PROPOSAL

FOR

TAB 16-34A D214509

WASH BAY INSTALLATION AT VEHICLE STORAGE BUILDINGS
AT HENRIETTA AND BATAVIA MAINTENANCE SITES
INTERCHANGES 46 AND 48 M.P. 362.44 AND M.P. 390.13

BOOK 1 OF 1

THIS BOOK CONTAINS SPECIFICATIONS AND
BID PROPOSAL WORKSHEETS.

SUBMITTED IN ACCORDANCE WITH THE NEW YORK STATE
DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS
OFFICIALLY ADOPTED MAY 1, 2016 EXCEPT AS MODIFIED
IN THE PLANS AND/OR PROPOSAL AND ANY CHANGES WITH
ARTICLE 2, TITLE 9 OF THE PUBLIC AUTHORITIES LAW.

LETTING OF

AUGUST 17, 2016

11:00 A.M.

NEW YORK STATE OF OPPORTUNITY. | Thruway Authority | Canal Corporation

200 Southern Blvd., Albany, NY 12209

NOTICE
TO
BIDDERS

In addition to the bid deposit requirement, this Proposal shall be accompanied by a Statement of Surety's Consent on the form furnished by the Authority. (See last page).

BIDDERS ARE SUBJECT TO LOSS OF BID DEPOSIT FOR FAILURE TO OBTAIN PROPER BONDING.

Thruway Authority/Canal Corporation
Designated Contacts

Pursuant to NYS Finance Law Sections 139-j and 139-k, the following people are the designated contacts for this procurement process:

- Catherine T. Sheridan
  Chief Engineer
  (518) 436-2810

- Michael W. Doyle
  Office of Capital Program and Contracts Management
  (518) 436-2902

- Pierre Cridlig
  Project Designer (For technical questions only)
  (518) 471-5319
  Pierre.Cridlig@thruway.ny.gov

For more information about NYS Finance Law Sections 139-j and 139-k, please see the New York State Thruway Authority / Canal Corporation Guidelines for Lobbying included in this Proposal.

NEW YORK STATE
THRUWAY AUTHORITY

NOTICE TO BIDDERS

Sealed bids must be hand delivered, or delivered by first class mail, USPS Express or Priority Mail, or overnight delivery service (e.g., FedEx, UPS) to the New York State Thruway Authority Headquarters Building, at the following address only: New York State Thruway Authority, 200 Southern Boulevard Albany, NY 12209.

Sealed bids should not be sent or delivered to any other address or location, and the Authority is not responsible for any late deliveries or misdirected bids.

Regardless of the delivery method selected, all sealed bids must be delivered by 11:00 AM, on Wednesday, August 17th, 2016, where they will be opened publicly and read aloud. Any bids sent or delivered to an address or location other than the one specified above, or received after this time, will not be accepted.

> Contract TAB 16-34A/D214509 Wash Bay Installation at vehicle storage buildings at West Henrietta and Batavia Maintenance Sites, Interchanges 46 and 48, M.P. 362.4 and M.P. 390.13 in Buffalo Division in Monroe and Genesee Counties in accordance with the Plans and Specifications.

Your bid must be secured with either a Bid Bond or a Bid Deposit. A Bid Bond must be in the amount of 25% of the total bid and must be on the Authority's Bid Bond Form (TA-44117) which is included in the Proposal. A Bid Deposit must be a certified check or cashier's check made payable to the New York State Thruway Authority in the amount of **$75,000.00.**

Plans, proposals, and information on how to download Contract Bid Data are available on the Authority's Website at www.thruway.ny.gov.

SPECIAL NOTE

The New York State Thruway Authority has discontinued the practice of reproducing and furnishing full-size and half-size plans to Contractors after contract award. Contractors shall be responsible for their own hard copies of plans and proposals at no additional cost to the Authority.

