel, overall clear coating and welded at joints. For any unit needing access it shall have an integral hinge and locking means.
- C. Wires shall have 2 in. maximum spacing.

D. Acceptable Manufacturers:

1. Design Make: American Time and Signal
2. Approved equal

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA NEIS (National Electrical Installation Standard) latest edition.

B. Unless otherwise noted, wiring for all systems indicated in the contract documents shall consist of insulated conductors installed in raceways. Raceways shall be continuous from outlet box to outlet box and from outlet box to cabinet, junction or pull box. Secure and bond raceways to all boxes and cabinets so that each system of raceways is electrically continuous throughout. Unless otherwise indicated on the drawings, install all wiring in the following raceway system:

1. Wiring 600 Volts or Less in Dry Interior Locations: EMT.
2. Wiring 600 Volts or Less in Dry Locations and Subject to Physical Damage: RMC.
3. Wiring 600 Volts or Less in Outdoors, Above Grade Locations: RMC.
4. Wiring Installed in Hazardous Locations: RMC.
5. Flexible metal conduit shall be used for final connection to all motors, final connection to rotating or vibrating equipment, final connections to dry type transformers and final connections to recessed lighting fixtures. Liquidtight flexible conduit shall be used in all wet or damp locations. Maximum length of flexible conduit shall be 36 in., except that from outlet boxes to lighting fixture maximum length shall be 6 ft. Provide green insulated equipment grounding conductor in all flexible metal conduit.
6. Surface metal raceway shall be used for surface runs in finished area where concealed conduit cannot be run or where specifically indicated on drawings.
7. Where allowed, branch circuits may be type MC cable between homerun junction box and equipment/device connection in drywall partitions only. Homerun junction box to be a maximum of 20 ft. from equipment/device.

C. Raceways:

1. Sized as indicated on the drawings. Where sizes are not indicated, raceways shall be sized as required by the National Electrical Code in accordance with the quantity, size, and type of the insulation conductors to be installed.

Raceways shall be minimum 1/2 in. trade size for branch circuit wiring and minimum 3/4 in. trade size for all telephone, data, intercommunications, instrumentation, fire alarm, television and computer systems and for all branch circuit "Home Runs" to panelboards. Installed to provide adequate grounding between all outlets and the established electrical system ground.

2. Arranged in a neat manner for access and allow for access to work installed by other trades.
3. Install raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts handtight, plus one-quarter turn more.
4. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4 inch trade size and insulated throat metal ground bushings on 1-1/2 inch trade size and larger conduits terminated with locknuts. Install throat metal grounding bushings on service conduit.
5. Complete raceway installation before starting conductor installation.
6. Provide stub-ups through floors with coupling threaded inside for plugs, set flush with finished floor. Plug coupling until conduit is extended above floor to final destination or a minimum of 2 feet above finished floor. Wherever a cluster of four (4) or more raceways rise out of floor exposed, provide neatly formed 6 in. high concrete envelop, with chamfered edges, around raceways.
7. Installed with a minimum of bends and offsets. All bends shall be made without kinking or destroying the cross section contour of the raceway. Factory made bends are acceptable and should be considered for raceways larger than 2 in.
8. Make bends in raceway using large-radius performed ells except for parallel bends. Field bending must be in accordance with NFPA 70 minimum radii requirements. Provide only equipment specifically designed for material and size involved.
9. Conceal conduit within finished walls, ceilings, and floors unless otherwise noted, or where permitted by the Owner's Representative. All exposed raceways shall be painted to match existing adjacent surface as directed by the Architect. Install conduit parallel or perpendicular to building lines.
10. Support conduit within 12 inches of enclosure to which attached.
11. Install raceway sealing fittings at accessible locations in accordance with NFPA 70 and fill them with listed sealing compound. For concealed raceways, install fitting in flush steel box with blank cover plate having finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings in accordance with NFPA 70.
12. Seal raceway opening that penetrate rooms or walls with acoustical requirements on both sides of rooms or walls with acoustically rated putty or firestopping.

13. Differing Temperatures: For raceways routed between areas with differing temperatures (interior to exterior, walk in coolers/freezers, environmental chambers, etc.) install raceway as follows:
 - a. Provide a thermal break, 4 in. minimum of stainless steel conduit within space wall/separation.
 - b. Seal raceway penetration through the wall/separation.
 - c. Provide a box on each side of the space wall/separation.
 - d. Provide raceway interior sealant (duct seal or suitable foam) to provide a complete air barrier after conductors are installed.
 - e. Mounting of raceway and boxes on equipment shall be coordinated and approved by the equipment manufacturer.
 - f. Installed with exterior surfaces not less than 6 in. from any surface with normal operating temperature of 200°F or higher.
14. Expansion-Joint Fittings:
 - a. Install in runs of aboveground PVC that are located where environmental temperature change may exceed 30 deg. F and that have straight-run length that exceeds 25 feet. Install in runs of aboveground RMC and EMT conduit that are located where environmental temperature change may exceed 100 deg. F and that have straight-run length that exceeds 100 feet.
 - b. Install expansion fittings at locations where conduits cross building or structure expansion joints.
 - c. Install with position, mounting, and piston setting selected in accordance with manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
 - d. Installed such that no undue stress is placed on any electrical raceway due to the proper functioning of expansion joints.
15. Raceway installed in wet/damp locations or on exterior walls shall have a spacer manufactured for this purpose provided to maintain a space/void between the mounting surface and the raceway.
16. Do not install conduits within 2 inches of the bottom side of a metal deck roof.
17. 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.

18. Cut conduit perpendicular to the length. For conduits 2 inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length. Ream inside of conduit to remove burrs. Bush where necessary.
19. Install pull wires in empty raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb tensile strength. Leave at least 12 inch of slack at both ends of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
20. Plugged at the ends of each roughed-in raceway with an approved cap or disc to prevent the entrance of foreign materials during construction.
21. Installed with UL approved rain-tight and concrete-tight couplings and connectors.
22. Raceways shall not be attached to or supported by wooden plug anchors or supported from mechanical work such as ductwork, piping, etc.
23. If it is necessary to burn holes through webs of beams or girders, call such points to the attention of the Owner's Representative and receive written approval both as to location and size of hole before proceeding with work. All holes shall be burned no larger than absolutely necessary.
24. Become familiar with the general construction of the building and place sleeves, inserts, etc., as required. All penetrations through existing floors shall be core drilled and sleeved.
25. All raceways shall be supported adequately by malleable iron pipe clamps or other approved methods. In exterior or wet locations, supports shall allow not less than 1/4 in. air space between raceway and wall. Firmly fasten raceway within 3 ft. of each outlet box, junction box, cabinet or fitting. The following table lists maximum spacing between conditions, strength of supporting members, etc.
26. Furnish and install such supports at no additional cost to owner.

Conduit Trade Size	Type of Run	Horizontal Spacing in Feet	Vertical Spacing in Feet
1/2 in., 3/4 in.	Concealed	7	10
1 in., 1-1/4 in.	Concealed	8	10
1-1/2 in. and larger	Concealed	10	10
1/2 in., 3/4 in.	Exposed	5	7
1 in., 1-1/4 in.	Exposed	7	8
1-1/2 in. and larger	Exposed	10	10

27. Where raceways puncture roof, install "witches hat" unit suitable with the roofing material with 50 year caulk/stainless steel clamp as required in order that the roof warranty is maintained. Coordinate with representative of roofing material manufacturer.

D. Outlet Boxes:

1. Consider location of outlets shown on drawings as approximate only. Study architectural, process piping, mechanical, plumbing, structural, roughing-in, etc., drawings and note surrounding areas in which each outlet is to be located. Locate outlet so that when fixtures, motors, cabinets, equipment, etc., are placed in position, outlet will serve its desired purpose. Where conflicts are noted between drawings, contact Owner's Representative for decision prior to installation. Comply with the NEC relative to position of outlet boxes in finished ceilings and walls.
2. Prior to installation, relocate any outlet location a distance of 5 ft. in any direction from location indicated on drawings if so directed by the Owner's Representative. Prior to completion of wall construction, adjust vertical height of any outlet from height indicated if so directed by Owner's Representative. The above modifications shall be made at no additional cost to the Owner.
3. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures. Outlet boxes shall be sized to accommodate the wiring, splices and device(s) to be installed in accordance with the NEC.
4. Saw-cut opening for boxes recessed in masonry walls in center of cell of masonry block, and install box flush with surface of wall. Box shall have extra-deep type raised tile covers or shall be 3-1/2 in. deep boxes with square corners and dimensions to accommodate conductors installed. Prepare block surfaces to provide a flat surface for a raintight connection between box and coverplate or supported equipment and box, whether installed indoors or outdoors.
5. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
6. Locate boxes so that cover or plate will not span different building finishes. Install a device cover plate over each and every outlet indicated on drawings. Do not install plates until painting, cleaning and finishing of surfaces surrounding the outlet are complete. Install single one-piece multi-gang covers over multi-gang devices.
7. Where outlets at different mounting heights are indicated on drawings adjacent to each other (due to lack of physical space to show symbol on drawings), install outlets on a common vertical line.
8. Where switch outlets are shown adjacent to strike side of door, locate edge of outlet box approximately 3 in. from door frame.
9. Support boxes in recessed ceilings independent of ceiling tiles and ceiling grid.
10. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for purpose.

11. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.
12. Floor outlet boxes shall be installed flush with finished floor, adjust level and tile as required. Where finished floor is terrazzo, provide boxes specifically designed for installation in terrazzo. Where floors are to receive carpet or flooring material, coordinate with appropriate trade and provide insert. Rectangular covers shall be parallel and perpendicular with the building or, if used, floor tile/floor joints/pattern. Coordinate cover type with the flooring and device type.
13. Outlet boxes installed in plaster, gypsum board or wood paneled hollow cavity walls shall be installed flush with raised plaster covers or raised tile covers. Boxes shall be mechanically fastened and supported by two (2) adjacent structural members (studs) with cross brackets (Garvin Industries Model BMB or approved equal).
14. Surface ceiling mounted outlet boxes shall be minimum 4 in. square, 1-1/2 in. deep, galvanized sheet metal.
15. Surface wall mounted outlet boxes shall be cast type boxes.
16. Do not install aluminum boxes, enclosures, or fittings in contact with concrete or earth.
17. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.
18. Seal openings and knockouts in back and sides of boxes and enclosures with acoustically rated putty for boxes and enclosures in areas of walls with acoustical requirements. Provide gaskets for wallplates and covers.
19. Seal openings and knockouts in back and sides of boxes and enclosures in areas of walls with lead shielding requirements.

E. Wiring Methods:

1. Conductors shall not be installed until raceway system, including all outlets, cabinets, bushings and fittings, is completed. Verify that all work of other trades which may cause conductor damage is completed. Use only U.L. approved cable lubricants when necessary. Do not use mechanical means to pull conductors No. 8 or smaller.
2. In general, conductors shall be the same size from the last protective device to the load.
3. Wiring systems shall be properly grounded and continuously polarized throughout, following the color-coding specified. Connect branch circuit wiring at panelboards, as required, in order to provide a "balanced" three-phase load on feeders.

4. Provide insulated green ground conductor in each branch circuit.
5. All feeder connections shall be made to bus and other equipment using solderless, pressure type terminal lugs.
6. Branch circuits connected to a 20A circuit breaker shall be sized as indicated except for lengths exceeding 75 ft. For circuits longer than 75 ft. to 100 ft. utilize No. 10 AWG conductors (line, neutral and ground) and for circuits from 100 ft. to 150 ft. utilize No. 8 AWG (line, neutral and ground) unless otherwise indicated. Conduit size shall be modified in accordance with the NEC.
7. For splices and taps, No. 10 AWG and smaller, use solderless "twist on" connectors having spiral steel spring and insulated with a vinyl cap and skirt.
8. For splices and taps, No. 8 and larger, use insulated solderless set screw AL/CU or hydraulically compressed sleeve fittings suitable for the intended use.
9. Use cast connections for ground conductors.
10. Provide minimum 6 in. of spare/slack of each conductor in each junction or pull box and termination.
11. Make all splices and connections in accessible boxes and cabinets only.
12. Cover uninsulated splices, joints, and free ends of conductor with rubber and friction tape of PVC electrical tape. Plastic insulating caps may serve as insulation. Heat shrink sleeves shall be acceptable for crimp type splices.
13. On termination at branch circuit outlets, leave a minimum of 8 in. free conductor for installation of devices and fixtures.
14. Feeder conductors shall be continuous from point of origin to load termination without splice. If this is not practical, contact the Owner's Representative and receive written approval for splicing prior to installation of feeder(s). Where feeder conductors pass through junction and pull boxes, bind and lace conductors of each feeder together. For parallel sets of conductors, match lengths of conductors as near equal as possible.
15. Branch circuit conductors installed in panelboards, and control conductors installed in control cabinets and panels shall be neatly bound together using "Ty-Raps" or equal.
16. Provide conduit seals and explosion proof devices as indicated on the plans and as dictated by the NEC for all hazardous locations indicated on the drawings.
17. Lighting fixtures, detectors, etc., in mechanical equipment, boiler and pump rooms shall be installed with exposed raceway after equipment, ductwork, piping, etc., are in place. In general, lighting shall be as located on the drawings; where conflicts exist, locate lights for best distribution.

F. Toggle Switches:

1. Switches shall be installed in accessible locations near room/space entryway(s).
2. Provide lighted handle switches in mechanical rooms, elevator pits, electric rooms, etc.
3. Switches shall have neutral pulled through the box even if not used.

G. Junction and Pull Boxes:

1. Install junction and pull boxes in readily accessible locations. Access to boxes shall not be blocked by equipment, piping, ducts and the like. Provide all necessary junction or pull boxes required due to field conditions and size as require by the National Electrical Code.
2. Boxes shall be clearly labeled indicating the associated circuit. Where the conduit is colored the box cover shall match this color.

H. Equipment Mounting Heights:

1. Unless otherwise noted, mount devices and equipment at heights measured from finished floor to device/equipment centerline as follows:
 - a. Toggle switches (up position "on") 46 in.
 - b. Wall lighting controls (dimmer, digital switch, etc.) 46 in.
 - c. Receptacle outlets (long dimension vertical, ground" pole farthest from floor) 18 in.
 - d. Receptacle outlets above counters 8 in. above counters
 - e. Receptacle outlets, above hot water or steam baseboard heaters. Do not install receptacle outlets above electric baseboard heaters 30 in.
 - f. Receptacle outlets, hazardous areas; also for refrigerators 48 in.
 - g. Receptacle outlets, weatherproof, above-grade 24 in.
 - h. Fire alarm manual stations 46 in.
 - i. Fire alarm combination audio/visual and standalone visual device (entire strobe lens at heights indicated) 80 in. to bottom of the notification device

- j. Standalone fire alarm speaker 80 in. to bottom
- k. Disconnect switches, motor starters, enclosed circuit breakers. 48 in.
- 2. Where structural or other interferences prevent compliance with mounting heights listed above, consult Owner's Representative for approval to change location before installation.
- I. Hangers and Supports:
 - 1. Provide steel angles, channels and other materials necessary for the proper support and erection of motor starters, distribution panelboards, large disconnect switches, large circuit breakers, pendant mounted lighting fixtures, etc.
 - 2. Panelboards, disconnect switches, circuit breakers, cabinets, large pull boxes, adjustable speed drives, cable support boxes and starters shall be secured to the building structure and not supported from conduits. Small panelboards, etc., as approved by Owner's Representative, may be supported on walls. Racks for support of conduits and heavy electrical equipment shall be secured to building construction by substantial structural supports.
- J. Identification:
 - 1. Provide engraved lamicoid identification nameplates on all items of equipment including individual circuit breaker enclosures and disconnect switches, listing the equipment connected to the particular device provided under Specification Sections 262000 and 262913, including, but not limited to: starters, disconnect switches, adjustable speed drives, circuit breakers, etc. Include voltage, phase, equipment served, voltage source to panel or equipment.
 - 2. Provide complete type written directory for each panelboard listing room number, function, etc., for each circuit breaker. Directory shall be placed in a plastic clear sleeve in the interior of the panelboard door. Provide type written updated panelboard directories for existing panelboards affected by this work.
 - 3. Identify junction and pullboxes for particular service and circuit such as power, emergency power, lighting, fire alarm, telephone, interphone, public address, nurse call, etc. using stencil lettering on cover. Colored to match the conduit system.
 - 4. Using adhesive backed printed tape label (clear background, black lettering) all receptacle and switch coverplates, power poles, etc. listing panel designation and circuit number. Tape shall be attached to outside of receptacle or switch coverplates.
- K. Spare Parts:
 - 1. Deliver to Owner and obtain receipt for spare parts including key switches, fuses, etc.

3.2 TESTS

- A. Branch circuits shall be tested during installation for continuity and identification and shall pass operational tests to determine that all circuits perform the function for which they are designed. For all feeder and exterior branch circuit wiring rated 600 volts or less, provide 1,000 volt "Megger" insulation test prior to energizing feeders. Use a 1,000-volt motor driven megger for all tests. Test voltage shall be applied until readings reach a constant value, and until three (3) equal readings, each one (1) minute apart, are obtained. Minimum megger reading shall be 45 megohms for feeder conductors. Document test results and submit for approval prior to energizing conductors.

END OF SECTION 260501

SECTION 260526 - GROUNDING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide grounding system equal to or exceeding the requirements of NEC and as indicated in the contract documents. Raceway system which includes metal conduit, wireways, pullboxes, junction boxes, busway, wire ways, cable trays, enclosures, motor frames, etc., shall be made to form a continuous, conducting permanent ground circuit of the lowest practical impedance to enhance the safe conduction of ground fault currents and to prevent objectionable differences in voltage between metal nonload current carrying parts of the electrical system.
- B. Provide solid grounding of building structures and electrical and communications systems and equipment. It includes basic requirements for grounding for protection of life, equipment, circuits and systems. Types of grounding systems include the following:
 - 1. Electrical Equipment Grounding

1.2 QUALITY ASSURANCE

- A. All methods of construction, details of workmanship, that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc., correspond to the nomenclature dictated by those manufacturers. Where "or equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.
- B. Electrical Components, Devices and Accessories: Listed and labeled as defined in the NEC by Nationally Recognized Testing Laboratory (NRTL) and marked for intended use.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

1.3 REQUIREMENTS

- A. Grounding conductors, bonding conductors, jumpers, grounded conductors, etc. shall be sized in accordance with the NEC.
- B. Equipment and materials shall be installed in accordance with the manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Conductors:

1. Exposed grounding components such as bars, straps, cables, flexible jumpers, braids, shunts, etc., shall be bare copper unless otherwise indicated.
2. Grounding conductors in raceway with 600V circuiting shall be insulated to match the circuit conductors with green color.
3. Grounding conductor size shall be as indicated or as required by the NEC whichever is larger, stranded, soft drawn or soft annealed copper, unless otherwise indicated. Sizing shall take into account circuit voltage drop.
4. Acceptable Manufacturers:
 - a. Same make as for 600 volt conductors.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Grounding Conductors:

1. Provide grounding conductor(s) with all power circuits. Conductor shall be sized as indicated or as required by the NEC as a minimum and shall be terminated on the equipment, device, enclosure, etc. grounding terminal. Conductor size shall be for the entire length unless approved by the Engineer where oversized for voltage drop.
2. Grounding conductors shall be installed to have a minimum radius of 3 in.
3. Grounding conductors in a raceway system shall be terminated/bonded to each box, cabinet, enclosure, etc. through which it passes or terminates.

B. Raceway Systems:

1. All metal supports, cable trays, messenger cables, frames, sleeves, brackets, braces, etc. for the raceway system, panels, switches, boxes, starters controls, etc., which are not rigidly secured to and in contact with the raceway system, or which are subject to vibration and loosening, shall be bonded to the raceway system.
2. Termination of rigid conduit at all boxes, cabinets, and enclosures shall be made up tightly with a double locknut arrangement and a bushing, bushings being of the insulated type. Utilize grounding bushings as specified elsewhere in these specifications.

3. Conduit which runs to or from boxes, cabinets, or enclosures having concentric or eccentric knockouts which partially perforate the metal around the conduit and hence impair the continuity of system ground circuits shall be provided with bonding jumpers connected between a grounding type bushing/locknut on the conduit and a ground bus or stud inside the box, cabinet, or enclosure and attached thereto.
4. Conduit expansion joints and telescoping sections of metal raceways shall be provided with bonding jumpers sized in accordance with the NEC.

END OF SECTION 260526

SECTION 262000 - ELECTRIC DISTRIBUTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide electric distribution equipment as indicated on the Contract Documents and as specified herein.

1.2 QUALITY ASSURANCE

- A. All methods of construction, details of workmanship, that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc., correspond to the nomenclature dictated by those manufacturers. Where "or equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.
- B. Installation shall be in accordance with NFPA-70 (National Electrical Code), National Electrical Safety Code (NESC), state codes, local codes, and requirements of authority having jurisdiction.
- C. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published ANSI, NEMA, UL and IEEE Standards.

1.3 SUBMITTALS

- A. Submit the following product data/information:
 - 1. Manufacturer and equipment type.
 - 2. Standard catalog information sheet.
 - 3. Detailed shop drawings indicating plan, elevation, end and isometric views. Top and bottom conduit areas shall be clearly shown and dimensioned on the drawings.
 - 4. Single-line diagram.
 - 5. Complete Bill of Materials.
 - 6. All relevant ratings including, but not limited to, voltage, current, interrupting and withstand.
 - 7. Overcurrent Device Information.
 - 8. Submit available and final settings, programming and adjustments.
- B. Submit product data and information for the following equipment, materials, products, etc.:
 - 1. Transformers
 - 2. Branch Circuit Panelboards
 - 3. Circuit Breakers

4. Switches.
5. Fuses

C. Test Reports

1. Submit type written test report for all testing indicated herein.

1.4 WARRANTY

- A. Provide full system warranty (labor, travel, equipment, etc.) in accordance with Division 1 and a minimum of one (1) year from acceptance.

PART 2 – PRODUCTS

2.1 TRANSFORMERS

A. Dry-Type Transformers:

1. Transformers to be factory-assembled and tested, air-cooled ventilated units for 60 Hz service. Transformers that require internal or external fan assisted forced air cooling to obtain ambient air (AA) rated kVA are not acceptable. Transformers 15 kVA and less shall have 185°C insulation system and shall be designed not-to-exceed 115°C rise above 40°C ambient. Transformers 30 kVA and higher shall have 220°C insulation system and shall be designed not-to-exceed 150°C rise above 40°C ambient. Insulation systems shall be U.L. listed. Cores shall be manufactured from a high-grade, non-aging, silicon steel with high magnetic permeability, low hysteresis and eddy current losses, one leg per phase, and grounded to enclosure. Cores shall be clamped with structural angles and bolted to the enclosure to prevent damage during shipment or rough handling. Remove clamping after installation. Coils shall be continuous winding except for taps, copper, vacuum impregnated with non-hydroscopic thermosetting varnish and shall have a final wrap of electrical insulating material designed to prevent injury to the magnet wire. Transformers having coils with magnet wire visible will not be acceptable. 30 KVA, and larger, floor mounted. Under 30 KVA, wall mounted. Provide Mason type ND, Korfund or Vibrex vibration isolation devices for each transformer. Provide ground bar kit or a ground bar installed on the inside of the transformer enclosure.
2. Ratings: Shall be as indicated on the “Transformer Schedule” or as noted on the drawings. IEEE #C57, NEMA and US Government requirements shall apply. The transformer efficiencies shall meet or exceed the requirements of New York State and the US Department of Energy.
3. For transformers up to 300 kVA, provide with 6-2-1/2% full capacity taps, 2-FCAN (for connections above nameplate) and 4-FCBN (for connections below nameplate). For transformers above 300 kVA, provide 4-2-1/2% fully rated taps, 2-FCAN and 2-FCBN.

4. Manufacturers: Subject to compliance with contract documents, the following manufacturers are acceptable:
 - a. Square D
 - b. Eaton Corporation
 - c. ABB
 - d. Acme
 - e. Sola/Hevi-Duty
 - f. Howard

2.2 BRANCH CIRCUIT PANELBOARD (480Y/277 volt, 208Y/120 volt, 240/120 volts):

- A. Provide branch circuit panelboard as indicated in the "Panelboard Schedule" and as located on the drawings. Panelboards shall be equipped with quick make/quick break thermal-magnetic, molded case circuit breakers as scheduled.
- B. Panelboard bussing and lugs shall be copper. Provide full sized neutral equipped with full capacity bonding strap for service entrance applications and mount electrically isolated from enclosure. Provide neutral bus rated 200 percent of phase bus where indicated on drawings with connectors shall be sized for double sized or parallel conductors. Provide grounding bus in each panelboard, securely bonded to the box. Panelboard bus structure and main lugs or main circuit breaker shall have current ratings as indicated. Such ratings shall be established by heat rise tests, conducted in accordance with UL Standard 67.
- C. Provisions for additional circuit breakers shall be such that field addition of connectors or mounting hardware will not be required to add circuit breakers to the panelboard. Bus connections shall be bolt-on.
- D. Each panelboard, as a complete unit, shall have a short circuit current rating equal to or greater than the rating shown on the Panelboard Schedule or on the plans. All panelboards shall be fully rated. "Series Ratings" are NOT acceptable. Reducing breaker ratings on the basis of series rating is not acceptable.
- E. The panelboard bus assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be specified in UL Standard 50 cabinets. Wiring gutter space shall be in accordance with UL Standard 67 for panelboards. Each front shall include a door and have a flush, stainless steel, cylinder type lock with catch and spring-loaded door pull. All panelboard locks shall be keyed alike. Doors shall be mounted by completely concealed steel hinges. A circuit directory frame and card with a clear plastic covering shall be provided on the inside of the door. Fronts shall be of code gauge, full-finished steel with rust inhibiting iron phosphate sealer and baked enamel finish. Minimum box width shall be 20 in. Provide full length piano-hinged trim allowing access to wiring gutters without removal of trim.
- F. Ratings shall be as indicated on the Panelboard Schedule.

- G. Manufacturers: Subject to compliance with Contract Documents, the following manufacturers are acceptable:

1. 480Y/277 Volt:
 - a. Square D “NF” - Design Make
 - b. Eaton Corporation “PRL2”
 - c. ABB ReliaGear “RE” or “RS”
 - d. Siemens
2. 208Y/120 Volt and 240/120 Volt:
 - a. Square D “NQ” - Design Make
 - b. Eaton Corporation “PRL1”
 - c. ABB ReliaGear “RQ”
 - d. Siemens

2.3 CIRCUIT BREAKERS

- A. Circuit breakers shall be molded case constructed using glass reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.
- B. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes. Single pole 15 and 20 ampere circuit breakers shall be UL listed as “Switching Breakers” at 120V ac or 277 V ac and carry the SWD marking. Lugs shall be mechanical, rated for 60/75° AL/Cu.
- 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 250A and larger.
- D. Adjustable, Instantaneous Trip Circuit Breakers – Magnetic trip element with front mounted, field adjustable trip setting.
- E. Listed combination of coordinated circuit breakers shall be verified by the equipment manufacturer utilizing published data sheets. Confirmation listings shall be submitted.
- F. Ratings shall be as indicated in the Contract Documents.
- G. Enclosed circuit breakers shall be molded case, thermal-magnetic type, ratings as noted, with overcenter, trip-free, toggle-type operating mechanism, quick make/quick break action and positive handle indication. Multiple pole breakers shall be common trip type. Each circuit breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each phase. Provide provisions for padlocking in the “off” position.

Breakers shall be calibrated for operation in an ambient temperature of 40°C and shall be suitable for mounting and operating in any position. Breakers shall have removable lugs, UL listed for copper and aluminum conductors. Breakers shall be installed in NEMA 1 general purpose, surface enclosures, unless otherwise noted.

1. Manufacturers: Subject to compliance with Contract Documents, the following manufacturers are acceptable:
 - a. Square D
 - b. Eaton Corporation
 - c. ABB
 - d. Siemens

2.4 SWITCHES

A. Disconnect (Safety) Switches

1. Shall be heavy-duty type three-pole, with “Quick Make/Quick Break” operating handle mechanically interlocked with the cover, horsepower and voltage rated to match equipment served. Where indicated switches shall be provided with dual-element, time delay, rejection type fuses. Switches shall be installed in NEMA 1, 12 for indoor use, NEMA 4X for outdoor use. Provide provisions for padlocking in the “off” position. Provide neutral bar in single phase or three phase, four wire circuits, and ground bar in all switches. Provide auxiliary contacts where called for.
2. All disconnects connected downstream of ASD’s shall have a normally open and normally closed auxiliary contacts which shall be wired to the ASD to indicate disconnect is open.
3. Manufacturers: Subject to compliance with Contract Documents, the following manufacturers are acceptable:
 - a. Square D
 - b. Eaton Corporation
 - c. ABB
 - d. Siemens

2.5 FUSES

- A. All fuses rated 600 volts and below shall be rejection type dual-element, time-delay type. Provide two (2) complete sets of fuses for all fusible devices. Deliver spare fuses to the Owner and obtain receipt.
- B. Manufacturers:
 1. Fuses 600 Amperes and Below: Type RK5, Bussman Type FRS-R (600 volts), Bussman Type FRN-R (300 volts) or equivalent.
 2. Fuses Rated Above 600 Amperes: Type L, Bussman Type KRP-C or equivalent.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Receive, inspect, handle, store, and install equipment as per NEMA published bulletins.
- B. Visually inspect physical and mechanical conditions, anchorage, alignment, and grounding. Verify the equipment is clean and perform specific inspections and tests recommended by the manufacturer.
- C. Secure covers to enclosures and tighten all bolts to manufacturer recommended torques to reduce noise generation. Remove shipping bolts, blocking and wedges.
- D. Construct concrete bases and anchor floor mounted equipment according to manufacturer's written instructions. Concrete base shall be 4 inch nominal thickness and extend 3 inches on all sides, with 6" x 6", #6 reinforcing wire mesh centered and doweled into floor. Coordinate size and location of concrete bases with actual equipment provided. Cast anchor bolts inserts into bases. Concrete, reinforcement, and framework requirements are specified with concrete. Locate base to provide adequate clearances for proper ventilation.
- E. Tighten electrical connectors and terminals according to manufacturer's published torque tightening values.
- F. Ground equipment per the NEC and Section 260526.
- G. Dry-Type Transformers:
 - 1. Install wall mounted transformers level and plumb with wall brackets fabricated by transformer manufacturer. Coordinate installation of supports with actual transformer provided.
 - 2. Provide flexible connections at all conduit and conductor terminations and supports to eliminate sound and vibration transmissions to the building structure.
- H. Panelboards:
 - 1. Mount top of trim 90 inches above finished floor unless otherwise noted. In ADA accessible locations, mount top of trim 48 inches above finished floor.
 - 2. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box. Securely mount to the building structure (not wall surface material, finishes, etc.) utilizing 3/8" minimum bolts/washers/nuts with quantity suitable for the building structure and in accordance with the manufacturer's recommendations. Distribution panelboards if not mounted to a concrete wall shall additionally have a galvanized steel channel base to support it from the floor with horizontal members around the perimeter and vertical a minimum of 18" on center.

3. Install overcurrent protective devices, surge protection devices, and instrumentation. Set field-adjustable switches and circuit breaker trip settings.
4. Install filler plates in unused spaces.
5. For recessed panelboards, stub four (4) 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four (1) 1-inch empty conduits into raised floor space or below slab to floor below not on grade.
6. Arrange conductors in gutters into groups and bundle and wrap with wire ties.
7. Provide insulated protective cover over threaded bolts/studs within the panelboard.
8. Provide lugs/terminations suitable for the indicated conductor size. Where conductors have been oversized for voltage drop and where approved by the Engineer it shall be allowed to reduce the conductor size using hydraulically crimped splice in a box next to the distribution equipment to allow for standard lug termination.

I. Molded Case Circuit Breakers:

1. Visually inspect that equipment nameplate data are as described in the specifications and shown on the drawings. Inspect physical and mechanical condition, and anchorage, alignment, grounding, and clearances.
2. Verify that the unit is clean and operate the breaker to ensure smooth operation. Inspect bolted connections for high resistance using a low resistance ohmmeter or by calibrated torque-wrench method in accordance with manufacturer's published data.
3. Inspect operating mechanism, contacts, and chutes in unsealed units.
4. Provide pad lockable branch circuit breaker device to hold circuit breaker in the closed position, but not prevent overcurrent protection, for all branch circuits serving fire alarm controls panels, emergency lighting and life safety branch circuits.

J. Disconnect (Safety) Switches:

1. Provide wiring, conduit and connections between ASD and disconnect auxiliary switch to ASD.

K. Fuses:

1. Examine fuses before installation. Reject fuses that are moisture or physically damaged. Examine holders to received fuses for compliance with installation tolerances and other conditions affecting performance. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

Arrange fuses so rating information is readable without removing fuse.

3.2 FIELD QUALITY CONTROL

A. Dry-Type Transformers:

1. Measure resistance at each winding, tap, and bolted connection.
2. Perform insulation-resistance tests winding-to-winding and each winding-to-ground. Apply voltage according to manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.5. Calculate polarization index: the value of the index shall not be less than 1.0.
3. Perform turns-ratio tests at all tap positions. Test results shall not deviate by more than one-half percent from either the adjacent coils or the calculated ratio. If test fails, replace the transformer.
4. Verify correct secondary voltage, phase-to-phase and phase-to-neutral, after energization and prior to loading.
5. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions and secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 5 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.

B. Switchboards and Panelboards:

1. Test insulation resistance for each bus, component, connecting supply, feeder, and control circuit. Open control and metering circuits within the switchboard, and remove neutral connection to surge protection and other electronic devices prior to insulation test. Reconnect after test. Test continuity of each circuit.
2. Test ground-fault protection of equipment for service equipment per NFPA 70.
3. Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters.
4. Correct multifunctioning units on site where possible, and retest to demonstrate compliance; otherwise replace with new units and retest.
5. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

3.3 IDENTIFICATION

- A. Identify all items of equipment as described in Section 260501. Identification shall be provided for switchboards, panelboards, transformers, motor starters, disconnect switches, enclosed circuit breakers, switchboard main/distribution breakers, surge suppression devices, control panels, etc.
- B. Switchboards and panelboards shall have a label indicating name/tag ID, feeder source, conductor color convention and for service entrance locations the available short circuit current.
- C. Provide a permanent label on service equipment containing the following information:
 - 1. Nominal system voltage.
 - 2. Available fault current at the service overcurrent protective device.
 - 3. The clearing time of service overcurrent protective device based on the available fault current at the service equipment.
 - 4. The date the label was applied.

3.4 ELECTRICAL LOAD TEST

- A. Conduct a load test prior to request for final payment and comply with the following:
 - 1. Energize maximum normal light and power load for a period of two hours when scheduled.
 - 2. Record voltage at service and at each panel.
 - 3. Measure current in each phase of all feeders.
 - 4. Adjust transformer taps as directed by engineer after review of report.
 - 5. Provide and install all necessary metering equipment.
 - 6. Owner's Representative or Site Representative shall witness the test.
 - 7. Before final acceptance specified test shall be completed to the satisfaction of the Owner's Representative who shall be sole judge of the acceptability of such tests and who may direct the performance of such additional tests as deemed necessary in order to determine the acceptability of the systems, equipment, material and workmanship. Additional tests required by the Owner's Representative shall be provided at no additional cost. Protective equipment shall be actuated in a manner that clearly demonstrated their workability and operation.

3.5 CLEANING

- A. At the completion of the project, while equipment is de-energized, it shall be thoroughly cleaned to a shipped condition using methods in accordance with the manufacturer's recommendations. Utilize vacuum for cleaning and not compressed gas.

3.6 SPARE PARTS

- A. Deliver loose equipment to the Owner and obtain receipt for fuses, keys to panelboards, etc.

END OF SECTION 262000

SECTION 262913 - MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide labor, materials, equipment and services as required for the complete installation and full operation of separately enclosed, preassembled, motor controls, rated 600V and less.

1.2 DEFINITIONS

- A. ASD: Adjustable speed drive motor controller.
- B. CPT: Control power transformer.
- C. DDC: Direct digital control. Building management/control system.
- D. EMI: Electromagnetic interference.
- E. PWM: Pulse width modulated.
- F. RFI: Radio-frequency interference.

1.3 SUBMITTALS

- A. Submit manufacturer's product data for each type and rating of motor controller indicated.
 - 1. Include dimensions, weights, enclosure types, rating capacities, operating characteristics, electrical characteristics, furnished specialties and accessories, mounting and attachment details, method of field assembly, components, and location / size of each field connection.
 - 2. Include diagrams for power, signal, and control wiring.
 - 3. Control functions and programmable features.
- B. As part of Operation and Maintenance Data, provide manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules, setting field-adjustable timers, controls, and status and alarm points, and setting field-adjustable overload relays.

1.4 QUALITY ASSURANCE

- A. All methods of construction, details of workmanship, that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc., correspond to the nomenclature dictated by those manufacturers.

Where "or equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.

- B. Installation shall be in accordance with the manufacturer's recommendations, NFPA-70 (National Electrical Code), National Electrical Safety Code (NESC), state codes, local codes, and requirements of authority having jurisdiction.
- C. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published ANSI, NEMA, UL and IEEE Standards.
- D. Equipment and systems shall be NRTL tested and labeled.

1.5 WARRANTY

- A. Provide full system warranty (labor, travel, equipment, etc.) in accordance with Division 1 with a minimum of one (1) year from acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufacturers include:
- B. Manual and Magnetic Motor Controllers:
 - 1. Square-D
 - 2. Cutler Hammer
 - 3. General Electric
 - 4. Allen-Bradley
 - 5. Siemens

2.2 MOTOR STARTERS

- A. Provide motor starters as listed on the Electric Equipment and Control Schedule on the drawings.
- B. Starters, contactors and controllers shall comply with NEMA standards having general purpose NEMA 1 or 1B enclosure unless otherwise called for. Provide explosion proof, weather resistant or watertight construction as required. Starters shall be minimum NEMA size 0 with overloads in each phase sized per NEC, motor full load amperage, service factor, and motor operating conditions.
- C. Pad lock arrangements shall be provided to lock the disconnect device in the "off" position. Magnetic starters shall be provided with a control power transformer with 120V secondary and primary and secondary fusing and be sized to accept the loads imposed there on.

Starters shall have LED type pilot lights. Each starter subject to electrical interlock and/or automatic control shall have necessary auxiliary contacts.

- D. Auxiliary Devices: Provide pushbutton stations, pilot lights, devices, relays, transformers, selector switches, electric thermostats, auxiliary starter contacts as required for functions called for. Provide separate relay for each speed to operate electric dampers or other devices as required for multispeed motor circuit.
- E. Manual Motor Starter:
 - 1. Provide all starters with thermal overload(s); and pilot light(s), and handle lock-out provisions. Gang starter with selector switch for multispeed applications. Provide single or 2-pole as required:
 - a. 120 volt, single-pole, H-O-A selector, surface mounted: Square-D FG-71P and handle guard.
- F. Manual Motor Starter - Speed Controller: Shall be similar to "Manual Motor Starter," above, except two-gang with motor speed control sized to handle motor indicated, with positive full on and full off bypass of speed control unit.
- G. Manual Starter with Relay: Shall be similar to "Manual Motor Starter," above, except to include a two-gang box with relay sized for load indicated, and hand-off-automatic switch. Connect relay for 120V operation on load side of starter in "automatic" mode. Coordinate connection of Form C maintained contact for control with Mechanical Contractor.
- H. Magnetic Starter: Shall be single-speed, across-the-line type rated in accordance with NEMA standards, sizes and horsepower ratings. Starters shall be mounted in NEMA 1 enclosures unless otherwise indicated. Magnetic starters shall be equipped with fused control power transformer for 120V control power and double break silver alloy contacts; all contacts shall be replaceable without removing starter or disconnecting power wiring. Starter shall have straight-through wiring. Coils shall be of molded construction and shall be replaceable from the front without removing starter. Overload relays shall be melting alloy type with replaceable control circuit module. Thermal units shall be of one-piece construction and interchangeable. Starter shall be inoperative if thermal unit is removed. Provide hand-off-auto selector switch and "run" pilot light in cover. Wire for maintained contact unless otherwise noted.
- I. Combination Magnetic Starter: Shall be similar to "Magnetic Starter," above, except shall include fusible disconnect switch connected ahead of starter. The disconnect handle shall be in control of the disconnect device with the door open or closed. Disconnect handle shall be clearly marked as to whether the disconnect device is "on" or "off".
- J. Packaged Control Unit: Shall be furnished and mounted by others, and installed and connected by Electrical Contractor. This can consist of one or more starters, overloads and additional control devices prewired.
- K. Contactor: Shall be similar to "Magnetic Starter", above, except without thermal overload units.

2.3 ENCLOSURES

- A. Enclosures: To comply with NEMA 250, to meet the environmental conditions at installed location. Provide Type 1 for dry and clean indoor locations, Type 3R for outdoor locations, Type 4X stainless steel for kitchen and wash-down areas, and Type 12 for areas subject to dust, falling dirt, and dripping non corrosive liquids.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, surfaces, and substrates to receive motor controllers, with installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of the Work.
- B. Examine motor controllers before installation. Reject motor controllers that are wet, moisture damaged, or mold damaged.
- C. Examine roughing-in for conduit systems to verify actual locations of conduit connections before motor controller installation.
- D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Wall-Mounted Manual and Magnetic Controllers: Install on walls with tops at uniform height, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks.
- B. Install fuses, heaters in thermal-overload relays (based on actual nameplate full-load amperes) after motors are installed, and install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.
- C. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.
- D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
- E. Setting of Overload Relays: Select and set overloads on the basis of full-load current rating as shown on motor nameplate. Adjust setting value for special motors as required by NFPA 70 for motors that are high-torque, high-efficiency, and so on.
- F. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Identify motor controllers, components, and control wiring. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs. Label each enclosure-mounted control and pilot device. Identify all items as described in Section 260501

3.4 FIELD QUALITY CONTROL

- A. Tests and Inspections for Manual and Magnetic Motor Controllers:
 - 1. Comply with the provisions of NFPA 70B, "Testing and Test Methods" Chapter.
 - 2. Visual and Mechanical Inspection:
 - a. Compare equipment nameplate data with drawings and specifications.
 - b. Inspect physical and mechanical condition, anchorage, alignment, and grounding, and that the controller is clean.
 - c. Inspect contactors: Verify mechanical operation and contact gap, wipe, alignment, and pressure are according to manufacturer's published data.
 - d. Motor-Running Protection: Verify overload element rating is correct for its application and if protection is provided by fuses, verify correct fuse rating.
 - e. Inspect bolted electrical connections for high resistance using one of the two following methods:
 - 1) Use a low-resistance ohmmeter. Compare bolted connection resistance values with values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data or NETA ATS Table 100.12. Bolt-torque levels shall be according to manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
 - f. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
- B. Motor controllers will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports, including a certified report that identifies the ASD and describes results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.5 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service. Complete installation and startup checks according to manufacturer's written instructions.

3.6 ADJUSTING

- A. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.
- B. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.
- C. Adjust carrier frequency for optimal operation with load and conditions.
- D. Adjust the trip settings of instantaneous-only circuit breakers and thermal-magnetic circuit breakers with adjustable, instantaneous trip elements. Initially adjust to 6 times the motor nameplate full-load amperes and attempt to start motors several times, allowing for motor cool-down between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed 8 times the motor full-load amperes (or 11 times for NEMA Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Construction Manager before increasing settings.

END OF SECTION 262913

SECTION 265000 - LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION

- A. Provide interior and exterior lighting systems, including luminaires, hangers, supports, fittings, wiring, connections and controls, as indicated in the Contract Documents for complete and operational systems. The lighting layouts on the drawings are diagrammatic only. Refer to architectural "Reflected Ceiling Plans" for exact location of interior luminaires. Luminaires, in general, have been specified for the particular type of ceiling in which they are to be installed. Verify the ceiling construction details and provide luminaires suitable for the respective ceiling types and room finish schedule.

1.3 REFERENCES

- A. The following standards, criteria, codes, etc. shall be followed in the manufacture and installation of the lighting systems.
 - 1. NFPA
 - 2. NEC
 - 3. IESNA
 - 4. NEMA
 - 5. ANSI
 - 6. UL

1.4 QUALITY ASSURANCE

- A. Luminaires shall be as specified in the "Luminaire Schedule". Luminaire types, appearance, characteristics, photometrics, finishes, etc., correspond to the specified manufacturer and associated series or catalog number listed in the "Luminaire Schedule". Products of other listed acceptable manufacturers shall be equivalent in every way to that of the luminaire specified. The Engineer reserves the right to disapprove any luminaire type submitted which they feel is not equal in quality, appearance or performance to the luminaire specified.
- B. Manufacturer's luminaire series or catalog numbers listed in the "Luminaire Schedule" indicate quality, type, and style, but may not cover required special design details. Provide luminaires having such special details as noted in the "Luminaire Schedule", as indicated by the specified luminaire model number and as required for proper installation.
- C. All luminaires shall be new and bear a Nationally Recognized Testing Laboratories (NRTL) label for the service intended.

- D. Luminaires shall be products of manufacturers regularly engaged in the manufacture of the type of luminaires specified and shall be the manufacturer's latest standard design that complies with specification requirements.
- E. Verify the availability of all luminaires proposed to be used in the execution of the work prior to submitting same for approval. The discontinuance of production of any luminaire after such approval has been granted shall not relieve the Contractor from furnishing an approved luminaire of comparable quality and design at no additional cost.
- F. Photometric and operational data shall be provided only by qualified and certified organizations. Certification documentation shall be submitted with the luminaire information.
- G. Should there be any difference between drawings and schedules, secure from Architect/Engineer such information as necessary prior to providing proposal. When finishes are not definitely specified, they shall be as selected by the Architect and not be limited to standard finishes.
- H. Locations indicated for luminaires are approximate. Field coordinate exact locations as near as possible to the location indicated. Coordinate with the Engineer for any major location changes.

1.5 SUBMITTALS

- A. Product Data: For each luminaire type, include in a single submittal, in order of luminaire designation, the catalog "cut" sheet with complete manufacturer and model number. Product data should include the following:
 - 1. Manufacturer and Catalog Number.
 - 2. Features, accessories, materials and finishes.
 - 3. Physical description and dimensions of luminaires.
 - 4. Life, power input, output (lumens, distribution, CCT, and CRI) and energy-efficiency data.
 - 5. Photometric data and adjustment factors based on laboratory tests (space to mounting height ratio, coefficient of utilization complete values, IES distribution, candlepower distribution by angle and luminaire efficiency). Format shall be in accordance with IES TM-27.
 - 6. Power, signal, and control wiring diagrams between luminaires and controllers.
 - 7. Lens/Louver Type.
 - 8. Driver with each type luminaire as applicable (type, sound rating, overload protection, voltage, input/fixture wattage, ballast factor, power factor, etc.).
 - 9. Emergency lighting units, including batteries and chargers.

10. Certification of IES LM-79, IES LM-80 and TM-21 testing for LED luminaires. Luminaires shall be tested in accordance with IES LM and TM standards.
11. Warranty.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Luminaires and equipment shall be delivered with NRTL and manufacturer's labels intact and legible. Broken, cracked and damaged materials and equipment shall be removed from the site immediately and be replaced with new materials and equipment. Luminaires and accessories shall be stored in protected dry locations in their original unbroken package or container. Luminaires shall be protected from dust and dampness both before and after installation. Luminaires shall be protected from paint and cleaning solvents during all phases of construction.

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

- 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. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division hazard by a NRTL.
- C. UL Compliance: Comply with UL 1598 and UL 8750.
- D. Recessed Luminaires: Comply with NEMA LE 4.

2.2 LIGHT-EMITTING DIODE (LED) LUMINAIRES

- A. Luminaires shall be identical in construction features, options and appearance to the luminaires specified in the Luminaire Schedule. LED luminaires include white and RGBW systems as indicated on the luminaire schedule.
- B. Luminaires shall be provided with all cables, controllers, power supplies, drivers, connectors, terminators and accessories required for a complete installation. LED system shall utilize pulse width modulation, non-linear scaling techniques and reverse polarity protection.
- C. Provide dimming down to 10% as a minimum, or to percentage indicated or called for on the drawings. Unless otherwise indicated, the dimming control shall be a 0-10VDC signal
- D. LED luminaires shall be high brightness and binned for forward voltage, luminous flux and wavelength.
- E. LED luminaires shall be tested in accordance with IESNA LM-79 (luminous output, power input, luminaire efficacy (lumens/watt), color temperature and color rendering index), IESNA LM-80 (L70, output luminous maintenance, 10,000 hour minimum test, calculation method is not acceptable) and IESNA TM-21/28.

Luminaire output shall be a minimum of 100 lumens/watt. Rated life shall be a minimum of 50,000 hours at 70% output. Testing shall be performed by a US Department of Energy (DOE) accredited laboratory.

- F. Drivers shall be solid state Class 1 power supply/driver with universal input (120-277V). The system shall have a minimum 90% power factor, 3.5 maximum crest factor, minimum efficiency of 90%, a maximum of 20% THD and overload protection. Adequate heat sink capability shall be provided to ensure the rated life. Unit shall meet FCC rules and regulations.
- G. Where indicated luminaires shall have color tuning capability and control. System to have separate dimming (5-100%) and color (3000K to 5000K, or as indicated on drawings) adjustability. Control shall be Dali or DMX512 for controllability as indicated. The system shall utilize the most recent settings when energized.
- H. The luminaire (to include LED sources and drivers) shall have a full five (5) year minimum warranty for replacement and labor.
 - 1. Acceptable LED Manufacturers:
 - a. Philips
 - b. Osram
 - c. Cree
 - d. Nichea
 - e. Lumiled

2.3 EXIT LUMINAIRES:

- A. Electrical Characteristics:
 - 1. LED type for 120/277 volt supply.
 - 2. Meet or exceed illumination requirements of NFPA 101 and all of the requirements of UL924.
 - 3. Maximum input power of 5 watts per illuminated face.
 - 4. Provide fully automatic internal emergency power pack including a premium grade battery, three-stage charger (constant current, equalize and float charge), relay, low voltage battery disconnect and brownout protection circuits. Battery shall provide sufficient capacity to operate the heads for 1-1/2 hours to an end voltage of 87-1/2% of nominal battery voltage.
 - 5. Provide self-diagnostic circuitry to warn at malfunction of battery, charger, transfer circuit or emergency heads by means of separate LED indicator lights. Also provide automatic programming which will include five minute discharge/diagnostic cycling every $28 \pm$ days to exercise the unit's battery and check emergency operation.

B. Cast Aluminum Unit:

1. Cast aluminum housing. Natural brushed aluminum faceplates(s). Black finish for frame.
2. 6 in. H x 2 in. W x 3/4-in. stroke exit letters on cast stencil face.
3. Red diffusing panel(s).
4. Removable snap outs provided in stencil face housing for right, left, or double directional arrows.
5. Luminous bottom with prismatic lens for even downlighting. Light tight assembly.
6. Provide Universal mount unit.
7. Provide single or double face and arrows as indicated on Contract Documents.
8. Acceptable Manufacturers:
 - a. Dual Lite Sempra Series (Design make).
 - b. Emergi-Lite Prestige, Siltron Vanguard II, Lithonia Signature or approved equal.

2.4 EMERGENCY LIGHTING UNIT WITH BATTERY BACK-UP:

- A. Completely self-contained in compact, low profile injection molded UL 94V-0 flame rated thermoplastic housing, damp location rated with universal mounting plate.
- B. Premium grade, pure lead maintenance free battery with sufficient capacity to operate the light sources for 90 minute to an end voltage of 87-1/2% of nominal battery voltage. Three stage charger (constant current, equalize and float charge), relay, low voltage battery disconnect and brownout protection circuits.
- C. Glare-free LED type lighting source. Test switch and charge rate indicator.
- D. Universal 120/277 volt supply.
- E. Photometric output: for a location with 8' unit mounting height, 9' ceiling, 8' wide corridor and 80/50/20% reflectance, multiple unit spacing shall be:
 1. Standard unit - 30' on center.
 2. High output (HO) unit - 60' on center.
- F. Provide self-diagnostic circuitry to warn malfunction of battery, charger, transfer circuit of emergency heads by means of separate LED indicator lights. Also provide automatic programming which will include five minute discharge/diagnostic cycling every 28 ± days to exercise the unit's battery and check emergency operation.

G. Acceptable Manufacturers:

1. Standard unit: Dual-Lite EV Series (Design make)
2. High output unit: Dual-Lite EVHC Series (Design make).
3. Approved equal.

2.5 LUMINAIRE CONSTRUCTION

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during maintenance and when secured in operating position.

C. Lenses:

1. Shall be listed materials tested in accordance with ASTM D-635, "Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position" and burns less than 2/5 inches per minute.
2. The products shall have a smoke density of less than 75 when tested in accordance with ASTM D-2843, standard test method for "Density of Smoke from the Burning or Decomposition of Plastics".
3. The flame spread rating shall not exceed 0-25 and smoke developed rating shall not exceed 450 in accordance with ASTM E-84, standard test method for "Surface Burning Characteristics of Building Materials".
4. Self-ignition shall not occur below 600°F, in accordance with ASTM D-1929, standard test method for "Ignition Properties of Plastics".
5. Materials shall remain in place 15 minutes at 175°F and fall from frame at 200° below ignition temperature in accordance with ASTM D-648, "Deflection Temperature of Plastics Under Flexural Load".

2.6 LUMINAIRE SCHEDULE

A. Luminaire schedule is found on the contract drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 GENERAL INSTALLATION

- A. Comply with NECA NEIS (National Electrical Installation Standard) latest edition.
- B. All luminaires shall be installed as per manufacturer furnished installation instructions.
- C. Provide for every luminaire as shown on the plans, or as scheduled on the drawings.
- D. Location of all ceiling and wall mounted luminaires shall be as indicated on the Architectural and Electrical drawings. The contractor shall verify ceiling type, construction, and material prior to ordering.
- E. Provide luminaires with an IC rating for luminaires installed in direct contact with insulation.
- F. Provide plaster frames for plaster ceilings and flanged frames for drywall ceilings.
- G. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- H. Luminaires shall be suitable and as recommended by the manufacturer for the actual intended mounting method and materials.
- I. Supports:
 - 1. Sized and rated for luminaire weight.
 - 2. Able to maintain luminaire position after cleaning and maintenance.
 - 3. Provide support for luminaire without causing deflection of ceiling or wall.
 - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- J. Flush-Mounted Luminaires:
 - 1. Secured to outlet box.

2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

K. Wall-Mounted Luminaires:

1. Attached to structural members in walls, to a minimum 20 gauge backing plate attached to wall structural members, or using through bolts and backing plates on either side of wall.
2. Do not attach luminaires directly to gypsum board.

L. Suspended Luminaires:

1. Pendant and Rods:
 - a. Pendant mount luminaires from 1/4 in. threaded rods of required length.
 - b. Brace pendants and rods longer than 48 inches to limit swinging.
2. Aircraft Cable:
 - a. Cables shall be 1/16 in. aircraft cable with end safety fittings. Cable shall be provided with 2 in. diameter mini-canopy and threaded coupler for attachment to a 1/4 in.-20 threaded stud extending 3/4 in. below ceiling.
 - b. Cable assembly shall include a spring-loaded adjustment device mounted in the fixture.
 - c. The Contractor shall be responsible for providing required supports for cable attachment.
 - d. For cord feed to the luminaire provide continuous cord clip of matching color to attach the cord to the cable.
 - e. Support per manufacturer's recommendations.
3. Support stem mounted, single unit luminaires with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
4. Use tubing or stem for wiring at one point of continuous rows of luminaires and tubing, rod, or wire support for suspension for each unit of length of luminaire chassis, including one at each end.

M. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.

2. Use approved devices and support components to connect luminaire to building structure in a minimum of four locations, spaced near corners of luminaire. Utilize #10 steel wire; similar to that used to support the ceiling grid.
 3. Provide UL listed seismic hold-down clips and fasten to luminaires and to ceiling grid members at or near each luminaire corner.
 4. Install luminaires of sizes less than ceiling grid as indicated on reflected ceiling plans or center in acoustical panel and support luminaire independently with at least two metal channels spanning and secured to ceiling tees.
 5. Contractor to verify luminaire mounting and supports are compatible with the ceiling grid type and mounting/support requirements.
 6. Contractor to coordinate recessed linear luminaire run lengths with the ceiling grid layout and required mains supports. All continuous run lengths to be verified and coordinated prior to determining the final housing lengths.
- N. Provide all necessary accessories for "end-to-end" mounting where continuous rows of luminaires are indicated. All luminaire assemblies shall be grounded.
- O. Luminaires installed in continuous rows may be fed by a single outlet if luminaires are UL approved and suitable for through wiring in luminaire raceway.
- P. New luminaires may be provided to replace existing luminaires indicated to remain or be reused, subject to shop drawing approval.

3.3 GROUNDING

- A. Ground all non-current carrying parts of all lighting luminaires.
- B. All grounding shall be accomplished with NRTL tested grounding connectors suitable for this purpose.

3.4 FINAL CLEANING

- A. Immediately prior to acceptance, damp clean diffusers, luminaire trim, reflectors, louvers, lens, and similar objects of all luminaires. Remove all dirt, corrosion, foreign material, finger marks, and blemishes. Replace all burned out LEDs and failed components.

3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
 2. Test of Emergency Lighting: Under supervision of Engineer, interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.

- C. Prepare test and inspection reports.
- D. Replace luminaires damaged during shipment, construction, or installation.

3.6 ADJUSTING

- A. Provide adjusting the direction of aim of luminaires to suit occupied conditions. Adjustment may be required during hours of darkness.
- B. Final distribution shall be acceptable to the Owner and may take several attempts.

3.7 REMOVAL OF BALLASTS IN EXISTING LUMINAIRES

- A. Assume ballasts contain PCB material unless labeled otherwise or test samples show materials are not PCB; submit a test report. Remove all ballasts from existing luminaires indicated on contract documents. Dispose of all ballasts which do not have non PCB labels in PCB containers and pay all costs to have containers taken to EPA approved incinerators and disposed of all EPA regulations. Follow all EPA regulations for transporting material. If ballast has leaked in existing luminaires, remove material deposited in luminaire and dispose of those materials as indicated above. Provide documentation verifying disposal of PCB contaminated ballasts.

3.8 REMOVAL OF LAMPS IN EXISTING LUMINAIRES

- A. The Contractor shall employ the service of a certified disposal/recycling service company to dispose of all removed fluorescent and/or HID lamps. All disposal procedures shall be performed in accordance with EPA Requirements and Subtitle C for the disposal of mercury contaminated lamps.

END OF SECTION 265000

SECTION 283102 - ANALOG ADDRESSABLE FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation of a fully operational analog addressable fire alarm system and related Work as described in the Contract Documents.
- B. Provide system as approved by local Fire Marshal and the Authority Having Jurisdiction (AHJ). System materials and installation shall be in accordance with the manufacturer's recommendations.

1.2 QUALITY ASSURANCE

- A. All methods of construction, details of workmanship that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc. correspond to the nomenclature dictated by those manufacturers. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.
- B. Installation shall be in accordance with NFPA-70 (National Electrical Code), NFPA-72 (National Fire Alarm Code), AHJ, state codes, local codes, requirements of authority having jurisdiction and the contract documents. Installer shall be certified in the State of New York for fire alarm installation.
- C. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published UL, NFPA, ANSI, NEMA and IEEE Standards. All system equipment shall be compatible and of the same manufacturer.
- D. Each item of the fire alarm system shall be listed as a product of a single fire alarm system manufacturer and be listed by a NRTL.
- E. System installation shall be under the supervision of an accredited factory representative. Final connections to the FACP, annunciator panel and any other panels shall be by the factory representative.
- F. The system provider must:
 - 1. Provide equipment from a single manufacturer for which they maintain a contract, distributorship, are an agent, or other formal arrangement for which documentation can be produced showing authority to sell and service the equipment in this territory.
 - 2. Demonstrate that they have successfully installed these systems, utilizing their standard products, for a period of five (5) years minimum.

3. Maintain a service organization to provide both normal and emergency service. Emergency service must be available 24 hours per day, 365 days per year and staff must be adequate to respond within 2 hours of an emergency call.
4. Have a service location not more than 50 miles from the project location.
5. Maintain adequate spare parts inventory to provide both normal and emergency service.
6. Employ service technicians who are trained in accordance with the systems manufacturer's recommendations.
7. Own and demonstrate proficiency in the use of the required test equipment, tools, etc. for the proper installation, set-up, testing and maintenance of the system. If requested, provide a listing of tools and/or equipment and where appropriate, certifications in the proper training and use of the tools and/or equipment.
8. Provide all system programming to deliver a customized system to the Owner ready for use.
9. All system programming is to be completed to the satisfaction of the Owner. If after preliminary use of the system, and/or training, the increased understanding of the system's features and capabilities necessitates reprogramming to any extent, it is to be performed at no additional cost.
10. Provide a minimum of two system inspections/tests each year during the warranty period as described in NFPA 72. Needed and requested system programming changes shall be provided at these times.
11. Warranty period shall be as described elsewhere with two years being minimum. Provide a service contract for the Owner review for two years beyond the warranty period. Warranty shall include all parts, materials, labor, transportation, etc.
12. Any system being extended or connected to an existing system shall be tested for full functionality prior to beginning work. System shall be signed off by Owner/Engineer as fully functional prior to any new work.

1.3 SEQUENCING AND SCHEDULING

- A. Existing Fire Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. When new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire-alarm equipment "NOT IN SERVICE" until removed from building.
- B. Equipment Removal: After full testing and acceptance of new fire-alarm system, remove existing disconnected fire alarm equipment and wiring.

1.4 SYSTEM DESCRIPTION

- A. The system shall constantly monitor all initiation devices and notification circuits for any abnormalities or alarm conditions. System shall sample/poll each addressable device no less than every 10 seconds.
- B. The system operation subsequent to the alarm activation by any initiating device shall be as follows:
 - 1. All audible alarm notification appliances within corresponding building or designated area shall provide a common audible fire alarm signal until the System Reset Key or the Signal Silence Key is depressed.
 - 2. All visual alarm notification appliances shall flash continuously and synchronized until the system is reset or silenced.
 - 3. The remote central monitoring station shall be notified automatically until the System Reset Key or the Signal Silence Key is depressed.
 - 4. Shutdown of the corresponding HVAC system equipment shall occur with a supervisory alarm until the system is reset. All fans over 1000 shall be shut down.
 - 5. Activation of all programmed outputs assigned to the initiating device shall occur until the system is reset or the silence key is depressed.
 - 6. The alarm shall be displayed at the local Fire Alarm Control Panel (FACP) and the fire alarm annunciator panel.
 - 7. The system alarm LED shall flash on the control panel and the fire alarm annunciator panel until the alarm has been acknowledged/reset. Once acknowledged, this same LED shall latch on. A subsequent alarm received shall flash the system alarm LED on the control panel and annunciator. The LCD display shall show the new alarm information.
 - 8. A pulsing audible alarm tone shall occur within the local building control panel and, where applicable, the fire alarm annunciator panel until the event has been acknowledged.
 - 9. Alarms shall be entered into the system event log history.
 - 10. Refer to Appendix A for operational/sequence matrix.
- C. Any subsequent alarm shall follow the operation described above.
- D. The activation by any system smoke detector or sensor shall initiate an alarm verification operation whereby the panel will reset the activated detector and wait for a second alarm activation. If, within a preset time after resetting, a second alarm is reported from the same or any other smoke detector, the system shall process the alarm as described previously. If no second alarm occurs within the prescribed time, the system shall resume normal operation. The alarm verification shall operate only on smoke detector alarms.

Other activated initiating devices shall be processed immediately. The alarm verification operation shall be selectable by device.

- E. A manual evacuation (drill) switch shall be provided to operate the alarm notification appliances without causing other control circuits to be activated. However, should an actual alarm occur, all alarm functions shall occur as described previously.
- F. The system shall have a password(s) to allow the operator to display all alarms, troubles, and supervisory service conditions log history including the time of each occurrence. This shall be able to be viewed from the front of the control panel, annunciator panel or from a computer connected to the FACP.
- G. The actuation of the " walk test" program at the control panel shall activate the "Walk Test" mode of the system which shall cause the following to occur:
 - 1. The remote central monitoring station connection shall be bypassed.
 - 2. Only audible and visual appliances shall be operated. Other alarm functions (elevator recall, HVAC shutdown, etc.) shall not be affected.
 - 3. Walk test shall be selectable by circuit or circuits.
 - 4. Actual alarms received during a "Walk Test" shall cause the control panel to go into alarm and override the walk test mode.
 - 5. The control panel shall show trouble conditions.
 - 6. The walk test activation of any initiation device shall cause the audible signals to activate for two seconds or a distinguishable audible.
 - 7. The panel shall automatically reset itself after signaling is complete.
 - 8. The control panel shall automatically return to normal condition if there is no activity on a walk test circuit for a period of 30 minutes.
- H. Any momentary opening of an initiating or notification appliance circuit wiring shall cause an audible signal to sound at the Fire Alarm Control Panel and, where applicable, the annunciator panel for four seconds indicating a trouble condition.

1.5 SUPERVISION

- A. The system shall utilize independently supervised initiation device circuits. The alarm activation of any initiation device shall not prevent the subsequent alarm operation of any other initiation device.
- B. Notification appliance circuits shall be supervised to indicate an open or short circuit condition.
- C. The incoming power to the system shall be supervised so that any power failure must be audible and visually indicated at the control panel and the remote annunciator. A green "power on" LED shall be displayed continuously while incoming power is present. This shall be a trouble alarm.

- D. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visually indicated at the control panel and the remote annunciator. This shall be a trouble alarm.
- E. The system shall have provisions for disabling and enabling all circuits individually for maintenance or testing purposes.

1.6 SUBMITTALS

- A. Provide a complete system submittal prior to ordering of equipment and installation including but not limited to:
 - 1. Comply with recommendations and requirements in “Documentation” section of “Fundamentals” chapter in NFPA 72.
 - 2. Complete equipment list.
 - 3. Catalog descriptive literature for all equipment. This shall include a description of the unit, ratings, functions, capability, materials and compatibility with other components.
 - 4. Riser Wiring Diagram showing all equipment, devices, device addresses, connections, control connections, remote notification connection(s), wire quantities and sizes.
 - 5. Typical Terminal Wiring Diagram for each type of device.
 - 6. Terminal wiring Diagram for all Fire Alarm equipment.
 - 7. Calculations including:
 - a. Battery sizing calculations indicating total number of power devices, load associated with each type device, backup period and recommended battery capacity (AH).
 - b. Voltage drop calculations with actual equipment loads used to derive battery back-up ampere-hour rating and individual circuit voltage drop (indicate the wire size to be used and the associated voltage drop with the allowed voltage drop) for each circuit.
 - 8. Input/output matrix.
 - 9. Complete console enclosure and equipment configuration.
- B. Submittal package, calculations and system wiring shall be performed/collected/signed by a NICET Level III technician.
- C. If required by the Authority Having Jurisdiction (AHJ) provide a submission of all requested information for review and comment by the AHJ. All AHJ comments shall be incorporated and resubmitted until approved.

- D. Test reports at the completion of the project. Testing shall be of all system devices, equipment, circuits, features and functions.

1.7 OPERATIONS AND MAINTENANCE MATERIAL SUBMITTALS

- A. All spare equipment.
- B. Provide a copy of the system programming to the Owner on a CD/DVD disk or flash drive.
- C. Provide to the Owner the system Operation Manuals as specified, that shall include as a minimum:
 - 1. Bill of Material.
 - 2. Catalog descriptive literature for all equipment. This shall include a description of the unit, ratings, functions, capability, materials and compatibility with other components.
 - 3. Riser Wiring Diagram showing all equipment, devices, device addresses, connections, control connections, remote notification connection(s), wire quantities and sizes.
 - 4. Floor plan indicating equipment and device locations, addresses, power circuit information with power panel location, notification circuiting, initiation circuiting and control circuiting. Contact the Engineer for a copy of the project floor plans.
 - 5. Instruction report starting when instruction was given and who was in attendance, signed by Owner's Representative.
 - 6. A written test report from an authorized representative of the equipment manufacturer that each device and overall system operation has been 100% tested and approved.
 - 7. Certificate of Completion as described in NFPA-72.
 - 8. A two (2) year warranty in accordance with the Basic Requirements of these Specifications shall be provided for this system.

PART 2 - PRODUCTS

2.1 EXISTING FIRE ALARM SYSTEM TO BE MODIFIED

- A. Existing System Manufacturer: Simplex 4007ES
- B. Source Limitations for Fire Alarm System and Components: Components must be compatible with, and operate as extension of, the existing system. Provide system manufacturer's certification that components provided have been tested as, and will operate, as a system.

- C. Prior to the start of any work on the existing fire alarm system, thorough testing shall be done on the system to verify proper working condition. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections, as per NFPA 72 requirements. Provide test report to Owner's representative and Engineer as a submittal.

2.2 FIRE ALARM SYSTEM

- A. The fire alarm system shall be comprised of the components specified as a minimum and also include components not indicated but required for a complete and operable system as described herein.
- B. The system and all its components shall be UL listed and in accordance with NFPA 72, local and state codes.
- C. Each initiating device shall have an individual address for system communication. The system addresses shall not exceed seven digits. Each address, initiation circuit, notification circuit and control point shall have an individual identification description.

2.3 FIRE ALARM CONTROL PANEL (FACP)

- A. Utilize existing Simplex 4007ES FACP. Provide all hardware, software, programming etc. as required for work shown on plans.

2.4 VENTILATION FAN SHUTDOWN CONTROL

- A. Provide supervised normally closed relays and contactors for connection into the fan motor control circuits ahead of all automatic devices.
- B. Sequence fan shutdown for every air distribution system over 1000 cfm. Provide duct detectors in return of systems over 2,000 cfm and in return at each floor of systems over 15,000 cfm.
- C. Provide drill bypass feature, locate switch on Fire Alarm Control Panel and label "DRILL-FAN SHUTDOWN BYPASS". Buzzer shall sound continuously while in bypass mode.
- D. Provide fan reset feature, locate switch on Fire Alarm Control Panel and label "FAN RESET".

2.5 ADDRESSABLE CONTROL MODULE

- A. The addressable control module shall have an individual system address, be supervised and control an output dry contact from indication from the FACP. This can be used to control or have an input to elevator controls, notification appliances, door holder circuits, fans systems, etc. as indicated. Output contacts shall be suitably rated for the intended amperage and be two pole double throw. Modules shall be connected to the addressable loop(s).
- B. The unit shall control an output relay (dry contact form C). The module shall mount in a 4 in. square, 2-1/8 in. deep electrical box.

- C. The module shall contain an integral LED that shall flash each time the module is polled.
- D. The module shall provide address setting means using rotary decimal switches and also store an internal identifying code which the control panel shall use to identify the type of device. Each unit shall have a separate address and be connected to the system addressable signaling circuit.

3.1 INSTALLATION OF EQUIPMENT

- A. Comply with NECA 305, NFPA 72, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install electrical wiring to comply with requirements in NFPA 70.
 - 1. Devices placed in service before other trades have completed cleanup must be replaced.
 - 2. Devices installed, but not yet placed, in service must be protected from construction dust, debris, dirt, moisture, and damage in accordance with manufacturer's written storage instructions.
- B. Building spaces shall have suitable environmental conditions to meet the system/equipment manufacturer requirements prior to installation and operation.
- C. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
 - 1. Connect new equipment to existing control panel/circuiting for the indicated new equipment.
 - 2. Expand, modify, and supplement existing equipment as necessary (power supplies, batteries, initiation circuits, etc.) to extend existing functions to new points. New components must be capable of merging with existing configuration without degrading performance of either system.
- D. All surface mounted devices shall be mounted on a special box furnished by fire alarm equipment manufacturer. Total assembly shall be secure, smooth contour and have no protrusions.

3.2 SYSTEM CIRCUITING

- A. All wiring shall conform to the NEC and to NFPA-72, National Fire Alarm Code.
- B. Install all wiring in accordance with manufacturer's recommendations, taking into account loading, intended location, circuit length, spare capacity and voltage drop.
- C. All wiring shall be copper, plenum rated.
- D. Ground equipment in accordance with Grounding and Bonding specification.
- E. Exposed raceway systems, system junction boxes, and surface mounted device boxes must be painted red.

- F. Provide minimum #18 AWG twisted shielded pair for addressable signal line circuits. Notification appliance circuits shall be #14 AWG minimum. Conductor size shall meet or exceed the manufacturer recommendation and be within the voltage drop calculations.
- G. Addressable signal line circuits shall be NFPA 72 - 2016 Class B.
- H. Notification appliance circuits shall be NFPA 72 - 2016 Class B.
- I. Notification circuits shall be segregated as indicated on the drawings and by individual floors as a minimum.

3.3 ELECTRICAL AND CONTROL CONNECTIONS

- A. All installations shall be accomplished in a professional manner by qualified personnel regularly engaged in and experienced in this type of Work. Fire alarm installation shall be directed by a person who possesses a state license for installation of fire alarm systems. All equipment and components shall be installed in accordance with the manufacturer's recommendations.
- B. Provide all wiring required for fan shutdown. Wire from the addressable control module for each fan to be shut down and provide wiring from the module to the fan control unit (starter, adjustable speed drive, etc.) Dry contact shall be wired ahead of all control functions for starters. Provide intermediate relay for control circuits beyond the rating of the control module.
- C. Provide circuiting from all indicated motor controls for indication if not operational and close any associated smoke dampers.

3.4 FIELD QUALITY CONTROL

- A. Field tests must be witnessed by the authority having jurisdiction.
- B. Tests and Inspections:
 - 1. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
 - 2. Visual Inspection: Conduct visual inspection of all equipment and components prior to testing.
 - 3. System Testing:
 - a. All system equipment, panels, components and functions shall be fully tested to meet NFPA 72, manufacturer's recommendations and ensure proper operation.
 - b. Each initiation device shall be tested with manufacturer recommended initiating method to verify FACP annunciation.
 - c. Each notification appliance shall be tested for alarm operation and proper audible/visual output.

- d. All ancillary initiation and control equipment shall be tested for proper operation.
 - e. Provide test report once all equipment has proper operation as a submittal and once approved send copies to the Owner (O&M) and local fire marshal.
- C. regard to use and operation of the system.

3.5 PROGRAMMING

- A. Include in bid the cost to cover all system programming, including items particular to this project (such as custom zone descriptions, time delay settings, sensitivity settings, etc.) such that entire system is 100% complete and operating to the Owner's satisfaction. Coordinate all system programming with the Owner. Provide up to three programming modifications.
- B. Provide programming of the system a minimum of once during the warranty period to provide changes requested by the Owner.

END OF SECTION 283102

APPENDIX A
FIRE ALARM SYSTEM OPERATION/SEQUENCE MATRIX

WARNING, THIS IS NOT SET UP FOR SMOKE EVAC SYSTEMS OR HIGH RISES																										
SYSTEM INPUTS		SYSTEM OUTPUTS																								
		ACTIVATE COMMON ALARM SIGNAL INDICATOR	ACTIVATE AUDIBLE ALARM SIGNAL	ACTIVATE COMMON SUPERVISORY SIGNAL	ACTIVATE AUDIBLE SUPERVISORY SIGNAL	ACTUATE COMMON TROUBLE SIGNAL	ACTUATE AUDIBLE TROUBLE SIGNAL	INDICATE CONDITION OR DEVICE DESCRIPTION	ACTIVATE NOTIFICATION APPLIANCES	SHOW STATUS CHANGE FAC/FACP/PRINTERS	ALARM SIGNAL TO CENTRAL STATION	SUPERVISORY SIGNAL TO CENTRAL STATION	TROUBLE SIGNAL TO CENTRAL STATION	RELEASE MAGNETICALLY HELD DOORS	RECALL ELEVATORS TO RECALL FLOOR	ACTUATE WARNING TO ELEVATOR CONTROLS	ACTUATE WARNING TO ELEVATOR CABS	ACTIVATE ELEVATORS SHUNT TRIP	CLOSE ALL RELATED SMOKE DAMPERS	UNLOCK ALL EXITS AND CONTROL DOORS	SHUT DOWN RESPECTIVE AIR HANDLING UNITS	ACTIVATE PRESSURIZATION OF FLOOR (HIGH RISE)	ACTIVATE STAIR SHAFT PRESSURIZE (HIGH RISE)	ACTIVATE SMOKE EXHAUST SYSTEM	OPEN ASSOCIATED SMOKE HATCH	LOCAL NOTIFICATION
	FIRE ALARM SYSTEM AC POWER FAILURE					X	X	X		X			X													
	FIRE ALARM SYSTEM LOW BATTERY					X	X	X		X			X													
	OPEN CIRCUIT					X	X	X		X			X													
	GROUND FAULT					X	X	X		X			X													
	CIRCUIT SHORT					X	X	X		X			X													
	MANUAL PULL STATION ACTUATION	X	X					X	X	X				X										X		
	AREA SMOKE DETECTORS	X	X					X	X	X	X			X						X				X		
	HVAC DUCT SMOKE DETECTOR	X	X					X	X	X	X								X	X	X		X			
	AREA HEAT DETECTORS	X	X					X	X	X	X			X						X			X			
	FIRE SUPPRESSION SYSTEM ALARM	X	X					X	X	X	X			X							X			X		
	SPRINKLER TAMPER SWITCH			X	X			X	X	X		X														
	SPRINKLER WATER FLOW IN BUILDING	X	X					X	X	X	X			X							X			X		
	SPRINKLER WATER FLOW IN ELEVATOR EQUIPMENT ROOM OR SHAFT	X	X					X	X	X	X				X	X	X	X			X			X		
	ELEVATOR SHAFT SMOKE DETECTOR	X	X					X	X	X	X				X						X			X		
	ELEVATOR EQUIPMENT ROOM AREA SMOKE DETECTOR	X	X					X	X	X	X			X	X		X				X			X		
	ELEVATOR SHAFT AND EQUIPMENT ROOM HEAT DETECTORS	X	X					X	X	X	X			X	X		X	X			X			X		
	ELEVATOR PIT SPRINKLER FLOW	X	X					X	X	X	X			X	X	X	X	X			X			X		
	ELEVATOR PIT HEAT DETECTOR	X	X					X	X	X	X			X	X	X	X	X			X			X		
	ELEVATOR LOBBY SMOKE DETECTOR	X	X					X	X	X	X			X	X						X			X		
	ELEVATOR LOBBY RECALL FLOOR SMOKE DETECTOR	X	X					X	X	X	X			X	X						X			X		
	FIRE PUMP POWER FAILURE/PHASE REVERSAL			X	X			X			X	X														
	FIRE PUMP LOW FUEL			X	X			X			X	X														
	FIRE PUMP RUNNING	X	X					X			X															
	JOCKEY PUMP RUNNING			X	X			X																		
	FIRE PUMP NOT IN AUTOMATIC MODE			X	X			X				X	X													
	AREA OF REFUGE TWO WAY COMMUNICATION STATUS			X	X			X			X	X														
	SMOKE HATCH SMOKE DETECTOR	X	X					X	X	X	X			X	X						X					X
	AHU OFF, ANY REASON																		X							
	SMOKE CONTROL AREA DETECTION / WATERFLOW							X	X													X	X	X		
	CO DETECTION			X	X			X				X														X

SECTION 311201 - SITE PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in Division 31, 32 and 33.

1.2 DESCRIPTION OF WORK

- A. The extent of site preparation is shown on the drawings.
- B. Site preparation work includes, but is not limited to, the following:
 - 1. Protection of existing trees, shrubs, ground covers and lawns to remain
 - 2. Topsoil stripping and stockpiling on site (See Section 329201)
 - 3. Site clearing and removals
 - 4. Asphalt milling
 - 5. Saw cutting
 - 6. Relocations/salvaged materials
 - 7. Clean up
- C. Provide materials, labor, equipment and services required to accomplish related work in accordance with the drawings and specifications.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 312201 - Site Earthwork
- B. Section 329201 - Seeded Lawns
- C. Section 334001 - Storm Drainage

1.4 SITE INVESTIGATION

- A. The Contractor shall visit the site before bidding, inform and familiarize themselves of all site conditions, including but not limited to, site topsoil, sub-soil, rock, subsurface and groundwater conditions affecting proposed work. No allowance or additional cost will be made in the work of this contract for failing to determine overall project site conditions.
- B. Verify locations and protect utilities and structures, whether or not shown on the drawings. Existing utilities and structures shown on the drawings are for the Contractor's convenience and locations are not guaranteed.
- C. Verify survey information given on drawings. Walk the site with the Owner's Representative to discuss approximate locations of reputed utilities shown and not shown on the survey, prior to performing work.

- D. Contractor shall provide Test Pits at all connection points at existing utilities and at all utility crossings to verify utility locations, size, type, invert, and elevations PRIOR to ordering and taking delivery of materials for construction. Notify the Architect and Owner of finding immediately. Contractor shall furnish all labor and materials to accomplish at no additional cost to the Owner.
- E. Locate and protect from disturbance existing survey monuments, pins, markers, and benchmarks whether or not shown on drawings. When any disturbance or damage occurs, notify Architect in writing within 24 hours. Describe nature of disturbance or damage and date first occurred. Provide copies to applicable government and municipal agencies. Pay costs for restoring monuments to satisfaction of said agencies, at no additional expense to the Owner.
- F. Contractor to model, coordinate, and verify all survey control points. If necessary, provide new or additional survey control points to synchronize any site model with real world coordinates at no additional cost to the Owner.

1.5 JOB CONDITIONS

- A. The terms "Architect" and "Landscape Architect" for Divisions 31, 32 and 33 work shall mean Appel Osborne Landscape Architecture, 102 West Division St., Suite 100, Syracuse, NY 13204, Tel. (315) 476-1022; or other representative(s) that King and King Architects may determine.
- B. Examine site drawings and specifications for the entire project. Become familiar with the scope and sequencing of work required. Coordinate and cooperate with other Contractors and trades working in and adjacent to the project.
- C. Examine work prepared prior to this contract. Commencement of work will be construed as complete acceptance of all preparatory work by others.
- D. Obtain and pay for permits required by authorities. Perform the work in compliance with applicable standards, codes and requirements of governing authorities having jurisdiction.
- E. Safety is the sole responsibility of the Contractor.
- F. Burning on site and use of explosives are not permitted.
- G. Responsibility for existing utilities:
 - 1. Contact Dig Safely New York at least two (2) full working days, and not more than ten (10) working days, before digging begins or as required by latest state law. Locate by hand excavation and provide protection from damage to existing utilities to remain in the area. (Tel. 811)
 - 2. Existing utilities encountered within excavated areas shall be supported, blocked and/or braced in a manner approved by the owner of the utility. Leave supports in place to the extent required by the owner of the utility.
 - 3. Should uncharted or incorrectly charted utilities be encountered, notify the Architect immediately for directions as to procedure.

4. Do not break utility connections without providing temporary services as acceptable to the Architect and the owner of the utility.
 5. Repair and pay for damages to existing utilities as directed by utility Owner at no additional cost to the Owner.
 6. Cap ends of utilities to be abandoned or removed in accordance with regulatory agencies and as directed by the Architect.
- H. Provide protections and conduct operations to prevent injury and damage to persons, work of other Contractors, existing items to remain, structures, pavements, lawns, and adjacent properties.
- I. Restore work damaged by this Contractor inside and outside the contract limits to the condition existing prior to the start of work, unless otherwise directed, to the satisfaction of the Architect at no additional cost to the Owner.
- J. Vehicular and pedestrian traffic control:
1. Maintain vehicular and pedestrian traffic during construction activities.
 2. Provide alternate routes and traffic control around closed and obstructed traffic ways as required by governing regulations or the Owner.
 3. Provide temporary fencing, flagpersons, barricades, warning signs, and warning lights or other measures to protect the public and cause the least interruption of work.
- K. Field Measurements: Take necessary field horizontal and vertical measurements required in order to perform the work and design intent shown on the drawings, and outlined in the specifications. Assume complete responsibility for accuracy of such measurements and dimensions.
- L. Removal of spoils, dust control, debris and clean up:
1. Control air pollution caused by dust and dirt; comply with governing regulations. Water to control dust when necessary and as directed by the Architect or Certified Erosion Control Specialist. Provide water sprinkling materials, equipment and labor to prevent the nuisance of dust to the surrounding areas.
 2. Legally dispose of removed and demolished items, including trash and debris, off the Owner's property, at a licensed disposal facility having adequate capacity to accept the project's waste.
 3. Burning of combustible materials on the site is not permitted.
 4. During the contract and at intervals as directed by the Architect, clear the site of extraneous materials, rubbish, construction waste, and debris. Leave the site in a clean, safe, neat, well-draining condition.

5. Soil Removal: Sweep roads, access ways, paved areas, and parking areas where soil, mud and debris have dropped or tracked from construction and delivery vehicles on a daily basis and as directed by the Architect or Certified Erosion Control Specialist.
 6. Spoils: Remove from site and dispose when not required for fill or determined to be unsatisfactory soil material per Section 312201 - Site Earthwork.
- M. Construction Review - General: Site visits will be made by the Architect to observe construction conformance to drawings and specifications. The occasional site visits by the Architect shall not be construed as supervision of construction or make them responsible for the safety programs and precautions, including but not limited to: the safe access, visit, use, work travel, or occupancy of any person. Site visits shall not make the Architect responsible for means, methods, techniques, sequences or procedures of construction selected by the Construction Manager, Contractor or his Sub-contractors.
- N. Site Complexity: The existing site will be intensively developed. Because of the construction and resulting graphic complexity, it is impractical to show every detail. However, the general design intent is clearly shown and shall be applied to individual conditions not specifically shown as directed by the Architect and at no additional cost to the Owner.
- O. Asbestos, Toxic and Hazardous Materials: The Division 31, 32 and 33 site work contract does not include testing for, handling or removal of hazardous materials such as, but not limited to: asbestos, fuel, oil, PCB's, or other toxic or hazardous waste materials as identified by the EPA and/or NYSDEC. If any such materials are encountered during any part of the site work, the Contractor is responsible for identifying potential hazardous material and immediately notify all governing agencies having jurisdiction as required by law. Also, within one (1) hour of discovery notify the Architect, Landscape Architect, Consultants, and Owner. The Owner shall provide testing and removal by others, under separate contract. The Contractor shall recommence work under this contract when the Owner provides written certification that remediation is complete per governing agency. The Contractor shall not be penalized for any delays caused by the hazardous testing and removal, unless such hazardous material incident was a result of Contractor's operations. The Contractor shall indemnify and hold harmless the Architect, Landscape Architect, Consultants and Owner, agents, and employees from and against all claims, damages, losses and expenses, direct and indirect or consequential damages, including but not limited to fees and charges of attorneys and court and arbitration costs, arising out of or resulting from the performance of the work by the Architect, Landscape Architect, Consultants and Owner, or claims against the Architect, Landscape Architect, Consultants and Owner arising from the work of others, related to hazardous waste.

The above indemnification provision extends to claims against the Architect, Landscape Architect, Consultants and Owner which arise out of, are related to, or are based upon, the dispersal, discharge, escape, release or saturation of smoke, vapors, soot, fumes, acids, alkalis, toxic chemicals, or pollutant in or into the atmosphere, or on, onto, upon, in or into the surface or subsurface soil, water or water courses, objects, or any tangible or intangible matter, whether sudden or not.

Should the hazardous material incident be the result of the Contractor's operations, the Contractor shall be responsible for all costs associated with the discovery and

remediation of such hazardous material such as, but not limited to: testing, consultant fees, damage, loss, fees and charges of attorneys, court and arbitration costs, claims by other contractors, direct and indirect or consequential damages.

- P. Salvageable Items: Remove at any time after work starts. Storage or sale on site of salvageable and removed items is not permitted. Do not remove topsoil from site without written permission from the Owner.

1.6 SUBMITTALS

- A. Provide photographic documentation. Photographically document existing features which, may be affected by the construction, inside and outside the contract limit line. Existing features include, but are not limited to: structures, pavements, curbs, utilities, lawns and vegetation, especially individual trees which are over six (6") inches in diameter and noted to remain on the drawings. Also, particular attention shall be paid to the construction access, stockpile and haul road areas. Distribute a copy of the photographic documentation (digital format) to the Owner and Architect prior to the start of construction.

PART 2 - PRODUCTS

2.1 PROTECTIVE DEVICES

- A. Shall include, but not be limited to; plastic fence, temporary chain link fence and gates, wood planks, rubber mats, barriers, lights, barricades, coverings, traffic controls, steel plates, and other temporary protections.
- B. Contractor to provide all necessary protections required by Occupational Safety and Health Administration (OSHA).

PART 3 - EXECUTION

3.1 PROTECT EXISTING VEGETATION TO REMAIN

- A. Prior to commencing site preparation work, notify Architect, and meet on site to locate existing trees, lawns and vegetation which are to remain.
- B. Protect and keep existing vegetation to remain free from physical damage. Keep in a healthy, vigorous growing condition for the entire construction period as follows:
 - 1. Keep site disturbance and staging limits to a minimum. Obtain approval from Owner for material and equipment storage areas. Limit access points and routes to the project site. Coordinate site access with other trades and contractors on the work site.
 - 2. Groups of Trees and Vegetation: Place orange plastic construction fencing around drip line(s) of trees and plant beds as detailed or directed by the Architect. Do not store materials, run equipment, park vehicles, or otherwise disturb area within the drip line (full canopy of tree) or in plant beds.

3. Specimen and Individual Trees: Protect each as noted and detailed. Do not store materials, run equipment, park vehicles or otherwise disturb area within the drip line (full canopy of tree).
- C. Rejuvenate damaged vegetation by pruning watering, fertilizing, staking and other methods as directed by the Architect. Replace trees and other vegetation that cannot be restored to full growth with comparable size, quantity, quality and species as determined by the Architect.
- D. Repair lawns disturbed due to construction operations outside the grading limits, as specified and directed by the Architect. Provide screened topsoil, seed, and mulch over damaged lawn areas, access ways or where tire rutting occurred.

3.2 TOPSOIL STRIPPING AND STOCKPILING ON SITE

- A. Strip full depth of existing topsoil from areas to be regraded, paved, or otherwise built upon. When amount of available topsoil exceeds what is indicated in geo-tech/boring report, on site test pits, or Contractor assumed depth, continue to remove all topsoil and lower the paved or built element subgrade. Place additional satisfactory earth fill in uniform depths as indicated in the Site Earthwork Section 312201. Maintain finished grades as shown on the drawings. This work shall be done at no additional cost to the Owner.
- B. Minimum quantity of topsoil shall be as needed to provide four (4") inches settled depth on lawn areas. Verify quality and quantity. Supply imported topsoil when amount of available topsoil meeting above requirements is less than what is required for the proposed lawn areas. See Section 329201 for imported topsoil requirements.
- C. When amount of available topsoil meeting above requirements exceeds what is required for the proposed lawn areas, lower the lawn subgrade and place additional topsoil in a uniform depth as directed by the Architect. Maintain finish grades as shown on the drawings. This work shall be performed and supplied at no additional cost to the Owner.
- D. Topsoil shall be well drained, homogeneous texture soil of uniform grade, without the admixture of subsoil material. Topsoil shall be free of dense material, hardpan, and stone over three-quarters (3/4") inch in diameter, and other objectionable foreign material including, but not limited to, brick, concrete, asphalt, glass, nails, screws, toxins, hazardous wastes and chemicals (such as, but not limited to, atrazine and muriatic acid) that may be injurious to humans, animals and plant materials.
- E. Excess topsoil, not needed for proposed lawns, as specified, shall be loaded and hauled offsite at no additional cost to the Owner. Should existing topsoil onsite not be in sufficient quantities to provide for proposed lawns and planting area depths as indicated on the plans and as specified, contractor shall furnish and install the required amount of topsoil at no additional cost to the Owner.

3.3 SITE CLEARING AND REMOVALS

- A. Items and materials noted to be removed shall become the property of the Contractor, unless otherwise noted. Obtain Owner's approval prior to removal off site or for relocation of salvaged material on site. Remove material off site and legally dispose of it.

Backfill voids with imported granular backfill, placed in eight (8") inch layers compacted to 95% maximum density.

- B. Remove physical elements above and below grade as shown and which interfere with proposed construction. Physical elements include but are not limited to: trees, root systems, shrubs, vines, grass, vegetation, pavements, walks, curbs, gutters, foundations, previous construction materials, glass, headwalls, flared end sections, catch basins, manholes, inlets, drywells, septic tanks, unused utilities, pipes, cisterns, walls, rocks, and other debris.
- C. Trees, shrubs and roots shall be completely removed and disposed of legally off site.
- D. Maintain existing utilities shown to remain and protect from damage during demolition and construction operations. Do not interrupt existing utilities; provide temporary services when required, as acceptable to the Architect.
- E. Research with Owner possible locations of existing subsurface utilities prior to excavating.

3.4 ASPHALT MILLING

- A. Mill existing asphalt to limits shown on the drawings and stockpile on site in an area as directed by the Owner. The Owner shall retain ownership of the asphalt millings.
- B. The Contractor shall use equipment with automatic grade and slope controls, capable of cold milling existing asphalt pavement to an accurate depth of cut, profile and cross slope and shall be capable of loading the milled material directly into trucks.
- C. Cold milling asphalt pavement shall be performed in a manner which prevents the tearing and breaking of underlying and adjacent pavement and the contamination of the millings with granular subbase material, subgrade or deleterious materials. All millings shall be loaded directly to trucks from the milling machine and hauled to stockpile or disposed of.
- D. The milled surface shall be swept and jet washed clean prior to installation of new surface material. The Contractor shall sweep the surface in a manner which minimizes dust.
- E. The Contractor shall promptly repair any and all localized areas of distress in the milled surface that may present a hazard to traffic, the finished surface, the stability of the new asphalt, or deemed unsuitable by the Architect, at no additional cost to the Owner.
- F. Contractor shall apply NYSDOT approved tack coat to the cleaned, milled surface in preparation to received new top course asphalt as specified in Section 321201 - Asphalt Paving.

3.5 SAW CUTTING

- A. The Work consists of vertical saw cutting of the existing asphalt or concrete pavement structure to facilitate the removal of the asphalt or concrete bound material.

- B. The equipment shall be capable of producing a smooth vertical saw cut without causing damage to the adjacent pavements or related site features.
- C. The Contractor shall saw cut the asphalt/concrete pavement to a depth which will allow removal of the material without causing damage to the adjacent pavement. Rough, jagged or cracked edges will not be acceptable. Concrete pavement shall be removed at the nearest contraction joint.

3.6 RELOCATIONS

- A. Any item noted to be relocated shall be removed by the Contractor from its existing position without damaging it, stored, protected from theft, fire, vandalism and damage for the project duration. Reset in the location(s) and in the manner detailed, noted on the drawings or specified.
- B. Backfill voids with imported granular fill material, placed in eight (8") inch layers compacted to 95% maximum density when located in proposed pavement areas or 90% maximum density when located in proposed non-paved areas.
- C. Salvaged items shall be returned to the Owner as noted on the drawings. Move items to Owner designated areas.

3.7 CLEAN UP

During the contract and at intervals as directed by the Architect and as site preparation is completed, clear the site of extraneous materials, rubbish, and debris. Leave the site in a clean, safe, well draining, neat condition.

END OF SECTION 311201

SECTION 312201 - SITE EARTHWORK

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. The extent of site earthwork and site grading is shown on the drawings.
- B. Site earthwork includes, but is not limited to, the following:
 - 1. Fill Materials
 - 2. Source Quality Control
 - 3. Shoring, Bracing and Supporting
 - 4. Horizontal and Vertical Layout
 - 5. Grading and Excavation
 - 6. Compacted Backfill and Fill
 - 7. Field Quality Control Testing and Inspection Services
 - 8. As-Built Survey
 - 9. Guarantee
 - 10. Clean Up
- C. Provide materials, labor, equipment and services required to accomplish related work in accordance with the drawings and specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 311201 - Site Preparation
- B. Section 312501 - Erosion, Sediment and Pollution Control
- C. Section 334001 - Storm Drainage

1.3 REFERENCES

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials
- B. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- C. ASTM D 75 - Practice for Sampling Aggregates
- D. ASTM D 422 - Particle-Size Analysis of Soils (without Hydrometer Analysis)
- E. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³)
- F. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³)

- G. ASTM D 2434 - Standard Test Method for Permeability of Granular Soils (Constant Head)
- H. ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- I. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- J. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
- K. ASTM D 6938 - In Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods
- L. ASTM D 4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- M. ASTM D 5084 - Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
- N. Occupational Health and Safety Administration Regulations and Standards

1.4 SUBMITTALS

- A. Furnish name of New York State licensed Land Surveyor to be employed and perform project layout. Obtain Architect's approval prior to performing work.
- B. Submit written report on NYS licensed Land Surveyor's letterhead verifying that professional's involvement with the project layout. The report shall briefly state the scope of services performed for the project, the dates work was accomplished, and an explanation of any adjustments required, specifically listing as-built and FIELD VERIFY requirements as noted in 3.2 of this specification section.
- C. Provide Earthwork Contractor's experience requirements as indicated in 1.5, "Quality Assurance". Obtain Architect's approval prior to performing work.
- D. Samples: 10 lb. samples of each type of fill; submit in airtight containers to testing laboratory.
- E. Materials Sources: Submit name of imported materials source for each type of fill material.
- F. Fill Composition Test Reports (Imported and Onsite): Provide results of laboratory tests (less than 2 months old) on proposed and actual materials used to determine acceptability. This shall include:
 - 1. One optimum moisture-maximum density curve (Modified Proctor) for each soil/imported fill type as determined by ASTM D1557, Method A, latest issue.
 - 2. Sieve Analysis - ASTM D422
 - 3. Moisture Density Relationship - ASTM D1557, Method C / ASTM D698

4. Plasticity Index - ASTM D4318
 5. Soundness Test - ASTM C88
 6. Soil Classification - AASHTO and ASTM D2487
- G. Compaction Density Test Report(s) required in Field Quality Control of this specification.
- H. Contractor's NYS Licensed Professional Engineer's layout and design calculations of sheet piling and shoring required.
- I. As-Built Survey: The Contractor shall have NYS Licensed Land Surveyor provide an updated AutoCAD file .dwg site survey, version 2024, or newer, and stamped pdf electronic copies of fully completed proposed site work (including but not limited to: spot elevations, contours, drainage structures and pipes with inverts, utilities, asphalt, concrete, and all site elements) at ALL proposed site work, to a minimum of 15'-0" beyond the proposed site work into existing conditions.

1.5 QUALITY ASSURANCE

- A. Perform all site earthwork, site grading and excavation in compliance with requirements of governing authorities having jurisdiction, OSHA Standards, and "References" in this project specification.
- B. The Owner will employ a licensed soil testing and inspection service for Field Quality Control Testing of materials. This Contractor will coordinate day to day scheduling with the Owner's testing agency for conformance with "Field Quality Control Testing and Inspection Services" in this project specification.
- C. Earthwork Contractor Experience Requirements: Submit business name, business Owner(s) name(s), business address, telephone number, website and/or email address signed by the Contractor/Subcontractor who meets the qualifications set forth in this specification and is proposed by the Contractor to perform the Earthwork for this Project. Provide a list of at least four (4) Earthwork projects of comparable size, scope and quality completed successfully by the proposed Contractor/Subcontractor within the past three (3) years that includes the date completed, project Owner's name and current contact information, including telephone numbers and email addresses.
- D. Layout Foreman Experience: The Earthwork Contractor must provide a competent layout foreman skilled in this specific type of layout/earthwork project. The layout/earthwork foreman shall have a minimum of four (4) similar projects completed within the last three (3) years. Provide a list of projects layout/earthwork foremen has completed including project name, address, Owner contact information and project scope of work.

1.6 JOB CONDITIONS

- A. Job conditions in Section 311201 apply.
- B. Provide sufficient quantities of fill materials to meet project schedule and requirements. When necessary, store materials on site in advance of need.

- C. When fill materials need to be stored on site, locate stockpiles where directed by Owner.
 - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
 - 2. Prevent contamination of material types.
 - 3. Protect all stockpiles from erosion and deterioration of materials by covering with plastic sheets, tarps or as directed by the Architect.
- D. Moisten or dry, fill or backfill materials, to the proper moisture content as determined in accordance with ASTM D1557, Method C in order to obtain proper compaction as indicated.

1.7 SUB-SURFACE SOIL INFORMATION

- A. Refer to subsurface information elsewhere in the specifications. The geo-technical data on subsurface conditions is not intended as representation warranties of the continuity of such conditions between test pits or test borings made by the Owner and included in the specification. It is expressly understood that the Owner, Architect, Landscape Architect, and Consulting Engineers are not responsible for interpretations or conclusions drawn therefrom by the Contractor. The data is made available for the convenience of the Contractor.
- B. Additional test borings and other exploratory operations may be made by the Contractor at no additional cost to the Owner, provided such operations are acceptable to the Architect and Owner. Coordinate test locations with Owner prior to starting work. Backfill immediately when completed and repair to satisfactory conditions as determined by the Architect. It is expressly understood that the Owner, Architect, Landscape Architect, and Consulting Engineers are not responsible for interpretations or conclusions drawn therefrom by the Contractor.

1.8 UNUSUAL SUBSURFACE CONDITIONS

- A. Notify the Architect immediately in writing via email when unusual conditions are encountered during excavation, including, but not limited to: excessive flooding, miscellaneous structures, uncharted or unlocated utilities, foundations, bed rock, toxic and hazardous materials and chemicals (such as muriatic acid and atrizene), suspected archaeological artifacts, and unsatisfactory soil materials. Request clarification from the Owner's Representative or Architect before proceeding. Refer to paragraph 3.4 of this specification.

PART 2 -PRODUCTS

2.1 FILL MATERIALS

- A. **Satisfactory General Earth Fill:**
 - 1. To be used at least 5'-0" outside of structural elements.

2. Satisfactory general earth fill shall be satisfactory on-site subsoil, or hauled in off-site subsoil free of toxics, hazardous wastes and chemicals (such as, but not limited to, atrizene and muriatic acid) that may be injurious to humans, animals and plant materials. Satisfactory earth fill shall also be free of rubbish, debris, wood, masonry, metal, frost, vegetation, organics or other deleterious material, which cannot be properly compacted. Use satisfactory general earth fill that is dry and free of clay. Rocks, gravel or soil shall not be larger than 3" in any dimension/direction.
3. Satisfactory earth fill materials are also defined as those complying with the American Association of State Highway Transportation Officials (AASHTO), M-145 soil classification Groups A-1, A-2-4, A-2-5, A-3 and Unified Soil Classification System GW, GP, GM, GC, SW, SP, SM, and SC (or a combination of these group symbols) as determined by ASTM D2487.

B. Imported Granular Backfill:

1. Imported granular backfill to be used for asphalt pavement subbase, other structures, and where indicated on the drawings.
2. Backfill shall be run of crusher stone meeting the following gradation as determined by ASTM-C136:

<u>Standard Sieve Sizes</u>	<u>Percent Passing By Weight</u>
2" or 50 mm	100%
3/4" or 19 mm	75 - 90%
1/4" or 6.3 mm	25 - 60%
#40 or 0.425 mm	5 - 40%
#200 or 0.075 mm	0 - 8%

3. Backfill shall be free of debris and deleterious materials. In no case shall the plasticity index exceed 5.0 or the percentage passing the 200 mesh sieve exceed 8%. The quality of the imported granular backfill shall be determined by the magnesium sulfate soundness test, if considered suspect by the Architect or Geotechnical Engineer. The maximum percent loss at four cycles by weight shall be 20.

2.2 UNSATISFACTORY SOIL MATERIALS

- A. Shall be defined as soil with high percentage of decomposed rock, sand, organic matter or moisture laden clay to prevent adequate compaction. Also, soil with toxics, hazardous wastes and chemicals (such as atrizene and muriatic acid) that may be injurious to humans, animals and plant materials. Also, soil with significant quantities of rubbish, debris, wood, masonry, metal, frost or other deleterious material which, in the opinion of the Geotechnical Engineer, Owner's Representative, and Architect, cannot be properly compacted shall be classified as unsatisfactory.
- B. Unsatisfactory soil materials are defined as those described in AASHTO M-145, soil classification, Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7 with CBR value less than

7.0. Also Unified Soil Classification System ML, CL, OL, MH, CH, OH as determined by ASTM D2487 (or a combination of these group symbols) with CBR value less than 7.0 in addition to peat (PT) and other highly organic soils, cobbles, boulders; and soil materials, of any classifications that have a moisture content at the time of compaction beyond the range of 1% below and 3% above the optimum moisture content of the soil material/backfill material, as determined by the Moisture Density Relationship test.

- C. When unsatisfactory soil materials are encountered at proposed subgrades and other design elevations, proceed as described in Part 3 (Execution) of this Section.
- D. When excavated materials become unsatisfactory as a direct result of the Contractor's work, this shall result in the rejection of the unsatisfactory soil materials by the Architect.
- E. The use of slag (a byproduct of metal processing) or recycled/crushed concrete is unacceptable for any use on this project site.

2.3 SOURCE QUALITY CONTROL

- A. See "Submittals" and "Quality Assurance" of this specification section for general requirements for testing and analysis of soil and fill materials.
- B. Where fill materials are specified by reference to a specific standard, Contractor is responsible to test and analyze all samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest until approved.

2.4 SHORING, BRACING AND SUPPORTING

- A. Shoring and bracing shall conform to the requirements of the Occupational Health and Safety Act.
- B. Shoring and bracing shall be provided, placed and maintained at the locations and elevation that are necessary or required to: support and protect the sides and bottom of the excavation; prevent undue disturbance or weakening of the supporting materials below or beside the works; prevent movement of ground which may disturb or damage the work, adjacent pavements, property, structures or other works.
- C. Provide materials for shoring, bracing, and supporting, such as sheet piling, uprights, sheathing, stringers, and cross-braces, in good serviceable condition. Use timbers that are sound and free of large or loose knots.
- D. Provide design by Contractor's NYS Licensed Engineer, when shoring is required to perform work as shown on the drawings. Submit to Architect for approval.
- E. Installation: Shoring and bracing shall be driven and placed so that it can be removed as backfilling takes place without damage to the pipeline or its appurtenances, structures, and without settlement of or damage to adjacent pavements and structures.
- F. Removal: The Contractor shall remove all shoring and bracing as the excavation is backfilled, unless directed by the Architect to be left in place. The procedure for

extracting shoring and bracing and placing backfill shall ensure the backfill load is applied gradually, and disturbance of the works or foundation material is avoided.

- G. Support all utilities as required by the municipality/utility owner.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify field conditions such as bench marks, monuments, topography, inverts, locations of utilities and property lines before proceeding. Notify the Architect immediately, in writing, of discrepancies prior to commencing work. Commencement of work will be construed as complete acceptance of survey and layout information. Additional costs resulting from failure to verify field conditions prior to commencing work shall be borne by this Contractor and at no additional cost to the Owner.

3.2 LAYOUT

- A. Stake layout up to and including those elevations and dimensions specifically noted on drawings as "FIELD VERIFY" (FV). Ensure that the field elevation and dimension agrees with the elevation and dimension on the drawings before continuing. Notify the Architect immediately, in writing, of any discrepancies prior to commencing work. Additional costs resulting from failure to verify dimensions as noted on drawings shall be borne by this Contractor and at no additional cost to the Owner.
1. Assume sole responsibility for the accuracy of the layout work.
 2. Run from point(s) of beginning (POB), base lines, property monuments, benchmarks, iron survey pins, or other points given on the drawings.
 3. Roads, Parking Areas, and Walks: Accurately locate and stake curb lines, center line, swales, point of curve and tangency as necessary to accurately build.
 4. Buildings and Site Features: Accurately locate and stake corners, offset corners, slopes, and center lines as necessary to accurately build.
 5. Pipe Work: Accurately locate with laser.

3.3 GRADING

- A. Cut and Fill: Presume the earthwork does **NOT** balance on site. Meet the grades shown on the drawings. Haul in or haul away as may be necessary. Provide earthwork calculations and provide for imported or exported material as part of bid. No additional costs will be allowed.
- B. Grade areas as indicated, including transition areas, with uniform levels and slopes between finish elevations.
- C. Cut to grades and profiles indicated.
- D. Set grade stakes at fifty-foot (50') intervals, at corners, and breaks in grade.

- E. Conduct operations to avoid ponding of water. Provide all pumping equipment, sump pits, and temporary diversion swales where and when necessary to continue work performance on schedule and as specified.
- F. Shape subgrade surface of site elements to within 0.10' above or below required subgrade elevation, compacted as required and sloped to provide drainage as shown on the drawings. Notify Architect and Geo-Technical Engineer for subgrade review prior to continuing work.
- G. Refer to Section 311201 for topsoil requirements.

3.4 EXCAVATION

- A. Remove and legally dispose of material encountered to obtain required subgrade elevations, including pavement, obstructions visible on ground surface, underground structures and utilities indicated to be removed.
- B. Sloping and Benching: Follow OSHA recommendations based on soil type to determine slope configurations. Slope the sides of excavations five (5') feet deep and over to the angle of repose of the material excavated; otherwise, shore, and brace where sloping is not possible either because of space restrictions or stability of material excavated.
- C. Bracing and Shoring:
 - 1. Provide bracing and shoring as required in excavations, to maintain sides and to protect structures from settlement.
 - 2. Maintain shoring and bracing in excavations regardless of the time period excavations will be open. Carry down shoring and bracing as the excavation progresses.
 - 3. Remove shoring and bracing before completion of backfilling except where required for structural support or slope stability.
 - 4. The design, installation, and maintenance of such shoring and bracing required to accomplish the above purpose are the sole responsibility of the Contractor.
 - 5. Follow OSHA recommendations for bracing and shoring.
 - 6. Indemnify the Owner, the Landscape Architect, Architect, and the Consulting Engineers against any action arising from damage to existing structures, utilities or injury to persons resulting from the Contractor's actions or failure to act, in carrying out the intent of this section.
- D. Protections: Protect structures, vegetation, utilities, sidewalks, pavements, and other facilities in areas of work. Barricade and secure open excavations and provide warning lights/signage from dusk to dawn each day.
- E. Extent of Excavations: Excavate for structures to elevations and dimensions shown, extending excavation a sufficient distance to permit placing and removal of other work

and for review. Trim bottom to required lines and grades to provide solid base to receive concrete or imported granular backfill material.

- F. Unsatisfactory Soil Materials: When unsatisfactory soil materials, as defined in this specification, are encountered at design elevations, immediately notify the Architect in writing by email or other equally expeditious means. Continue as directed by the Architect and Geo-Technical Engineer. When, in the sole opinion of the Architect, conditions are not a result of Contractor's negligence, additional excavation may be directed by the Architect and paid for as a Change Order on a unit price or negotiated price basis in accordance with Contract Documents. This additional excavation shall be measured each day and verified by the Owner's representative and the Contractor's Superintendent. A daily written accounting, attested by both parties, shall be maintained with copies daily to the Architect. No claim for extra compensation will be considered except through the procedure outlined above.
- G. Unauthorized and Over Excavation: Consists of removal of materials beyond required subgrade elevations or dimensions without specific direction of the Architect or Geotechnical Engineer. Unauthorized or over excavation, as well as remedial work directed by the Architect or Geotechnical Engineer, shall be at Contractor's expense. Fill of unauthorized excavations shall be as follows (all at no additional cost to the Owner):
1. Fill the voids created by the removal of materials beyond indicated subgrade elevations with lean concrete (2000 psi). Or;
 2. Extending the indicated bottom elevation of the concrete footing to the lower elevation. Or;
 3. Adding imported granular backfill material compacted to 95% density to proper design elevation and layout as directed by the Architect. Testing agency to perform compaction testing prior to proceeding.
- H. Dewatering:
1. Contractor shall anticipate seasonal variations of soil moisture content and groundwater in the Base Bid as verified by site investigation indicated in Section 311201.
 2. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
 - a. Surface and ground water shall be intercepted and removed before entering excavations. All necessary measures shall be taken. Earth dikes, ditches, or other devices, if required, shall be constructed to prevent such flows.
 3. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - a. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

- b. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations.
 - c. Provide and maintain pumps, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- 4. The Contractor shall at all times provide and maintain proper and satisfactory means and devices (i.e. ditches, temporary pipes, pumps, and/or other temporary construction) for the removal of all water entering the excavations. Water shall be removed as fast as it may collect, in such manner that shall not interfere with the execution of the work or in the proper placing of pipe, structures or other work.
- 5. Provide and operate sufficient pumping machinery to keep excavated parts free of water. Dig sump pits when necessary into which the excavation shall be drained. Take care and proper precautions in the use of pumps so that in no case will foundations, footings and utilities already in place or existing foundations, footings of adjacent structures or utilities be undermined or disturbed, and erosion occur due to pumping.
- 6. Do not discharge pumped materials into any body of water, wetland, adjacent property, roadside swales, subsurface storm systems, or any infiltration practices as determined by the Architect. Provide temporary sediment basins, traps, and filter bags for pumped water.
- 7. Adjust, repair, replace, or clean all work, surfaces, and property, which may have been affected as a result of any dewatering operation.
- I. Prepare subgrade and twelve (12") inches of existing sub-soils below subgrade elevations in excavated areas to minimum density of 95% in structure, pavement, utility areas, trenches, and 90% under lawn non-paved areas.
- J. Rock and Rock Excavation:
 - 1. Rock Definition: Shall be defined as solid hard material located in ledges, bedded aggregate deposits and unstratified masses, and all-natural conglomerate deposits so firmly cemented as to present all the characteristics of solid rock, which must be removed by pneumatic hammers. Rock does not include shale, slate, soft sandstone, hardpan, masonry or concrete rubble, boulders less than three (3) cubic yards, such other rock material which is decomposed, stratified, weathered or shattered, or any material capable of being removed by a well maintained Caterpillar 225 power shovel, D8 Dozer with Ripper, or Architect approved equivalent.
 - 2. Rock Excavation Administrative Procedures: When encountered, shall be stockpiled for measurement before removal and paid for on a unit price basis in accordance with Contract Documents. Notify Architect immediately of rock discovery prior to performing any rock removal or continued excavation. Rock

excavations as defined shall be measured each day and verified by the Owner's designated representative and the Contractor's on-site Superintendent. A daily written accounting, attested to by both parties, shall be maintained with copies daily to the Architect. No claim for extra compensation will be considered except through the procedure outlined above.

3. Rock Excavation Removal Procedures: Includes removal and disposal of rock. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions.
 - a. 24 inches outside of concrete forms other than at footings.
 - b. 12 inches outside of concrete forms at footings.
 - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. 8 inches beneath bottom of concrete slabs-on-grade.
 - f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.
4. Any over excavation due to rock excavation and removal shall be handled as directed under "Over Excavation" in this Section.
5. Contractor has the option to remove existing rock and dispose off-site or crush existing rock and use as satisfactory general earth fill when it meets gradation noted in 312201 for imported granular backfill material.

3.5 BACKFILL AND FILL

- A. Preparation of Ground Surface to Receive Fill: Remove vegetation, organic materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Break up and remove existing foundations, concrete slabs, abandoned utilities, and site features. Plow, strip, roughen, or break up slopes steeper than 1 vertical to 4 horizontal so that fill material will bond to existing surface.
- B. Execute these steps when the existing ground surface, after removal of the above unsatisfactory soil materials, has a density less than that specified under "Compaction" for the particular area classification: Break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to the required depth and percentage of maximum density.
- C. In no case shall fill be placed on a subgrade that is wet, muddy, rutted, spongy, frozen or that contains frost or that has not been tested and approved to achieve satisfactory results.

- D. Areas to receive any fill or backfill should be properly prepared, proof rolled, tested per "Field Quality Control" within this specification, inspected and approved by the Architect and Geo-Technical Engineer prior to the placement of fill.
- E. Following grade approval by the Architect and Geo-Technical Engineer, place imported granular backfill, imported structural fill and satisfactory general earth fill material in layers not more than eight (8") inches in loose depth in a manner to minimize segregation. The fill shall be placed in nearly horizontal lifts commencing at the lowest fill area elevation and proceeding with each lift upward and outward from the lower lift.
- F. Moisture Content: Contractor shall anticipate seasonal variations of all soils (on site or imported) and imported fills moisture content in the Base Bid and timing required for such shall be included in the project schedule. The moisture content of the materials shall be adjusted prior to application of compaction such that it is no more than 1% below or 3% above the optimum moisture content of the material. Apply water to surface, subgrade or layers of soil material when required to achieve compaction densities stated below. Remove and replace, or scarify and air dry, soils or imported materials that is too wet to permit compaction to specified density.
- G. Compaction:
 - 1. Compact each eight (8") inch layer of fill and backfill materials.
 - 2. Compact fill and backfill material below subgrade for structures, slabs, pavements, and utilities to minimum 95% of optimum in place density as determined by ASTM D1557, Modified Proctor.
 - 3. Compact fill material below subgrade for lawns or unpaved areas to minimum 90% of optimum in place density as determined by ASTM D1557, Modified Proctor.
- H. Equipment:
 - 1. Use sheepsfoot rollers, pneumatic tired rollers, drum rollers, vibrating tampers, and other compaction equipment capable of obtaining the required density throughout the entire layer being compacted.
 - 2. Use power-driven hand tampers for compacting materials adjacent to site structures.
 - 3. For utility trenches or other confined areas, small compaction equipment may be necessary such as a vibratory plate, jumping jack or walk-behind vibratory roller. In these cases, lift heights no greater than six (6") inches should be maintained.
- I. Reconditioning Compacted Areas: Where previously completed compacted areas are disturbed by subsequent construction operations (by any Contractor), traffic or adverse weather, scarify and dry out the surface, regrade, and recompact to the required density prior to further construction at no additional cost to the Owner. Use hand tamping for recompaction over underground utilities and trenches.

3.6 FIELD QUALITY CONTROL TESTING AND INSPECTION SERVICES

- A. Soil Testing Service/Geo-Technical Engineer must inspect and approve density tests, retesting, and proof rolling of subgrades, as described in this section, before further construction work is performed thereon.
- B. Perform compaction density testing on compacted fill and imported granular base course in accordance with ASTM D1556, ASTM D1557, ASTM D2922, and D3017.
- C. In place density testing should be performed at a frequency of one (1) test per 500 square feet per lift in smaller open areas, one (1) test per 2,500 square feet per lift in larger open areas, and one (1) test per 25 feet per lift in confined areas and utility trenches.
- D. When the test results indicate that insufficient compaction has been obtained in any layer, the Contractor shall take action to modify or alter the moisture content in the soil, to provide additional compaction and testing or otherwise to increase the in-place soil density. If the Contractor cannot obtain satisfactory compaction due to material properties, the Contractor shall remove the unsatisfactory material and replace with new material at no additional cost to the Owner.
- E. Materials contaminated by mud, debris, organics, frost, and/or other deleterious materials shall be removed and replaced with uncontaminated specified material.
- F. No fill or backfill shall be placed over an area or lift of fill that has not be tested and achieved satisfactory results.
- G. Proof Rolling: On pavement subgrades, in cut areas only, unless otherwise directed by the Architect, the only testing required will be the proof rolling as described below:
 - 1. Provide Soil Testing Service/Geo-Technical Engineer with 48-hour advance notification when subgrades are ready to proof roll.
 - 2. Proof Roll the prepared pavement subgrade surface with fully loaded ten (10 c.y.) cubic yard earth moving truck or, in the opinion of the Architect/Geo-Technical Engineer, using a 5-ton smooth drum roller making at least 3 overlapping passes, in each of 2 perpendicular directions, on static mode at a speed of 1 to 4 feet/second. Check for unstable areas. Subgrades that rut, pump or deflect under the truck's tires may be judged unstable by the Architect/Geo-Technical Engineer. These areas may require further compaction or undercutting as directed by the Soil Testing Service/Geo-Technical Engineer.

3.7 AS-BUILT SURVEY

- A. Provide full as-built survey in AutoCAD .dwg format with stamped .pdf electronic files to the Architect for approvals. Survey shall include: spot elevations, contours, drainage pipes and structures with installed inverts, utilities, and all site pavements and elements)
- B. Survey shall be conducted by a NYS Licensed Surveyor.
- C. Areas to be surveyed include ALL completed proposed site work to a minimum of 15'-0" beyond

3.8 GUARANTEE

- A. Guarantee concrete slabs, pavements, trenches, utilities, structures and lawns free from settlement for a period of one (1) year from the date given on the certificate of substantial completion or final punch list when satisfactorily completed and accepted by the Architect, whichever is later.
- B. Repair to proper grade and alignment any and all settlement of concrete slabs, pavements, trenches, utilities, structures and lawns adversely affected by settlement within one (1) year after date given on the certificate of substantial completion or final punch list when satisfactorily completed and accepted by the Architect, whichever is later, at no additional expense to the Owner. In damaged compacted areas, scarify the surface, re-shape, and compact to required density prior to further construction.
- C. All repairs/corrections shall be completed to the satisfaction of the Owner within seven (7) days of written notice by the Owner.

3.9 CLEAN UP

During the contract and at intervals as directed by the Architect and as earthwork is completed, clear the site of surplus earth, large surface stones, debris, tools and equipment. Leave the site in a clean, safe, well draining, and neat condition.

END OF SECTION 312201

SECTION 312501 - EROSION, SEDIMENT AND POLLUTION CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Provide erosion, sediment and pollution controls as shown on the drawings and as directed by the Architect to significantly reduce runoff on downstream and neighboring properties. This includes temporary control measures to mitigate land disruption by other Contractors during construction of this project.
- B. Erosion, sediment and pollution control includes, but is not limited to, the following:
 - 1. Silt fence
 - 2. Rip rap
 - 3. Rock check dam
 - 4. Temporary seeding
 - 5. Permanent seeding
 - 6. Straw mat
 - 7. Temporary sediment filter bag for pumped water
 - 8. Construction site dust control
 - 9. Spill prevention, reporting and documentation
 - 10. Clean up
- C. Provide materials, labor, equipment and services required to accomplish related work in accordance with the drawings and specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 311201 - Site Preparation
- B. Section 312201 - Site Earthwork
- C. Section 329201 - Seeded Lawns
- D. Section 334001 - Storm Drainage

1.3 REFERENCES

- A. Spill Guidelines Manual (SGM) New York State Dept. of Environmental Conservation.
- B. New York State Standards and Specifications for Erosion and Sediment Control, dated July 2016 or latest edition.

1.4 SUBMITTALS

- A. Manufacturer's Data (MPD) are required for:
 - 1. Silt Fence with Net Backing
 - 2. Sediment Filter Bag
 - 3. Straw Mat

4. Spill Response Equipment
- B. Material Certificates (MC) showing content/mechanical analysis and Samples are required for:
 1. Rip Rap
 2. Rock Check Dams: No. 1 stone (facing material), NYSDOT light stone fill (core material)
 3. Temporary Seeding: Submit seed mix species and source
 4. Permanent Seeding: (See Section 329201)
- C. Listing of emergency contract numbers. This list shall include the name of an Emergency Response Contractor that may be used in certain situations.

1.5 QUALITY ASSURANCE

- A. Perform erosion, sediment and pollution control in compliance with applicable requirements of the New York Standards and Specifications Erosion and Sediment Control Manual, dated July 2016 (or latest edition) or other governing authorities having jurisdiction.
- B. It is this Contractor's responsibility to prevent stormwater pollution from running offsite. All pollution control work related to the site contract shall be included in the Base Bid. All pollution control work related to other contracts shall be on a time and material basis and back-charged to the responsible party.
- C. In the event of a chemical or hazardous spill or release, the individual(s) who caused the spill is responsible for prompt and proper clean-up. If the spill requires cleanup procedures beyond the means of the Contractor, an emergency spill cleanup Subcontractor shall be hired by the Contractor. They shall be utilized when the Contractor does not have the appropriate training, equipment or materials to cleanup the area safely and effectively. This shall be done at no additional cost to the Owner. Any testing and cleanup required post cleanup shall be provided by the Contractor at no additional cost to the Owner.

1.6 JOB CONDITIONS

- A. Job conditions in Sections 311201, 312201, 329201 and 334001 apply.
- B. Contractor will take all necessary precautions to avoid allowing dust generation that violates NYSDEC regulations and compromises compliance with governing authorities air monitoring plan.

1.7 INSPECTIONS AND MAINTENANCE

- A. The Architect or qualified personnel of the Operator shall inspect disturbed areas of the construction site at least once per week. Special attention will be focused on areas not finally stabilized, structural control measures, point discharge (outlets) and locations where vehicles enter or exit the site. Disturbed areas will be inspected for pollutants entering the drainage system. Structural control measures will be reviewed for

effectiveness in preventing significant impacts to receiving waters. Locations where vehicles enter or exit the site will be inspected for evidence of off site sediment tracking.

- B. The Contractor shall provide timely maintenance of vegetation erosion and sediment control measures, and other protective measures, during construction. Corrective measures must be performed within one (1) calendar day of the Architect's or Operator's (Owner's) report. Failure by the Contractor to perform corrective work within this schedule automatically authorizes the Operator to hire others and backcharge this Contractor. The Architect or Operator will send a letter or email correspondence one (1) calendar day before hiring others and backcharging this Contractor.
- C. The Contractor shall conduct daily inspections of the equipment staging and maintenance, fueling, hazardous waste staging and waste storage areas to ensure that spill control measures are in place. Stock appropriate clean-up materials whenever changes occur in the types of chemicals used or stored on site.
- D. The Operator (Owner) shall provide long term maintenance of the storm water facilities after the site is finally stabilized.

1.8 SPILL PREVENTION, REPORTING AND DOCUMENTATION

- A. To minimize the potential for discharge to the environment of oils, petroleum, or other hazardous substances, the following requirements shall apply:
 - 1. All oil, petroleum, or hazardous materials stored or temporarily relocated on site during the construction process shall be stored in a way to provide protection from vehicular damage and to provide containment of leaks or spills. Temporary berms, dikes, storage basins, or similar methods shall be employed as appropriate on site.
 - 2. Maintain file of Material Safety Data Sheets (MSDSs) or other references for recommended spill clean-up methods and materials.
 - 3. Keep spill response equipment readily accessible.
- B. In the event of a spill contact the Construction Manager, Owner (Operator), and Architect. The Contractor shall also notify all other Contractors working around the area of the spill.
- C. If spilled material has entered any sanitary/storm sewer system then contact the municipality or agency with jurisdiction over the system, in addition to those listed in this section.
- D. The contractor shall be responsible for the initiation of spill reporting and documentation procedures. All petroleum spills must be reported to NYSDEC Spill Hotline at 1-800-457-7362, less than two (2) hours following discovery. All petroleum spills must be reported to NYSDEC unless all of the following apply:

Criteria	Description
Quantity	Must be known to be less than 5 gallons.
Containment	Must be contained on an impervious surface or within an impervious structure. No access to the environment.

Control	Must be under control and not reach a drain or leave the impervious surface.
Cleanup	Must be cleaned-up within two (2) hours of occurrence.
Environment	Must not have already entered into soil or groundwater or onto surface water.

- E. A release of a “reportable quantity”¹ or unknown amount of a hazardous substance must also be immediately reported to the NYSDEC Spill Hotline. Spills of reportable quantities of chemicals or “harmful quantities”² of oil to navigable waters must be reported to the federal National Response Center, 1-800-424-8802 or 1-202-426-2675.

¹ Reportable Quantity: Refers to the quantity of a hazardous substance or oil that triggers reporting requirements under the Comprehensive Emergency Response, Compensation, and Liability Act (CERCLA) (USEPA, September 1992).

² Harmful Quantity: Includes discharges that violate applicable water quality standards, cause a film, sheen, or discoloration on a water surface or adjoining shoreline; or cause a sludge or emulsion to be deposited beneath the water surface or shoreline (40 CFR 110.3).

PART 2 - PRODUCTS

2.1 SILT FENCE

- A. Shall be a woven polypropylene geotextile comprised of UV stabilized polypropylene slit film and 1.25" square, non pressure treated, pointed, hardwood posts and net mesh backing for additional support. Standard of quality for silt fence shall be IVI-3611MW as manufactured by Indian Valley Industries, Inc., www.iviindustries.com, (607) 729-5111, or Architect approved equal.
- B. Provide and install 250 linear feet in locations as directed.

2.2 RIP RAP

- A. Light: Shall be placed rip rap. Stones conforming to NYSDOT Table 733-21A and the following gradations:

<u>Standard Sieve Size</u>	<u>Percent Passing by Weight</u>
Lighter than 100 lbs	90 - 100
Larger than 6"	50 - 100
Smaller than ½"	0 - 10

- B. Gradation of rip rap shall be accepted or rejected based on a visual examination by the Architect prior to placing rip rap.
- C. Soil Separation Fabric: Shall commercially manufactured non-woven polypropylene filter fabric. Standard of quality shall be Mirafi 140N as manufactured by NICOLON/MIRAFI GROUP or Architect approved equal.

2.3 ROCK CHECK DAMS

- A. Facing Stone: Shall be No. 1 clean, washed stone meeting the following gradation:

<u>Standard Sieve Size</u>	<u>Percent Passing By Weight</u>
1"	100
1/2"	90-100
1/4"	0-15

B. Core Stone: Shall meet gradation requirements for NYSDOT light stone fill.

C. Provide and install in 6 locations as directed.

2.4 TEMPORARY SEDIMENT FILTER BAG FOR PUMPED WATER

A. Provide prefabricated bags/pouches with nonwoven geotextile fabric. The standard of quality shall be Dirtbag as manufactured by ACF Environmental, 800-448-3636 or Architect approved equal.

B. Provide wooden pallet to set filter bag on for ease of disposal.

2.5 TEMPORARY SEEDING

A. Seeding shall be 100% Perennial Ryegrass with no more than 30% of any one cultivar and always at least 2 different cultivars and a 90% germination rate or more.

B. All seed mixtures to contain 0.5% weed seed or less.

C. All seed must be fresh seed, not seed that is left over from last year and beyond the sell by date.

2.6 PERMANENT SEEDING

Seeding shall be as specified in Section 329201.

2.7 STRAW MAT

A. 100% biodegradable thread on 1.5 inch centers stitched to a 100% biodegradable natural fiber top net. Blanket shall be manufactured with a colored line or thread stitched 2-5 inches from edge to ensure proper overlap. Standard width is 4'-0".

B. Standard of quality shall be BioNet Blanket as manufactured by North American Green, 1-800-772-2040 or Architect approved equal for the following slope conditions:

<u>Slope Condition</u>	<u>Water Flow Condition</u>	<u>Product Type</u>
4:1 (or flatter)	Low flow (5 fps)	S75BN: Single Net Straw
3:1	Moderate flow (6 fps)	S150BN: Double Net Straw
2:1	Medium flow (8 fps)	SC150BN: Double Net Straw-Coconut (70/30 blend)
1:1 (and greater)	High Flow (10 fps)	C125BN: Double Net Coconut

- C. Stakes: Six inch lengths of 100% biodegradable "T" shaped pin designed to safely secure erosion control blanket. Standard of quality shall be Bio-Stake as manufactured by North American Green or Architect approved equal.

2.8 SPILL RESPONSE EQUIPMENT

- A. The following is a list of recommended spill control material. The contractor is responsible to have spill control and personnel protective equipment readily available for the materials being used. Acquire sufficient quantities and types of appropriate spill control materials needed to contain any spills that can be reasonably anticipated. The need for equipment to disperse, collect and contain spill control materials should be on site at all times.
 - 1. Personal Protective Equipment
 - a. Chemical Splash Goggles
 - b. Gloves
 - c. Boot Covers
 - d. Tyvek Aprons or Suits
 - 2. Absorption Materials
 - a. Spill Pillows and Socks
 - b. Absorbent Booms and Pads
 - c. Dikes for use on rough surfaces
 - d. Storm Structure Covers
 - e. "Loose" Absorbents
 - 3. Tools
 - a. Shovel, Broom, Brush
 - b. Disposal Bags
 - c. Sealing Tape
 - d. Hazardous Waste Stickers
 - e. "Danger" and "Keep Away" Signs
 - f. Five gallon pails or 20 gallon drums with polyethylene liners
- B. Basis of Design shall be provided by: 3M, 888-364-3577; New Pig Corporation, 800-468-4647; SpillKits911, 800-474-5911; Dawg, Inc., 800-935-3294; or Architect approved equal.
- C. Place spill response equipment in a readily assessable location within or immediately adjacent to the project site.

PART 3 - EXECUTION

3.1 REQUIREMENTS

- A. Between the Pre-Construction Meeting and starting site work, the Contractor shall:
 - 1. Review inspection and maintenance procedures.
 - 2. Designate specific Owner and Contractor personnel responsible for daily inspection and maintenance.

3.2 GENERAL EROSION CONTROL

- A. Install initial construction erosion control features, as indicated on drawings and specifications or as directed by the Architect, prior to topsoil stripping, earthwork, and removal of existing vegetation. Keep the disturbance to a minimum and shall not exceed five (5) acres, unless directed by the Architect. Install other features as described in the sequence of erosion, sediment and pollution control on the drawings.
- B. Start permanent seeding within seven (7) calendar days of rough grading. When this is not possible, provide temporary seeding of 100% perennial rye grass at the rate of six pounds (6#) seed per one thousand (1,000 sf) square feet. Provide temporary seeding within seven (7) days on non-roof, non-paved areas. When adverse weather conditions prevent good germination, repeat seeding as directed by the Architect until the area is stabilized. Till under temporary grass and fine grade when preparing for final permanent lawn stabilization.
- C. Until a disturbed area is stabilized, trap runoff sediment by the use of sediment debris basins, diversion swales, sediment traps, or other methods acceptable to the Architect and governing authorities. Provide temporary dry mulch (straw) to stabilize exposed soils as directed by the Architect.
- D. Provide erosion controls on slopes and swales traversing, bordering, or leaving the site. Limit the water flow to a nonerosive velocity.
- E. Do not store fill materials within one hundred (100) feet of the banks of any streams or waterbodies, intermittent or perennial.
- F. Inspect erosion and sediment control measures immediately after each rainfall and at least daily during prolonged rainfall. Make required repairs immediately.
- G. Remove sediment deposits when they reach approximately one-half of the height of the barrier. Dispose sediment in a manner that does not result in additional erosion or pollution.
- H. Provide prompt (weekly) removal and disposal of rubbish and debris in accordance with the governing authorities, Owner policies, and good housekeeping measures.

3.3 MUNICIPAL SEWER, SWALES AND WETLAND EROSION CONTROL

Control erosion, siltation and pollution to municipal sewers, swales and wetlands by taking appropriate measures such as, but not limited to, the following:

- A. Do not disturb the bed and banks of waterbodies unless specifically shown on drawings. When bed and bank work is shown, obtain permits and proceed with work creating the minimum disturbance necessary to complete the project.
- B. Prevent petroleum products and excessive amounts of silt, clay, and muck from entering municipal sewers, waters, swales or wetlands of New York State during construction.
- C. Prevent fresh concrete, concrete leachate, and washings from equipment and trucks, from entering municipal sewers, waters, swales or wetlands of New York State during construction.

- D. Place silt fence to control erosion at the downslope edge of disturbed areas. This barrier to sediments is to be put in place before disturbance of the ground occurs and is to be maintained in good condition until disturbed land is heavily vegetated or otherwise permanently stabilized.
- E. Seed areas of soil disturbance resulting from this project with appropriate perennial grass seed and mulched with straw within seven (7) calendar days as described in general erosion control. Mulch shall be maintained until a suitable vegetative ground cover is established and as directed by the Architect.

3.4 CONSTRUCTION SITE DUST CONTROL

- A. The Contractor shall prevent surface and air movement of dust from disturbed soil surfaces that may cause off-site damage, health hazards, and traffic safety issues.
- B. Dust control applies to construction roads, access points, other disturbed areas and stockpiles subject to surface dust movement and dust blowing.
- C. Contractor may use any number and combination of dust control methods, as approved by the Architect. They include:
 - 1. Applying water to haul roads
 - 2. Restricting vehicle speeds to 10 mph
 - 3. Hauling materials in properly tarped or watertight containers.
 - 4. Covering stockpiles and materials
 - 5. Wetting equipment and work area
 - 6. Mulching
 - 7. Spray adhesives and polymer additives (MSDS sheets required)
 - 8. Barriers and wind breaks
- D. Contractor is responsible for any cleanup and site restoration associated with dust control measures, dust pollution on or off the project site property at no additional cost to the Owner.

3.5 SILT FENCE

- A. Locate as shown on drawings and as directed by the Architect. Excavate trench along the lower perimeter(s) of site, along the contract limit line, and as indicated on the drawings. Place excavated material on uphill side of trench for backfilling.
- B. Drive stakes securely into the downhill side of the trench. When prefabricated silt fence with fabric attached to stakes is used, drive stakes so that fabric is buried in the ground as detailed.
- C. Backfill trench with excavated material, so that fabric is securely buried in the ground to prevent undermining. Tamp soil.
- D. Join sections by overlapping fabric between two (2) stakes. Set stakes simultaneously. Overlap by minimum six (6") inches, fold, and staple to prevent sediment bypass.

- E. Attach silt fence securely to stakes spaced no more than eight (8' o.c.) feet on center. Secure fence fabric to stake with minimum three one (1") inch staples.
- F. Toward the end of the project, when site is stabilized and as directed by the Architect, remove silt fence and correct lawn area around removal to a smooth, neat, well-draining condition.

3.6 RIP RAP

- A. Place and install rip rap where shown on drawings. Do not leave jagged, sharp pieces of stone facing up.
- B. Level out stone to provide smooth transition to adjacent finish grades.

3.7 ROCK CHECK DAMS

Install rip rap as detailed and described in Section 334001. Plant vegetation as detailed and described in Section 329202.

3.8 TEMPORARY SEDIMENT FILTER BAG FOR PUMPED WATER

- A. Install prefabricated bags/pouches on top of straw bale base as recommended by the manufacturer. Replace system when full (discharge into bag/pouch is significantly reduced).
- B. Silt may be used as general site fill or hauled off site. Remove straw bales, fabric, and prefabricated bags/pouches off site. Regrade area and return to lawn as specified.

3.9 TEMPORARY SEEDING

- A. Provide temporary seeding of topsoil stockpile immediately.
- B. When necessary and as directed by the Architect, provide temporary seeding on disturbed areas at no additional cost to the Owner.

3.10 PERMANENT SEEDING

- A. Install as described in Section 329201.

3.11 STRAW MAT

- A. Install as recommended by the manufacturer and as directed by the Architect for drainage channels and slopes.
- B. Stake spacing shall reflect slope to which the straw is being applied.

3.12 SPILL RESPONSE EQUIPMENT

Use per manufacturer's recommendations and as directed by the NYSDEC, or other governing agencies.

3.13 CLEAN UP

- A. During the contract and at intervals as directed by the Architect and as erosion, sediment and pollution control procedures are completed, clear the site of extraneous materials, rubbish, and debris. Leave the site in a clean, safe, well draining, and neat condition.
- B. Clean storm ponding areas, catch basins and detention basins: Clean out contaminants, sediment, rubbish, construction debris, foreign objects and accumulated floatables from chambers and ponding areas thoroughly, immediately prior to final acceptance.

END OF SECTION 312501

SECTION 321201 - ASPHALT PAVING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. The extent of asphalt paving is shown on the drawings.
- B. Asphalt Paving work includes, but is not limited to, the following:
 - 1. Soil Stabilization Fabric
 - 2. Granular Base Course
 - 3. Asphaltic Concrete
 - 4. Bituminous Tack Coat
 - 5. Painted Lines and Traffic Markings
 - 6. Self-Adhering Waterproof Membrane
 - 7. Hot Pour Crack Sealing and Filling
 - 8. Field Quality Control
 - 9. Clean up
- C. Provide all materials, labor, equipment and services required to accomplish related work in accordance with the drawings and specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 311201 - Site Preparation (Asphalt Milling)
- B. Section 312201 - Site Earthwork
- C. Section 334001 - Storm Drainage

1.3 REFERENCES

- A. The latest editions of the following Standards, as referenced herein, shall be applicable:
 - 1. New York State Department of Transportation Standard Specifications, Section 402 - "Hot Mix Asphalt (HMA) Pavements" and 407 - "Bituminous Tack Coat"
 - 2. "Standard Specifications for Highway Materials and Methods of Sampling and Testing, American Association of State Highway and Transportation Officials (AASHTO)."
 - 3. American Sports Builders Association (ASBA) Asphalt Guidelines, latest edition
- B. The following reference standards shall apply for Testing and Inspection:
 - 1. ASTM D1074: Standard Test Method for Compressive Strength of Bituminous Mixtures
 - 2. ASTM D1188: Standard Test Method for Bulk Specific Gravity and Density of Compacted Mixtures Using Paraffin-Coated Specimens.
 - 3. ASTM D2041: Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures

4. ASTM D2726: Standard Test Method for Bulk Specific Gravity and Density of Non-absorptive Compacted Bituminous Mixtures
 5. ASTM D2950: Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods
 6. ASTM D3203: Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
 7. ASTM D3549: Standard Test Methods for Thickness or Height of Compacted Bituminous Paving Mixture Specimens
 8. NYSDOT Materials Method 28 Friction Aggregate Control and Test Procedures
- C. The following reference standards shall apply for pavement markings:
1. ASTM D562, D711, D1475, D1640, D2369, D3723, D3960.
 2. DOT Code of Federal Regulations, Hazardous Materials and Regulations Board, Reference 49CFR, ICC Regulations
 3. Federal Specification TT-P-115E, Type III (Type I if V.O.C. compliance)
- D. Additional testing required, only if directed in writing by Architect, due to asphalt installation and material issues:
1. ASTM C295: Standard Guide for Petrographic Examination of Aggregate
 2. ASTM D1560: Standard Test Methods for Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus
 3. ASTM D4125: Standard Test Methods for Asphalt Content of Bituminous Mixtures by the Nuclear Method
 4. ASTM D5444: Standard Test Method for Mechanical Size Analysis of Extracted Aggregate
 5. ASTM D6307: Standard Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method
 6. ASTM D6931: Standard Test Method for Indirect Tensile (IDT) Strength of Asphalt Mixtures
 7. ASTM D7312: Standard Test Method for Determining the Pavement Shear Strain and Complex Shear Modulus of Asphalt Mixtures Using the Superpave Shear Tester

1.4 SUBMITTALS

- A. Provide Paving Contractor experience requirements, as outlined in "Quality Assurance" of this specification section, for the following:
1. General Paving
- B. Provide Asphalt Producer Vendor Certificate and proof of quality control monitoring as outlined in "Quality Assurance" of this specification section.
- C. Provide material certificates showing content/mechanical analysis for the following:
1. Asphaltic Concrete Mix Design with Authorization Signature:
 - a. Type/name of mix (less than 24 months old)
 - b. All aggregates gradations and quality measurements

- c. Plot (0.45 power graph) of the final aggregate blend
 - d. Bulk (dry) specific gravity of all aggregates and final aggregate blend (Gsb) including worksheets for natural (virgin) as well as reclaimed asphalt pavement (RAP)
 - e. Grade of asphalt binder (PG) being used
 - f. Optimum percent asphalt binder (Pb)
 - g. Mix air voids at optimum (Va)
 - h. Bulk specific gravity of mix at optimum (Gmb)
 - i. Theoretical maximum specific gravity of mix at optimum
 - j. Voids in the Mineral Aggregate (VMA) and Void Filled with Asphalt (VFA)
 - k. Dust to total asphalt content (AC) ratio
 - l. All design data and associated design curves
2. Bituminous Tack Coat
- D. Provide Manufacturer's Product Data (MPD) for the following:
- 1. Soil Stabilization Fabric
 - 2. Painted Lines and Traffic Markings
 - 3. Self-Adhering Waterproof Membrane
 - 4. Hot Pour Crack Sealing and Filling
- E. Provide shop drawings for the following:
- 1. Painted Lines and Traffic Markings: Shop drawings indicating sizes, shapes, patterns, and colors of markings, including manufacturers and types of paint.
 - 2. Owner to approve all paint colors prior to installation.
- F. Submit Asphalt Placement Work Plan, indicating paving pass widths, paving directions, site access, and timing/coordination of any site equipment installation (posts, boxes, fencing, etc.) indicated in 3.3 of this specification section. Supply Owner with yield calculations for all asphalt paving products and materials used on the project as part of the work plan.
- G. Field Quality Control test reports as indicated in this specification section.

1.5 QUALITY ASSURANCE

- A. Paving Contractor Experience Requirements:
- 1. General Paving: Contractor shall have the experience of at least five (5) years in business. Paving superintendent has a minimum of three (3) years' experience as a paving crew operating foreman.
- B. Asphalt Testing and Inspection Services:
- 1. The Owner will employ and pay for the services of an Independent Testing Agency to provide testing and inspections of asphalt pavements.

2. The services and the information provided by the Testing Agency are provided for the sole benefit of the Owner. The information is provided to the Contractor for the sole purpose of being aware of what is being reported.
 3. The Contractor is solely responsible for assuring the work complies with the Contract Documents in all respects and may not rely on the testing agency for this or any other assurances. The Testing Agency and their representatives are not authorized to revoke, alter, relax, enlarge, or release any of the requirements of the Contract Documents, approve or accept any portion of the work, perform or excuse any duties of the Contractor, or be involved in the scheduling of any work.
 4. Asphalt paving materials and operations shall be tested and inspected as the work progresses. Failure by the Testing Agency to detect any defective work or material shall not in any way prevent later rejection (when such defect is discovered) nor shall it obligate the Owner for final acceptance.
- C. Asphalt producer shall monitor production according to the procedures of NYSDOT Material Method 28 Friction Aggregate Control and Test Procedures. Asphalt producer shall be a New York State approved/certified HMA (Hot Mix Asphalt) manufacturing facility.
- D. Calibrated equipment and qualified personnel must be always accessible during the construction of the HMA.

1.6 JOB CONDITIONS

- A. Job conditions in Section 312201 apply.
- B. Atmospheric conditions for applying courses:
1. Hot mix asphalt shall generally arrive on the project site between 270°-300° F. (per asphalt producer recommendations).
 2. Place asphalt concrete wearing course or bituminous surface treatment only when atmospheric temperature is above 50 degrees F. and rising, and when asphalt binder course is thoroughly dry.
 3. Place binder course only when air temperature is above 45 degrees F. and rising and when asphalt base course or granular stone base course is thoroughly dry.
- C. Grade Control: Establish and maintain required lines and elevations.
- D. Codes and Standards: Perform the work in compliance with applicable requirements of governing authorities having jurisdiction. Obtain and pay for permits required by local authorities.
- E. Construction Review and Testing: Notify and coordinate with the Independent Testing Agency and Architect when the subgrade is shaped and ready for proof rolling. Also, when the granular base course is fully installed, compacted and ready for density testing. Protect subgrade and subbase at all times.

- F. When staging or scheduling delays occur and wearing course cannot be installed directly after binder course installation before winter, provide temporary asphalt transition ramp/collar around drainage structures in paved areas and at handicap ramps to prevent damage by snow plow. Remove prior to installation of wearing course. Power wash surface and apply asphalt tack coat, as specified, prior to wearing course installation, at no additional cost to the Owner.

1.7 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver all materials to the job site with all labels intact and legible at time of installation.
- B. Store materials off ground under cover. Protect from damage or deterioration.
- C. Handle materials to prevent damage to surface, edges, ends and factory applied finishes of items. Damaged material shall be rejected and replaced.

PART 2 - PRODUCTS

2.1 SOIL STABILIZATION FABRIC

- A. Shall be a heavy duty, commercially manufactured woven polypropylene geotextile. Standard of quality shall be Mirafi 500X, manufactured by TenCate or Architect approved equal.

2.2 GRANULAR BASE COURSE

- A. Shall be as specified in Section 312201.
- B. The graded and designed granular base below all new Asphaltic Concrete Pavements shall be constructed, tested, and prepared in accordance with Section 312201 - Site Earthwork of the Contract Documents.

2.3 ASPHALTIC CONCRETE

A.	<u>Pavement Types</u>	<u>Percent Asphalt*</u>
	37.5mm Type 1 Base Course	4.8% Asphalt
	19.0mm Type 3 Binder Course	4.8% Asphalt
	9.5mm Type 7 Top Course	6.3% Asphalt

* Percentage of Asphalt is approximate and shall be based off actual project submittals provided by the Asphalt Producer.

- B. Hot Mix Asphalt Top Course: Pavement shall meet the minimum requirements for 9.5 mm (Type 7) SUPERPAVE Hot Mix Asphalt Top Course (75 gyrations), with a PG 64-22 Binder as specified in Section 404, of the current NYSDOT Standard Specifications, with the exception that the maximum proportion of Recycled Asphalt Pavement (RAP) to virgin aggregates shall not exceed 20% of the total mix.

- C. Hot Mix Asphalt Binder Course: Pavement shall meet the minimum requirements of 19.0mm SUPERPAVE Hot Mix Asphalt Binder Course (75 gyrations), with a PG 64-22 Binder, as specified in Section 404, of the current NYSDOT Standard Specifications, with the exception that the maximum proportion of Recycled Asphalt Pavement (RAP) to virgin aggregates shall not exceed 20% of the total mix.
- D. Hot Mix Asphalt Base Course: Pavement shall meet the minimum requirements of 37.5mm SUPERPAVE Hot Mix Asphalt Base Course (75 gyrations), with a PG 64-22 Binder, as specified in Section 402, of the current NYSDOT Standard Specifications, with the exception that the maximum proportion of Recycled Asphalt Pavement (RAP) to virgin aggregates shall not exceed 30% of the total mix.
- E. The coarse aggregate used in HMA shall be sound, angular crushed stone (crushed or rounded gravel is not acceptable). The fine aggregate shall be well graded, moderately sharp to sharp (angular) sands.

2.4 BITUMINOUS TACK COAT

- A. Material shall consist of an asphalt emulsion, Grade RS-1h, and shall meet the minimum requirements of Section 407, of the current NYSDOT Standard Specifications. Bituminous Tack Coat shall be installed over all new and existing concrete and asphalt pavements and structures prior to the installation of new Hot Mix Asphalt materials. The following application rates shall apply:

1. New Hot Mix Asphalt	0.05-0.07 gal/sy
2. Milled Surfaces of Existing Asphalt	0.10-0.15 gal/sy
3. Abutting Vertical Edges (drainage structures, appurtenances)	0.05-0.07 gal/sy
4. All Styles of Curbs and Gutters	0.05-0.07 gal/sy
5. Delayed asphalt installation of HMA Courses	0.10-0.15 gal/sy

2.5 PAINTED LINES AND TRAFFIC MARKINGS

- A. The extent of the pavement markings shall match the extent, location and composition of pavement markings existing at the site prior to start of work where applicable.
- B. The work includes, but is not limited to the following: parking stall divider lines, wheelchair legends, "STOP" legends, "NO PARKING" legends, pick-up zone, striping and legends, directional arrow legends, diagonal striping, center line striping, fire lane striping, student area line striping, and other pavement markings as may be shown on the plans.

All templates utilized for road/traffic markings and painted lines shall be turned over to the Owner at the end of the project, in a location as noted by the Owner.

- C. Provide ready-mixed, one component waterborne traffic line paint. Standard of quality shall be: Pro-Park® Waterborne Traffic Marking Paint B-97 Series as distributed through Sherwin-Williams, 800-474-3794; or Architect approved equal.
 - 1. Colors (as approved by the Owner in writing):
 - a. Yellow: 1 Gallon & 5 Gallon, Product Number B97YD2467

- b. White: 1 Gallon & 5 Gallon, Product Number B97WD2434
- c. Blue: 1 Gallon & 5 Gallon, Product Number B97LD2022
- d. Black: 1 Gallon & 5 Gallon, Product Number B97BD2021

- 2. Paints shall contain all necessary co-solvents, dispersants, wetting agents, preservatives and all other additives, so that paint shall retain viscosity. Halogenated solvents and glass beads shall not be permitted.
- 3. Volatile Organic Compound (VOC) content shall not exceed 250 grams maximum per liter of paint as determined in accordance with ASTM D 3960 test, excluding water and exempt solvents.

2.6 SELF-ADHERING WATERPROOF MEMBRANE

- A. Shall be a composite membrane designed specifically to prevent water from permeating joints and cracks. Product shall be comprised of self-adhering rubberized asphalt and durable poly propylene non-woven fabric with a "peel-n-stick" release. Standard of quality shall be 12" Mirafi MTK as manufactured by TenCate or Architect approved equal.
- B. Priming material composed of refined asphalt and rapid drying solvent meeting ASTM D41. Polyguard 650 RC Liquid Adhesive or Architect approved.
- C. Contractor to provide 1,000 linear feet in Base Bid.

2.7 HOT POUR CRACK SEALING AND FILLING

- A. Single component, hot applied asphalt crack and joint sealant capable of withstanding temperatures of up to 450° without experiencing polymer degradation.
- B. Shall be supplied in solid blocks comprised of heat stabilized polymers and asphalt.
- C. Meeting the following material requirements when tested in accordance with ASTM D5329. (see chart below)

Chemical & Physical Analysis

Recommended Application Temperature	350-400°F
Maximum Heating Temperature	450°F
Cone Penetration at 25°C	50 max.
Flow at 60°C, mm	0.
Softening point	200°F Min.
Flexibility 0°F	(1" Mandrel)-Pass
Specific Gravity	1.17
Asphalt Compatibility	Passes

- D. Standard or quality shall be Crack Master Supreme as manufactured by Thorworks Industries, Inc., 800-395-7325, www.thorworks.com or approved equal.

PART 3 - EXECUTION

3.1 PREPARE SURFACE

- A. Prior to commencement of asphalt paving, all excavations, drainage, utilities, backfilling, fencing, bollards, storm structures, curbing installations, adjustments, proof-rolling and density test procedures shall be complete to the satisfaction of the Architect.
- B. Prior to commencement of tack coat and asphalt paving within pavement milled areas, as shown on the plans, all cracks and joints in the milled pavement surface shall be prepared and filled in accordance with the project specifications. Any oil or grease spots shall be scraped and treated to prevent bleeding through the tack coat.
- C. Saw cut, using straight and true lines, all existing asphalt pavements to remain in place with straight, neat edge for abutting against proposed asphalt pavement.
- D. Provide and confirm field quality control as described in Section 312201 for pavement subgrade and granular base course stone.

3.2 CONSTRUCT PAVEMENT GRANULAR BASE COURSE

- A. General: Consists of placing granular base course material, in layers of specified thickness, over prepared subgrade and fabric to support a pavement course.
- B. Grade Control: Provide engineering layout per Section 312201 and grade stakes. During construction, protect grade stakes; maintain lines and grades including crown and cross-slope of each course.
- C. Install soil stabilization fabric after subgrade has been acceptably compacted and proof rolled. Install soil stabilization fabric as recommended by the manufacturer AND;
 - 1. Lay fabric in direction of construction traffic.
 - 2. Overlap fabric side to side and end to end a minimum of two (2') feet.
 - 3. Establish reasonable compaction and rut stability before using heavy or vibratory compaction equipment.
- D. Placing:
 - 1. Place granular base material over soil stabilization fabric, on prepared subgrade in layers of uniform thickness, conforming to the asphalt pavement details on the drawings.
 - 2. Place granular base material in a maximum of six (6) inch layers and compact with a vibratory or 10 ton smooth wheeled roller.
- E. Provide density testing as described in Section 312201.
- F. Surface Smoothness: Test finished surface for smoothness. Surface will not be acceptable when it deviates more than 3/8" measured by a 10 foot straightedge, in any direction.

- G. The finished grade of the granular base course shall be verified to ensure that the final finished product of the bituminous concrete pavement surface will be installed to the lines and grades of the existing pavements and proposed elevations surveyed by the Contractor prior to the start of the paving work.

3.3 PLACE ASPHALT MIX

A. General:

1. The Contractor shall submit a paving plan, indicating intended direction of paving, number of pulls, etc. for approval prior to the start of paving operations.
2. Joints: Saw cut vertical straight, neat edges for joints required. Joints shall be sharp and clean, conforming to shapes drawn on drawings. Ragged joints will not be accepted.
3. Mill two (2') feet into surface of adjacent asphalt so joints do not line up or "stack".
4. Place bituminous tack coat to all surfaces as indicated in this specification. When pavement surface temperature is above or below the 75-130 degrees F. range, the grade of asphalt emulsion must be modified according to NYSDOT standards. Tack coat shall not be applied to a wet surface or when the pavement surface temperature is below 45 degrees F.
5. Place asphalt on approved prepared surface, spread and strike-off.
6. Spread mixture at minimum temperature of 225-240 degrees F. Place inaccessible and small areas by hand. Hand work shall be minimized to ensure the best possible finished surface.
7. Place each course to required grade, cross-section, and compacted thickness.
8. Paving operations shall not be scheduled when ample time does not exist to place, compact, and finish roll the hot mix asphalt during daylight hours and prior to rainfall.

- B. Pavement Placing: Shall be installed in accordance with Section 402-"Hot Mix Asphalt (HMA) Pavements", of the current NYSDOT Standard Specifications.

C. Paving Equipment:

1. Must be capable of placing, spreading and finishing courses of HMA to the specified thickness.
2. HMA shall be free of marks, segregation and be placed to the required uniform elevation with a smooth texture not showing tearing, shoving, or gouging.
3. Auger extensions are required while pavers are extended beyond the basic screed width.

4. Paving equipment shall be self-propelled and capable of maintaining the line and grade shown on the plans with suitable electronic equipment. The screed shall be straight and true with no bow and utilizing a vibratory screed. Paving equipment should have fully functional screed heaters and joint preheaters.
- D. Asphaltic Concrete shall be installed as follows:
1. Heavy Duty Asphalt Pavement: Installed in three (3) lifts consisting of a 37.5mm SUPERPAVE Hot Mix Asphalt Base Course overlain by 19.0mm SUPERPAVE Hot Mix Asphalt Binder Course overlain by 9.5mm SUPERPAVE Hot Mix Asphalt Top.
- E. Place in strips not less than ten (10') feet wide, unless otherwise acceptable. In placing each succeeding pass after the placement of the initial pass, the screed of the paver shall be set such that it overlaps the preceding pass by 6" and be sufficiently high such that when compacted, a smooth joint is produced. Prior to pinching the joint, the excess material shall be pushed onto the edge of the new pass with a lute. Excess material shall be removed.
- F. After first lift has been placed and rolled, place succeeding lifts and extend rolling to overlap previous lifts. Where possible, top course shall be placed at right angles to binder course and in the direction that the drainage flows. Where this is impractical, offset joints of the two courses by a minimum of two (2') feet so upper and lower joints do not align.

3.4 ROLL ASPHALT MIX

- A. General:
1. Rollers shall conform to the manufacturer's specifications for all ballasting. At least one vibratory roller shall be required for each project, with two rollers required as a minimum. (Three rollers shall be required when tonnage is greater than 300 tons/day.)
 2. Rollers shall be of a good condition and capable of compacting the HMA to the minimum in-place density required by this specification. Compact asphalt with a nominal 10 ton steel wheel roller or pneumatic rubber tired roller. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
 3. Begin rolling when mixture will bear roller weight without obvious or excessive displacement.
- B. Finish Rolling: Each lift of the Asphaltic Concrete Pavement shall be mechanically rolled and compacted to the finished thicknesses specified in the Contract Documents. The pavements shall be compacted to a minimum of 94%-97% (95%-102% at longitudinal joints) of the materials theoretical density as determined by AASHTO Method T 209 and an air void percentage of 5%-6% maximum.
- C. Patching: Remove and replace paving areas mixed with foreign materials, dirt, and defective areas. Cut-out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.

D. Joints:

1. The Contractor shall sequence the installation and orientation of all Asphaltic Concrete Pavements such that the minimum numbers of longitudinal and transverse joints are produced and in accordance with the approved Asphalt Placement Work Plan.
2. Neat, straight butt joints between successive passes. Offset joints a minimum of six (6") inches between lifts of asphalt.
3. When repairs or staging of work occurs, make neat vertical saw cut between old and new work to create butt joint. Heat joint prior to pouring. Cold joints are not acceptable.
4. Apply bituminous tack coat to all surfaces and rates indicated under "Bituminous Tack Coat" of this specification section. Tack coat shall not be required on abutting vertical edges for pavements placed in the same day.
5. Minimize construction, longitudinal, and transverse joints left open for an extended period of time.
6. Construct longitudinal joints by paving in a hot fashion with a temperature of not less than 220°F to ensure maximum performance and adhesion.
7. Compact all joints to provide for a neat, uniform and tightly bonded joint that will meet both surface tolerances and density requirements of this specification.
8. Cut straight and true (vertical construction or transverse joints if the material has cooled to less than 220°F prior to the placement of the next pass to ensure the best performing joint possible.

E. Edges: Roll at 45 degrees as detailed, creating clean edge conforming to shapes indicated on the drawings. Ragged edges will not be accepted. Return and saw cut ragged edges at no additional cost to the Owner as directed by the Architect.

F. The final finished grades of the new Bituminous Concrete Pavements must be smooth and true to the contours and shall be installed to the lines and grades of the site prior to start of construction. The final finished grades shall match adjacent pavement surfaces and concrete slabs, aprons, and doorways.

G. Construction Delays (over 48 hours): When placement of the wearing course over the binder course is delayed over 48 hours, thoroughly clean existing surface of dirt, oil and other debris by pressure washing and sweeping. Place bituminous tack coat as specified in this section.

3.5 ASPHALT TOLERANCES

A. Thickness and Density: Compact each asphalt course to produce the thickness indicated on the drawings within the following tolerances:

1. Base Course: Plus or minus 1/2-inch
 2. Binder Course: Plus or minus 1/4-inch
 3. Wearing Course: Plus or minus 1/8-inch
- B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined using a 10-foot straightedge applied transversely or longitudinally to paved areas:
1. For Asphalt Concrete:

Base Course Surface: 3/8"
Binder Course Surface: 1/4"
Wearing Course Surface: 1/8"
- C. Asphalt Cores: Shall be provided as indicated under "Field Quality Control" of this specification.

3.6 FIELD QUALITY CONTROL

- A. The Owner's Testing Agency shall provide the following in the daily report at a minimum:
1. Verify the following for the asphalt mix design prior to asphalt placement:
 - a. The asphalt mix design has been approved.
 - b. The asphalt mix design specifies the minimum relative compaction and the methods required to determine maximum density.
 2. Verify the asphalt subgrade has been acceptably proof-rolled. (See Section 312201.)
 3. Inspect /test aggregate base course material for in-place density (95%) and thickness. Test materials for gradation classification, and physical properties. (See Section 312201.)
 4. Inspect/test asphalt wearing course material for compaction during placement and conduct thickness measurements during lay-down. Take temperature of the asphalt mixture and compare actual temperature with the approved asphalt mixture design range. As a minimum, perform the following inspection/tests:
 - a. Collect trip tickets from trucks delivered to the site and verify correct mix design being used for the project.
 - b. Temperature tests: one per truck.
 - c. Lay down thickness (uncompacted): one per strip or 500 square feet minimum
 - d. Verify equipment rolling pattern and passes to ensure proper compaction: one per day
 - e. Density test (daily lab density): one test per 5000 square feet minimum
 - f. Hot mix samples (laboratory testing for density per ASTM D1188): one per day

- g. Thickness per ASTM D3549 and density samples per ASTM D2950 by a properly calibrated nuclear asphalt testing device. If there is a disagreement between tests done by ASTM D2950 and ASTM D1188, the values done by ASTM D1188 will govern: one test per 20,000 square feet (surface lift), one test per 10,000 square feet (base lift)
 - h. Air voids per ASTM D3203 or D2726: one test per 5000 square feet minimum
 - i. Verify compaction at the joints and seams. The completed paved surface to be true to grade and cross section. Verify smoothness by using an unleveled 10 foot straightedge and ensuring no gap at any point between straightedge and pavement exceeds surface smoothness requirements above except at interception or at changes of grade.
 - j. The screed/lay down thickness tolerance shall be between 1/8 to 3/16 inches greater than the required asphalt minimum layer requirement. When screed depth is set for the exact thickness as specified, immediately notify the Owner's Representative and Contractor that the installed asphalt thickness may be deficient to achieve the specified minimum thickness. Identify areas of non-complying thickness and attach a drawing identifying the areas to the daily field report.
 - k. Immediately notify the Owner's Representative and Contractor when paving is being conducted in cold weather and asphalt temperatures are below or above the design mix range.
 - l. Check the surface grades and drainage patterns. Identify on a drawing all paved areas that are holding water after asphalt placement and notify the Owner's Representative and Contractor. Small ponding areas (bird baths) larger than two (2') feet in any dimension are not acceptable. When this test proves that surface conditions are not acceptable, the Contractor will be responsible for correcting the problem areas. Install a one (1") inch shim coat of wearing course material, or other means acceptable to the Architect.
 - m. Verify tack coat and edge coat have been applied at the proper rate.
5. Asphalt Cores: Shall be as directed by the Architect.
- a. Prior to final acceptance of the asphalt and before traffic markings are placed, the Owner's Testing Agency shall core 3" diameter areas of the asphalt surfacing where directed by the Architect. Consistency, density, thickness, and tensile strength per ASTM D6931 will be evaluated.
 - b. Patch core areas as directed by the Architect to match adjacent density, texture and thickness.
 - c. Coordinate day to day scheduling with the Testing Agency.
 - d. If cores vary significantly from the contract requirements, additional cores will be performed by the Testing Agency as directed by the Architect. Once the overall general quality is determined, provide remedial work as directed by the Architect to achieve the quality and consistence as specified.
- B. Unacceptable Paving: Remove and replace unacceptable paving as directed by the Architect, immediately and without argument or delay. Correction of deficient areas in the wearing course shall be done by sawcutting and removal of defective area of work. Tack coat shall be applied to all edges and the pavement shall be replaced. Shimming or

skin patching of the wearing course shall not be permitted. Correction of deficient areas within the binder course shall be corrected by sawcutting and milling high spots, and truing and leveling low spots or as directed by the Architect.

3.7 SURFACE PROTECTION

- A. Protection: After final rolling and sealing, do not permit any type of vehicular or construction traffic on pavement until it has cooled and hardened as recommended by the producer/manufacturer, minimum of 48 hours.
- B. Provide protection including, but not limited to, fencing, traffic cones, barrels, lights, reflective signs, flagpersons and barricades until mixture has cooled and attained its maximum degree of hardness.

3.8 PAINTED LINES AND TRAFFIC MARKINGS

- A. Cleaning: Sweep and clean surface to eliminate loose material and dust. Remove dirt, oils and other foreign matter. All surfaces to receive pavement markings shall be clean and in good condition to accept pavement markings.
- B. Coordinate provisions for installation with work of other trades.
- C. Locate to alignment and dimensions as shown on drawings and/or approved by Owner.
- D. Painted markings shall meet regulations described in the "Manual of Uniform Traffic Control Devices", latest edition, as published by NYSDOT, Division of Traffic and Safety, Section 262.25 and figure PM-42; and they shall comply with the most recent version of the Americans with Disabilities Act Standards for Accessible Design.
- E. Protect: Adjacent surfaces and other items to remain with tape, drop cloths, or other Architect approved means.
- F. Application: Two coats according to manufacturer's recommendations resulting in a dense, opaque application without any ghosting of former pavement markings showing through. Overspraying along edges will not be accepted. Edges shall be sharp and crisp, to the shapes required by the drawings.
 - 1. First coat shall be installed at the recommended DFT (dry film thickness) after paving is in place. The second coat shall be applied at the recommended DFT no later than thirty (30) days after the completion of work.
 - 2. Apply paint materials using clean brushes, rollers or spraying equipment.
 - 3. Apply paint materials as a rate not exceeding those recommended by the paint manufacturer for surfaces being painted, less 10% of losses
 - 4. Comply with manufacturer's recommendations for drying time between coats. The minimum DFT must be met. Apply additional coats as needed to achieve minimum total specified DFT of the paint system.

5. The minimum required total Dry Film Thickness (DFT): The DFT shall be the minimum required thickness as measured in mils.
 6. System coverage requirements minimum total thickness (unless otherwise noted):
 - a. 1st Coat – 3.0 mils
 - b. 2nd Coat – 6.0 mils
 7. Exterior Paint Systems: Provide the following paint systems as indicated: (Colors to be approved by Owner.)
 - a. Parking stall, division and limit lines shall be 4" in width, true and straight. Color: White – DFT 6.0 mils
 - b. Pavement lettering "NO PARKING" shall be 2'-0" in height. Color: Yellow – DFT 6.0 mils
 - c. Compact lettering "COMPACT" shall be 1'-0" in height. Color White – DFT 6.0 mils
 - d. Stop legends shall be as detailed on drawings. Color: White – DFT 6.0 mils
 - e. Wheelchair legends shall be as detailed on the drawings. Color: Blue background with white symbols. Parking stall striping shall be Blue at handicap stalls only – DFT 6.0 mils
 - f. Diagonal striping Handicapped. Color: Blue – DFT 6.0 mils
 - g. Diagonal striping Loading Zone. Color: Yellow – DFT 6.0 mils
 - h. Directional signage shall be as detailed on the drawings. Color: White – DFT 6.0 mils
 - i. Center line striping shall be 4" in width as detailed on the drawings. Color: White – DFT 6.0 mils
 - j. Fire line striping shall be 4" in width. Color: Yellow – DFT 6.0 mils
- G. Allow 48 hours minimum curing time for paint before allowing traffic on surfaces. Clean up thoroughly including all protective tape, spilled paint, and debris. All parking area marking and painting to be protected by appropriate traffic barriers, lighted if necessary, so located as to prohibit parking and traffic until traffic lines are completed and properly dry.

3.9 SELF-ADHERING WATERPROOF MEMBRANE

- A. Surface Protection: Existing pavement surface must be cleaned of all loose dirt and debris and be dry. Cracks wider than 3/8-inch should be filled with suitable crack filler. Severally spalled or other distressed areas must be repaired according to this specification. Note: Commercial crack filler expands under the heat of any overlay and therefore the crack should be filled level or just below the existing pavement surface.
- B. Primer: (Surface shall be primed as follows):
 1. Primer must be used on all milled surfaces. The liquid adhesive shall be placed on the surface, at a minimum rate of 250 square feet per gallon on milled surfaces.
 2. The primer must be completely dry prior to application of the membrane.

3. Primer may be applied using brushes, rollers or by spraying at the prescribed rate of application. Never apply primer to wet or frozen surfaces.
 4. Areas primed and not covered with membrane within 24 hours should be re-primed. Smoothness and porosity of existing asphalt surface may affect coverage rate. Do not apply liquid adhesive at heavier rates than recommended. Excessive material build-up will delay drying and membrane application.
- C. Temperature: The surface temperature should be 45 degrees F. and above when installing self-adhering waterproof membrane. Storage temperature should not exceed 125 degrees F.
- D. Installation:
1. Center the roll over the joint or crack to be treated with the release paper attached. Allow for a material overrun of 4 to 6 inches beyond each end of the crack to ensure a waterproof seal. Cut the membrane with utility knife. Install the self-adhering membrane by removing release paper.
 2. Material should be laid smooth and adhere well to the existing pavement by rolling the membrane with a pickup truck or pneumatic roller. A stiff broom can also be used to aid adhesion.
- E. Tack Coat: A standard NYSDOT approved tack coat is applied over the self-adhering membrane and the remaining portion of the surface before placing the hot mix asphalt layer as specified.

3.10 HOT POUR CRACK SEALING AND FILLING

- A. The crack must be free from moisture, dust, and loose aggregate. Routing or wire brushing are preferred methods followed by a compressed air heat lance immediately prior to sealing. The substrate and air temperature must be above 45°F.
- B. Shall be melted in direct fired or oil jacketed melters. Material should reach recommended pouring temperature of 350-400°F. Fresh material may be added as sealant is used.
- C. Apply heated crack filler using either a pump and wand system or a pour pot. For best results the sealant depth to width ratio should not exceed 2 to 1 (i.e. 2-inches deep to 1-inch wide). The cooled sealant height should not exceed 1/8" above surrounding pavement. Using a sealing shoe or squeegee, band the material 2 to 3 inches wide over the crack.

3.11 CLEAN UP

During the contract, and at intervals as directed by the Architect, and as asphalt paving is completed, clear the site of extraneous fabric, gravel, asphalt and debris. Leave the site in a clean, safe, well draining, neat condition.

END OF SECTION 321201

SECTION 323001 - TRAFFIC SIGNS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. The extent of traffic signs is shown on the drawings.
- B. Provide materials, labor, equipment, and services required to accomplish related work in accordance with the drawings and specifications.

1.2 SUBMITTALS:

- A. Provide shop drawings for each different type and size of sign listed in the Traffic Sign Schedule.
- B. Provide MPD for signposts, breakaway system, and sign plates.

1.3 JOB CONDITIONS

- A. Job conditions in Section 312201 apply.
- B. No work shall be fabricated until shop drawings for the work have been favorably reviewed by the Architect.
- C. Construction Review: Notify the Architect when locations for signs are coordinated to avoid underground utilities and marked in the field for review.
- D. Provide posts, bolts, splice bars, sign plates and build in coordination with work of other trades.

PART 2 - PRODUCTS

2.1 SIGNS

- A. Sign Plate:
 - 1. Sign Plate shall be aluminum sheets .090" (approximately 3/32") thick, with two coats of Dupont Imron spray semigloss paint.
 - 2. Letters, numbers, symbols, and arrows shall be engineering grade, (EG) reflective. Sign plates, letters and numbers shall meet the colors and regulations described in the "Manual of Uniform Traffic Control Devices", latest edition, as published by the State of New York Department of Transportation, Division of Traffic and Safety.
 - 3. The following Traffic Sign Schedule shall apply:

<u>SIGN WORDING</u>	<u>SIGN NO.</u>	<u>SIZE</u>	<u>LETTER SIZE / COLORS</u>
Stop	R1 - 1C	30" x 30"	10"C/White and Red
Yield	R1 - 2	30" x 30"	4"C/White and Red
Area Speed Limit 15 MPH	R2-3B	18" x 24"	2"/White and Black

4. Refer to Traffic Sign Schedule and/or sign details on drawings for sign wording, quantities, and other information.
5. Hardware shall be galvanized.
6. Standard of quality shall be as manufactured by Eastern Metal/USA-Sign, www.usa-sign.com or Architect approved equal.

B. Breakaway Signposts:

1. Shall be minimum 2.5 lbs. / ft high carbon new billet steel (SP-80) U-channel posts with predrilled 3/8" holes at 1" on center.
2. Crashworthy to NCHRP 350 criteria. Meeting FHWA (Federal Highway Administration) for small sign support applications.
3. Lap Splice U-channel Breakaway System shall be 3/8" x 3/4" x 5" and sized to post, bar color silver. Special manufacturer designed bolts for lap splice are required.
4. Hot dipped galvanized as directed by the Architect.
5. Standard of quality shall be "Rib-Bak" U-channel signposts as manufactured by NUCOR Steel Marion, Inc. www.nucorhighway.com (800) 333-4011 or Architect approved equal.

PART 3 - EXECUTION

3.1 INSTALL SIGNS

- A. Erect signs plumb. Drive posts into firm ground or bolt to sleeve in pavement areas or concrete footings as detailed. Use driving caps to avoid deforming posts.
- B. Mount sign plates at heights detailed. Attach metal sign plates to steel posts securely with 1/4" galvanized allen head screws.

3.2 CLEAN UP

During the contract and at intervals as directed by the Architect and as traffic sign installation(s) are completed, clear the site of extraneous paint, fasteners, concrete, gravel, asphalt, and debris. Leave the site in a clean, safe, well draining, neat condition.

END OF SECTION 323001

SECTION 329201 - SEEDED LAWNS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. The extent of the lawn work is shown on the drawings. The lawn work limits equal the Contract Limit Line except as noted on the drawings. Non-paved, non-roofed areas within the Contract Limit Line shall receive four (4") inches settled depth of topsoil and lawn seed. Existing lawn areas that are not disturbed require no additional work. Lawn types as shown on the drawings are defined as follows:
 - 1. Lawn Type 1: Strip and stockpile 4" topsoil, remove debris, replace 4" topsoil, seed, and mulch.
 - 2. Lawn Type 2: Strip, stockpile 4" topsoil, remove debris, replace 4" topsoil, seed and straw mat.
- B. Lawn work includes, but is not limited to, the following:
 - 1. Placing and spreading stockpiled topsoil
 - 2. Importing, placing and spreading topsoil
 - 3. Seed bed preparation
 - 4. Seeding lawns
 - 5. Mulching and fertilizing
 - 6. Straw mat stabilization
 - 7. Maintenance: See watering, mowing, fertilizing, core aerating, weed control, grow in and other specific requirements.
 - 8. Clean Up
- C. Provide materials, labor, equipment, and services required to accomplish related work in accordance with the drawings and specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 311201 - Site Preparation (Topsoil Stripping)
- B. Section 312201 - Site Earthwork

1.3 REFERENCES

- A. ASTM D4972 - Standard Test Method for pH of Soils
- B. ASTM D5268 - Standard Specification for Topsoil Used for Landscaping Purposes
- C. ASTM D422 and D1140 - Standard Test Method for Particle Size Analysis of Soils
- D. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effect
- E. ASTM F1647 - Standard Test Method for Organic Material Content of Athletic Field Rootzone Mixes.

- F. ASTM F1632 - Standard Test Method for Particle Size Analysis and Sand Shape Grading of Golf Course Putting Green and Sportsfield Rootzone Mixes
- G. ASTM F2060 - Standard Guide for Maintaining Cool Season Turfgrasses on Athletic Fields
- H. National Turfgrass Federation, Inc.
- I. National Turfgrass Evaluation Program (NTEP).
- J. Cornell Universities: Sportsfield Management Guidelines

1.4 SUBMITTALS

- A. Furnish name of Landscape Contractor or Nurseryman to perform lawn work and a list of completed projects including contact information for each project demonstrating compliance with applicable qualification requirements outlined in 1.5 "Quality Assurance" of this specification section.
- B. Provide Material Certificates and MPD for:
 - 1. Seed species and source
 - 2. Limestone
 - 3. Fertilizers
 - 4. Hydromulch
 - 5. Straw mat - MPD only
 - 6. Straw (dry mulch) - location of straw producer
- C. Provide Topsoil Test Report (for Onsite and Imported Topsoil): Submit test results from Architect approved independent testing laboratory on their letterhead. Report shall:
 - 1. Certify soil texture, organic content, and particle size analysis.
 - 2. Chemical analysis testing nitrogen, phosphorus, potassium, calcium, magnesium, cation exchange capacity, base saturation percentages, micronutrients and acidity (pH).
 - 3. Provide timing and rates of soil additives, liming and fertilizers. (Materials and procedures regarding soil amendments and fertilizers specified in this section are approximate.) Adjust all soil amendments to comply with test results based on actual soil tests and as directed by the Architect at no additional cost to the Owner.
- D. Provide letter on Contractor's letterhead certifying that only topsoil from the above tested source was used on the project.
- E. Lawn Seed Mix: Submit one (1 lb.) pound seed sample for each mix specified in supplier's unopened package with supplier's certification statement clearly showing the following:
 - 1. Name and address of labeler
 - 2. Lot number

3. Kind and variety of turfgrass seed listed in order of predominance
 4. Percent by weight of pure seed of each species and variety (percent purity)
 5. Germination percentage (percent viable seed)
 6. Percent by weight of other crop seed
 7. Percent by weight of weed seed
 8. Percent undesirable grass seed
 9. Percent by weight of inert matter
 10. Date on which the germination test was conducted
- F. Submit seed tags from **ALL** used or partially used seed bags. At times throughout the project, the Architect may request seed samples of onsite seed bags.
- G. Provide schedule for review and approval as outlined under "Sequence and Scheduling" of this specification section.

1.5 QUALITY ASSURANCE

- A. General and Athletic Field Lawn Contractor: Work shall be contracted to a single, established Landscape Contracting or Nursery firm having sufficiently experienced crews, supervisor(s), specialized equipment, and an excellent record of performance on completed lawn and athletic field projects of comparable size, scope, and quality. Provide expert turfman to direct the work in the field on a regular, daily basis. The expert turfman shall be employed by the same company engaged in the installation of the lawn and athletic field work for a minimum of five (5) years.
- B. Nomenclature: Seed names shall conform to the National Turfgrass Federation, Inc.
- C. Seed Quality Rating: Shall meet testing standard for New York State outlined by the National Turfgrass Evaluation Program (NTEP).
- D. Testing: If required by the Architect for poor lawn grow in, engage an Architect approved independent, qualified New York State testing service and turfgrass specialist to evaluate Contractor grow in practices and materials used. Pay for all testing/inspection services, materials, and manpower to correct lawn areas as approved by the Architect.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Seed:
1. Packing and Shipping: Ship seed and associated materials with certificates of inspections required by governing authorities.
 2. Do not make substitutions. If specified seed material is not obtainable, submit to the Architect proof of non-availability and a proposal for use of equivalent material with similar performance criteria as the originally specified seed material.
 3. Store all seed at the site in a cool, dry place in a manner to prevent wetting and deterioration, as approved by the Architect. Replace any seed damaged during storage as directed by the Architect.

4. Deliver seed in supplier's unopened packages bearing labels showing the supplier's name and seed analysis by weight.

B. Fertilizer:

1. Deliver fertilizer in the manufacturer's standard sized bags showing the weight, analysis, and manufacturer's name. Store all fertilizer under a waterproof cover or in a dry place as approved by the Architect.

1.7 JOB CONDITIONS

A. Job conditions in Section 312201 apply.

B. Lawn Work:

1. Perform lawn work after planting, fine grading and other work affecting the ground surfaces in the lawn work areas has been completed satisfactorily.
2. Where practical, the Owner will provide a connection to the water system such as, but not limited to, existing yard hydrants, building hose bibs, etc. If this source is insufficient, not available or practical to provide a source of sufficient water to meet the requirements herein, the Contractor shall secure a water source sufficient to meet the water requirements herein such as, but not limited to, municipal hydrants, water truck, etc. at no additional cost to the Owner.
3. Contractor shall provide all watering equipment and appurtenances such as, but not limited to, meters, backflow preventer, labor, hoses, sprinklers, irrigation and watering equipment.
4. Calendar dates for seeding under "Sequence and Scheduling" of this specification section shall apply.
5. Perform lawn seeding using mechanical and hand seeding methods. Hydromulching is not permitted within ten (10') feet of buildings edges.
6. Protect newly seeded lawns from vehicles, vandalism, or trespass. Provide temporary fencing or barriers as required.

C. Construction Review:

1. Upon completion of topsoil spreading and seed bed preparation, notify Architect to review work.
2. The Architect may review fine graded areas by the Contractor to check for surface smoothness and general compliance with grading requirements. Fill or cut by hand raking or other acceptable means to achieve smooth, even well-draining lawn surfaces free of "bird baths" and breaks in grade as directed by the Architect at no additional expense to the Owner.

3. Review of any fine graded lawn areas by Architect shall not alleviate the Contractor of his responsibility for conforming to the required grades as shown on the drawings, nor be misconstrued as final acceptance of lawn work.

1.8 SEQUENCING AND SCHEDULING

- A. Schedule: Prior to construction, provide a schedule which addresses the following lawn thresholds involving erosion control stabilization:
 1. Seeding Installation: The Contractor may invoice for 50% of the approved schedule of value breakdown at the time of acceptable installation.
 - a. Unless otherwise directed in writing by the Architect, seed lawns from April 1 to May 15, and from August 15 to October 1. Seeding between May 16 and August 14 is not acceptable unless adequate water supply is available and applied to the turfgrass as required herein and approved by the Architect.
 - b. Proceed with and complete seeding as rapidly as portions of the site become available, working within the seasonal limitations for each kind of landscape work required.
 2. Substantial Completion: The Contractor may invoice for 25% of the approved schedule of value breakdown at the time of substantial completion as described in Part 3, "Standards For Substantial Completion Of Lawns" of this specification section. At this time, the Architect may issue the Notice of Termination to satisfy the NYS DEC stabilization requirements. The date of substantial completion is anticipated approximately 60 days after lawn installation presuming all Contractor maintenance operations have been vigorously performed.
 3. Final Acceptance: The Contractor may invoice for the final 25% of the approved schedule of value breakdown at the time of final acceptance as described in Part 3, "Standards For Final Acceptance Of Lawns" of this specification section. The date of final acceptance is anticipated approximately 30 days after substantial completion presuming all Contractor maintenance operations have been vigorously performed.
 4. Owner Maintenance: After final acceptance of the lawns, the Owner will maintain for 1 to 3 growing seasons to reach competitive maturity and beyond per ASTM F2060.

PART 2 - PRODUCTS

2.1 TOPSOIL

- A. Source: Provide from off site, Architect approved source, when stripped, stockpiled and amended quantity is inadequate to provide four (4") inches settled depth of topsoil for all lawn areas at no additional cost to the Owner.
- B. Texture and Content: Provide topsoil conforming to the following:

1. Soil texture and content:
 - a. Sandy loam topsoil, well drained homogeneous texture and of uniform grade, without the admixture of subsoil material. Topsoil shall be entirely free of dense material, hardpan, clay, stones over 3/4" in diameter, sod, or any other objectionable foreign material, including but not limited to, glass, debris, toxins, hazardous wastes and chemicals (such as atrazine or muriatic acid within the past seven (7) years) that may be injurious to humans, animals and plant materials.
 - b. Organic Matter: Containing not less than 5% or more than 10% organic matter in that portion of a sample passing a 1/4" sieve when determined by the wet combustion method on a sample dried at 105 degrees F.
2. pH Value: Containing a pH value within the range of 6.0 to 7.0 on that portion of the sample which passes a 1/4" sieve.
3. Soluble salt content: Not higher than 500 parts per million.
4. Sieve Analysis for general lawn work: Shall be screened or rock picked to meet the following gradation:

<u>Sieve Designation</u>	<u>% Passing</u>
3/4"	100
1/4"	97-100
No. 200	20-65 (of the 1/4" sieve)

- C. No lawn shall be seeded on topsoil that has been chemically treated until sufficient time has elapsed to permit dissipation of all toxic materials. The Contractor shall assume full responsibility for any loss, damage to, or the inability to grow a sufficient stand of grass from seed, as indicated herein, arising from improper use of chemicals or due to failure to allow sufficient time to permit dissipation of toxic residues, whether or not such materials are specified herein.

2.2 LAWN SEED MIX

- A. Provide fresh, clean, new-crop seed mixed in the proportions specified for species and variety, and conforming to Federal, State, latest American Association of Nurseryman (AAN) Standards and National Turf Evaluation Program (NTEP).
- B. Acceptable material in a seed mixture other than pure live seed consists of nonviable seed, chaff, hulls, live seed of crop plants and inert matter. The percentage of weed seed shall not exceed 0.05% by weight.
- C. All seed must be fresh seed. Seed that is left over from the previous year and beyond sell by date is not acceptable.
- D. Grass seed shall be certified "Blue Tag" seed composed of a blend of varieties mixed in proportion by weight and tested for minimum percentages of purity and germination. Submit the proposed mixture to the Architect for approval.

E. Provide the following lawn seed mix:

1. General Lawn Type 1:

<u>Amount by Weight</u>	<u>Species or Variety</u>	<u>Purity</u>	<u>Percentage Germination</u>
40% (Min.)	Kentucky Bluegrass Blend*	95%	85%
35% (Max.)	Fine Textured Endophytic Perennial Rye**	98%	90%
25% (Min.)	Creeping Red Fescue***	97%	85%
100%			

* Kentucky Bluegrass Blend shall contain no more than 25% of any one cultivar and always at least two (2) different cultivars. Acceptable cultivars: Rambo, Princeton-105, Wildwood, Allure, Coventry, Champagne, Northstar, Cardiff, Nimbus, Raven, SR2100, Misty, America, Brilliant, Limousine, Conni, Liberator, Apollo, NuGlade, Total, Eclipse, Unique, Impact, Midnight, Arcadia, and Serene or Architect approved equal.

** Perennial Rye Blend shall contain no more 30% of any one (1) cultivar and always at least three (3) different cultivars. Acceptable cultivars: Palmer III, Calypso II, Brightstar II, Secretariat, Monterey, Catalina, Pennant II, Premier II, Sonata, Sunshine and Ascend or Architect approved equal.

*** SR5000 is acceptable.

2. Overseeding: Seed blend shall consist of 100% Perennial Ryegrass with at least three (3) cultivars. Acceptable Perennial Ryegrass cultivars include the following: Palmer III, Calypso II, Brightstar II, Secretariat, Monterey, Catalina, Pennant II, Premier II, Sonata, Sunshine, and Ascend. The Perennial Ryegrass shall have a minimum germination percentage of 90%. The percentage of weed seed shall not exceed 0.05% and other crop seed shall not exceed 0.5% by weight of the mixture.

F. Acceptable Seed Suppliers:

United Agri Products
Steve Hyde (315) 383-5035;

Matrix Turf Solutions
Jerry Clark (315) 480-7340;

Lesco, Inc.
Will Abel (315) 437-3423;

Preferred Seed
Jack Bryant (716) 895-7333;

Or Architect approved equal.

2.3 LIMESTONE

- A. Shall be ground limestone in the producer's standard bags containing not less than 85% total carbonates and conforming to the following gradations:

<u>Sieve Designation</u>	<u>% Passing</u>
No. 100	50-100
No. 20	100

- B. The lime shall be uniform in composition, dry and free flowing and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Any lime which becomes caked or otherwise damaged making it unsuitable for use will be rejected.

2.4 TACKIFIER FOR SEEDED LAWNS

- A. Shall be liquid concentrate diluted with drinkable water forming a transparent three-dimensional film-like crust permeable to water and air, containing no agents toxic to seed germination to hold straw mulch in place.
- B. Standard of quality shall be Terra Tack or Architect approved equal.

2.5 FERTILIZER

- A. For Starter Fertilization: Immediately prior to seeding, fertilize with a commercial starter fertilizer, granular, non-burning product, with not less than 90% organic slow acting, micro nutrients and 1% iron, guaranteed analysis commercial fertilizer. Fertilizer ratio shall be: (1-2-1). Apply at a rate of 0.33 - 0.66 lbs of nitrogen (N) per 1,000 sf.
- B. For Subsequent and Final Fertilizations: Apply commercial fertilizer, poly coated granular non-burning product with not less than 90% organic slow acting, guaranteed analysis
1. For Spring and Fall Lawn Work: Fertilizer ratio shall be: (3-0-1). Apply at rate of 1.5 - 2 lbs nitrogen (N)/1,000 s.f.

2.6 STRAW MAT FOR SEEDED LAWNS

See Specification Section 312501.

2.7 MULCH FOR SEEDED LAWNS

- A. Dry Application Straw: Shall be straw consisting of clean stalks of oats, wheat, rye or other approved crops well seasoned before baling which are free of noxious weed seeds and roots. Weight shall be based on 15% moisture.
- B. Hydro Applications: Shall be hydromulch containing 100% wood fiber mulch. Standard of quality shall be Mat Fiber as manufactured by Mat, Inc. and distributed by Matrix Turf Solutions, (315) 468-6000 or Architect approved equal.

2.8 WATER: Free of substance harmful to lawn, other plants, humans and animals.

2.9 COMPOST

A. Compost shall contain organic matter or material of a generally humus nature capable of sustaining vegetation growth, with no foreign matter (ie. glass, plastic, etc.) or other material toxic to plant growth. It shall be free from stones, lumps, or similar objects larger than one-half inch in greatest diameter, roots, and brush. Composts derived from organic wastes such as food and agricultural residues and animals manures, and sewage sludge that meet the above requirements, and are approved by the National Environmental Protection Agency and NYS Department of Environmental Conservation are acceptable compost sources.

B. Compost shall have the following properties:

<u>Parameters</u>	<u>Range</u>
pH	6.0 to 7.5
Moisture Content	35 to 55%
Particle Size	< 1/2"
C:N Ratio	15:1 to 30:1
Soluble Silts	< 4.0 minutes (ds)
Organic Matter Content	> 20%
Bulk Density	< 1200 lbs/cy
Foreign Matter	< 1% (dry weight)

C. Standard of quality shall be WeCare Organics, P.O. Box 785, Hillburn, NY 10931, (845) 753-2242, www.wecareorganics.com, or Architect approved equal.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify limits of lawn and other types of ground cover materials in the field with drawings. Also any imported and screened topsoil areas. Notify Architect of discrepancies prior to proceeding with lawn work.
- B. Examine finish surfaces, grade, topsoil quality, and depth.
- C. Do not start lawn work until unsatisfactory conditions are corrected to the satisfaction of the Architect.

3.2 SPREAD TOPSOIL

- A. Limit preparation to areas which will be immediately seeded.
- B. Perform topsoil spreading operations only during dry weather.
- C. To insure a proper bond with the topsoil, disc, harrow, or otherwise scarify and loosen the lawn subgrade to a depth of four (4") inches before spreading topsoil.
- D. Spread topsoil to ensure a minimum settled depth of four (4") inches in lawn areas.

3.3 PREPARE GENERAL LAWN AREAS TYPE 1

- A. Perform a pH test, sieve, and nutrient analysis of the topsoil and advise the results to the Architect prior to adding limestone or other soil amendments. Soil amendments shall be uniformly incorporated into the top four (4") inches of topsoil by discing, harrowing or other approved methods.
- B. Remove debris and stones 3/4" or larger by handpicking, fine tooth aluminum grading rakes, and mechanized stone picker. When topsoil has hardened, cultivate soil to a four (4") inch depth by plowing, discing, harrowing, or otherwise scarifying and loosening the topsoil.
- C. Grade lawn areas to a smooth, free draining even surface with a loose, moderately coarse texture. Scarify, rake, level, and roll with a light static roller as necessary to obtain true, even lawn surfaces and fill depressions as required to drain. Correct irregularities in the surface resulting from tillage operations to prevent formation of depressions or water pockets.
- D. Cultivate soil to provide a firm bed of minimum of four (4") inches deep, free of clods, stones, or foreign matter over 3/4" in diameter from the top of soil. Do not move heavy objects except necessary lawn making equipment over the lawn areas after the soil is prepared unless it is again loosened and graded. Remove stones and all debris greater than one 3/4" in diameter during cultivation. Level undulations and irregularities in the surface.
- E. For pH correction provide adjusted rate of application as recommended in Topsoil Test Report submittal. For low pH correction: Add ground limestone at the rate indicated by the soil test. For high pH correction: Materials and application rates shall be determined by appropriate soil tests.
- F. Place starter fertilizer at the rate of 0.33 - 0.66 lbs. of nitrogen (N) per 1,000 sf. and mix into full depth of topsoil.
- G. Rake area with fine toothed aluminum grading rake before placing seed to obtain a smooth surface at the proper elevation. Drag area with a wood float to level out minor humps and hollows. Beds shall have a smooth friable uniform surface, free of areas ponding water.

3.4 LAWN SEEDING

- A. Notify Architect when seed bed is ready for review as specified in Job Conditions. Obtain Architect's approval of finish grade prior to seeding.
- B. Seed lawns immediately after preparation of bed and Architect's approval.
- C. For General Lawn Type 1:
 - 1. Seed at the rate of 6 lbs. per 1,000 S.F.

2. Seeding shall be performed as follows: $\frac{1}{2}$ rate and mechanically incorporated into the top $\frac{1}{2}$ " of topsoil. The remaining $\frac{1}{2}$ rate shall be mechanically spread at 90 degrees to the first application and lightly rolled.

3.5 MULCHING SEEDED AREAS

- A. Mulch immediately after seeding.
- B. Dry Mulch Application: Place mulch by hand or by machine at a rate of one bale/1,000 s.f. to produce a light even mulch cover so that 50% of soil is visible through the mulch layer.
- C. Hydro Application: Place hydromulch by machine at a rate of one bale/1,000 sq. ft. to produce a light even mulch cover so that 50% of soil is visible through the mulch layer. NOTE: Seeding with a hydroseeder is NOT acceptable.
- D. Anchor mulch by thorough heavy coat of tackifier over entire area and watering.
- E. Protect seed bed from washout, wind erosion, rutting and drying out. Do not use machinery that leaves ruts in the seed bed. It is the Contractor's responsibility to add or remove mulch as needed to encourage optimum seed germination and growth.

3.6 INSTALL STRAW MAT AND CHECK DAMS

Install as specified in Section 312501, Part 3.

3.7 MAINTENANCE

- A. Maintenance by Contractor begins as soon as lawns are seeded. Protect lawns from drought, washout and wind erosion. In general, maintain new installed lawn areas, including watering, fertilizing, core aerating, spot weeding, overseeding, mowing, applications of herbicides, fungicides, and insecticides until a full, uniform, healthy, vigorous stand of grass free of weed, undesirable grass species, disease, and insects is achieved and accepted by the Architect. Specifically:
 1. Watering Seeded Lawns:
 - a. First Week: In the absence of adequate rainfall, watering shall be performed daily or as often as necessary during the first week to maintain moist soil to promptly germinate the lawn seed, preventing it from drying out, and keeping it in a healthy, growing condition until final acceptance. Lawn areas shall receive a minimum of one (1") of water per week, by natural rainfall, irrigation or a combination of both. Water daily until 2nd mowing (just enough water to keep the top $\frac{1}{2}$ " of soil moist, 1 time daily).
 2. Second and Subsequent Weeks: Contractor shall provide water to the lawns as required to maintain adequate moisture, in the upper four (4") inches of soil, necessary for the promotion of deep root growth until final acceptance. After 2nd mowing, water two (2) times weekly until thoroughly established.

3. Protect: Protect lawn areas against trespass, vandalism and routine pedestrian traffic and Owner maintenance traffic by temporary fencing or other means.
 4. Repair: Repair, rework, and overseed (as originally specified for that area) areas that have washed out, eroded, do not germinate and are vandalized or otherwise damaged. Overseeding rates are to be adjusted to 6 lbs. of seed per 1,000 s.f.
 5. Mow: Initial mowing shall begin when the blade height reaches 2" and the soil will bear the weight of the lawn mower. Use mowers with low impact tires. For the first 3 mowings cut the grass blades to 1.5 inches. After that mow the grass when it reaches a height of about 3.5" to a height of about 2.5". Never remove more than 1/3 of the grass blade at any one mowing. A minimum of eight (8) to ten (10) mowings are required (approximately once per week after the initial germination period to final acceptance). Notify the Architect of dates in writing as mowing is performed. Excess clippings shall be carefully raked so as not to remove healthy grasses, and removed.
 6. Core Aerating: Between mowings three (3) and four (4), and between mowings seven (7) and eight (8) core aerate lawns about three (3") inches on center minimum three (3") inches deep to ensure aggressive root growth. This will require multiple passes at different directions to achieve 16 to 20 holes 3/4" to 1" diameter per square foot. Sweep scattered plugs off paved areas onto adjacent lawn areas. Pulverize plugs during subsequent mowing operations. Provide additional core aerating after the 10th mowing as directed by the Architect to expedite the lawn maturation process. Moisten field by thoroughly watering the topsoil profile, several days in advance of coring to facilitate proper penetration of the topsoil.
 7. Fertilizer: Immediately after core aerating, between mowings three (3) and four(4), and between mowing seven (7) and eight (8) apply subsequent fertilizer at the rate of 1.5-2 lbs./1,000 s.f. Provide additional fertilizer after the 10th mowing as directed by the Architect to expedite the lawn maturation process. Apply a final fertilizer just prior to final acceptance at the same application rate.
 8. Weed Control: When infestation of weeds or crabgrass develops, treat infestation by hand weeding or herbicides control appropriate to the area. Furnish and install weed chemical control as recommended by manufacturer. Herbicides controls must be acceptable to the Owner. Obtain and pay for permits. Use as directed by the manufacturer and applicable laws, codes, ordinances and regulatory requirements. Under NO circumstances is it acceptable to seed or overseed over Nutsedge, Crabgrass or other grassy/broadleaf weeds.
- B. Maintenance by the Contractor continues through the certificate of substantial completion to final acceptance by the Architect as described below. Maintenance by Owner begins after final acceptance of the lawn.
- 3.8 STANDARDS FOR SUBSTANTIAL COMPLETION OF LAWNS: Review to determine substantial completion of lawns will be made by the Architect, upon request. Provide notification at least five (5) working days before requested review date.

- A. Lawn areas will be substantially complete provided requirements, including maintenance, have been complied with. A healthy, vigorous, uniform, partially mature stand of lawn is established free of weeds, undesirable grass species, disease, and insects. With proper watering and maintenance as indicated herein, this should culminate after an approximate 60-72 day period for initial germination with average temperatures above 40°F. Grass roots shall have matured to a minimum of 1½" depth as determined by the Architect when core samples are taken.
- B. Lawn areas shall not have more than 10% dead/bare spots.
- C. Contractor shall provide a written copy of all maintenance activities performed up to this date.
- D. The architect will prepare a written punch list of items which need correction prior to final acceptance.

3.9 STANDARDS FOR FINAL ACCEPTANCE OF LAWNS: Review to determine final acceptance of lawns will be made by the Architect, upon request. Provide notification at least five (5) working days before requested review date.

- A. Lawn areas will be acceptable provided requirements, including maintenance, have been complied with. A healthy, vigorous, uniform, full stand of lawn is established free of weeds, undesirable grass species, disease, and insects. Grass roots shall have matured to a minimum of 2" depth as determined by the Architect when core samples are taken.
- B. Any lawn which contains disease, more than 1% dead/bare spots, or any dead/bare area greater than one (1) square foot shall be rejected and the unacceptable area(s) repaired as originally specified at no additional cost to the Owner.
- C. In the event the Contractor fails to complete the punch list items within a 30 day period with average temperatures of 40°F after the time of Substantial Completion, the Contractor shall be liable to the Owner for any additional costs including those charged by the Architect.
- D. Contractor shall provide a written copy of all maintenance activities performed during the contract up to final acceptance of lawns.

3.10 CLEAN UP

During the contract and at intervals as directed by the Architect and as lawn work is completed, clear the site of extraneous materials, rubbish, and debris. Leave the site in a clean, safe, neat, well-draining condition.

END OF SECTION 329201

SECTION 334001 - STORM DRAINAGE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. The extent of the storm drainage is shown on the drawings.
- B. Storm drainage work includes, but is not limited to:
 - 1. Trenching, backfilling and compaction
 - 2. Piping, jointing and fittings
 - 3. Connection(s) to other storm system(s)
 - 4. Flared end section(s)
 - 5. Clean Up
- C. Provide materials, labor, equipment and services required to accomplish related work in accordance with the drawings and specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 311201 - Site Preparation
- B. Section 312501 - Erosion, Sediment and Pollution Control
- C. Section 312201 - Site Earthwork: For Elaboration of Shoring and Bracing, Dewatering, Backfilling, Compaction and Field Quality Control Testing.
- D. Section 321201 - Asphalt Paving

1.3 REFERENCES

- A. ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewer and Other Gravity Flow Applications.

1.4 SUBMITTALS: .

- A. Manufacturer's Product Data (MPD) required for:
 - 1. Pipe, joints and fittings
 - 2. Flared End Section(s)
- B. Quality Control Submittals:
 - 1. Provide a list of completed projects including Owner's contact information for each project, demonstrating compliance with applicable "Experience Requirements" specified in "Quality Assurance" of this specification section.

1.5 QUALITY ASSURANCE

- A. Drainage Contractor Experience Requirements:

1. Submit business name, business owner(s) name(s), business address, telephone number, website and/or email address signed by the Contractor/Subcontractor who meets the qualifications set forth in this specification and is proposed by the Contractor to perform the Drainage for this Project.
2. Provide a list of at least four (4) Drainage work projects of comparable size, scope and quality completed successfully by the proposed Contractor/Subcontractor within the past three (3) years that includes the date completed, project Owner's name and current contact information, including telephone numbers and email addresses.

1.6 JOB CONDITIONS

- A. Job conditions in Section 312201 apply.
- B. Plan and execute piping work so that trenches are not opened for more than two hundred (200') feet in advance or left unfilled more than one hundred (100') feet behind. No overnight open excavation is permitted.

1.7 SUBSTITUTIONS

- A. Contractor is responsible for design of any substituted structures, systems or units in Section 334001 by a NYS licensed engineer. Submit to Architect for approval.
- B. If a product is being submitted as a substitution to the specified product; the the Prime Contractor shall submit and request a product material substitution with his/her bid. The Prime Contractor shall at a minimum provide the following for review by the Architect and Owner:
 1. All submittals as specified herein
 2. Product comparison
 3. Cost Information (including proposal of change in Contract Sum)
 4. Contractor's certification that proposed substitution complies with requirements in the Contract Documents
 5. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

PART 2 - PRODUCTS

2.1 BACKFILL

- A. Backfill for pipes shall be as specified in Section 312201.

2.2 FLARED END SECTION(S)

- A. Flared end sections for 12" pipe and larger shall be galvanized steel, 16 gauge.
- B. Flared end sections for 10" pipe and less shall be high density polyethylene.

PART 3 - EXECUTION

3.1 CONNECTIONS TO OTHER STORM SYSTEM

- A. Connections to existing Storm Systems:
 - 1. Coordinate with the Municipality and other agencies having jurisdiction. Notify governing agency in writing a minimum of two (2) weeks prior to anticipated date of connection so that field procedures and installation can be reviewed by a representative of the Municipality. Copy letter to Architect.
 - 2. Locate accurately per drawings. Verify inverts and sizes. Notify Architect of any discrepancies immediately, prior to installation.
 - 3. Make connections securely, watertight and as detailed. Provide all necessary couplers and fittings to make connections.

3.2 TRENCHING AND BACKFILL

- A. Reference: Refer to Section 312201 for elaboration of shoring and bracing, supporting, rock, dewatering, and backfilling.
- B. Trenching:
 - 1. Remove material encountered to the depth shown on drawings and with a maximum width of fourteen (14") inches and a minimum of nine (9") inches each side of conduit springline as detailed. Provide safe shoring, sheeting, and bracing. Remove before backfilling. Backfill excess or over excavation as described in Section 312201 to proper line and grade. Compact to 95% density.
 - 2. When unsatisfactory soil materials are encountered at design elevations, immediately notify the Architect in writing via email. Continue as directed by the Architect. When conditions are not a result of Contractor's negligence, additional excavation may be directed by the Architect and paid for as a Change Order on a unit price basis in accordance with specification Section 312201.
- C. Water: Remove from trenches; drain trenches and/or provide sump pits and pumping equipment as necessary to keep trenches stable and dry at no additional cost to the Owner.
- D. Soft Material in Trench Bottom: Dry out and stabilize or remove and replace with imported granular backfill material to achieve firm, stable foundation at no additional cost to the Owner.
- E. Rock: Remove boulders and rock within one (1'-0") foot of pipe. Provide one (1'-0") foot of granular backfill between rock and conduits at no additional cost to the Owner.

- F. Backfill: Conform to details on drawings and as specified. Compact backfill to a minimum 95% of optimum density.

3.3 PIPE LAYING

- A. Attach flared end sections as detailed to pipe outlets, draw up bolts tight to provide firm anchorage.

3.4 CLEAN UP

- A. During the contract and at intervals as directed by the Architect and as storm drainage is completed, clear the site of pipe, trench and backfill material, stone, concrete and debris. Leave the site in a clean, safe, well draining, neat condition.
- B. Clean drainage structures, storm water management trenches and pipes: Clean out sediment, rubbish, construction debris, and foreign objects thoroughly, immediately prior to final acceptance.

END OF SECTION 334001