New York State Can Help You Secure Surety Bonding

The NYS Surety Bond Assistance Program (NYSBAP) provides technical and financial assistance to help contractors secure surety bonding. Contractors may be eligible to receive a guarantee of up to 30% to secure a surety bond line, bid bond or a performance and payment bond on State projects. Training is also available to contractors requiring technical support on how to become bond-ready. For more information and to fill out a NYSBAP application, visit http://esd.ny.gov/BusinessPrograms/BondingAssistance.html or contact Ms. Huey-Min Chuang at Empire State Development at 212-803-3238 or BAP@esd.ny.gov.

SPECIAL NOTE
REQUEST FOR INFORMATION (RFI)

A **request for information (RFI)** is a written process used to clarify a detail, specification, or note in the contract documents, provide notification of a possible error or omission, or request a minor modification due to possible unforeseen issues that may occur during construction. During the period between project advertisement and award of contract, the Contractor shall submit all RFIs to the appropriate "Designated Contact" listed in the Proposal. The Contractor's RFI to Engineering Design shall follow the same general format as the Authority's Contractor Request for Information Form (TA-N44136-9) used during construction. The form shall be filled out as completely and accurately as possible and numbered sequentially, if needed. Any supporting information that may help describe the issue more clearly, as well as any suggestions or recommendations for possible resolution, should be provided.

TA-N44136-9 (12/2012)

CONTRACTOR REQUEST FOR INFORMATION

New York State Thruway Authority • New York State Canal Corporation

Purpose: This form is completed by a Project's Construction Supervisor upon receipt of a Contractor's request for information when further information is needed to respond to the Contractor's request.

INSTRUCTIONS:

- *Construction Supervisor:* Complete Section I upon receiving the Contractor's written request for information. This form, along with the Contractor's request, is forwarded to the appropriate Thruway Bureau (Design or Maintenance) with a copy being sent to the Office of Construction Management's Liaison.
- *Receiving Thruway Bureau:* Completes Section II, providing the requested information, and returns the form to the Construction Supervisor with a copy being sent to the Office of Construction Management's Liaison.

Section I Request for Information

Construction Supervisor	Phone No.	RFI No.
	( ) -	

Project Description	Contract TA No.
	TA
	Contract D No.
	D

Trades (if applicable)	Contract Drawing No.	Specifications Section	Contractor's Reference No.

Request Date	Requested Response Date	Requested By	Company

Detailed Description of Issue (use additional sheets if necessary)

Proposed Solution (use additional sheets if necessary)

Section II Request Response

Receipt Date	Response Date	Response By	Thruway Bureau

Response (use additional sheets if necessary)

Attached Document(s) Description

SAMPLE FORMAT

New York State Thruway Authority

Contract No. TAB 16-34A

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PROJECT INFORMATION

TAB 16-34A
D214509

NEW YORK STATE THRUWAY AUTHORITY

DEPARTMENT OF ENGINEERING

PROPOSAL ESTIMATE FOR

WASH BAY INSTALLATION AT VEHICLE STORAGE BUILDINGS

AT HENRIETTA AND BATAVIA MAINTENANCE SITES AT INTERCHANGES 46 AND 48

AT

MILEPOSTS 362.44 AND 390.13

IN THE

BUFFALO DIVISION

OF THE

NEW YORK STATE THRUWAY

IN

MONROE AND GENESEE COUNTIES

TYPE	LIMITS
Architectural, Mechanical, Electrical, Plumbing, Concrete and Masonry Work.	Henrietta and Batavia Maintenance sites

DEPOSIT REQUIRED **$75,000.00**

COMPLETION DATE **April 7th, 2017**

PRE-AWARD NOTICE

A Pre-Award Meeting has not been scheduled for this project. If a Pre-Award Meeting is deemed necessary, notice of the date and time will be provided.

To assist the Authority in its award process, the successful low bidder must furnish the following items upon request:

1. A current New York State Uniform Contracting Questionnaire (NYSUCQ) CCA-2 form must be on file;

2. A list of current contracts giving the firm or agency for which they are being performed, the name and phone number of someone therein familiar with the contractor's work, the contract amount, and percent of completion;

3. Pre-Award Project Schedule;

4. Documentation of the actions taken to comply with the Minority/Women's Business Enterprise Utilization goals (Non-Federal), or Disadvantaged Business Enterprise goals (Federal) as defined in the Proposal;

5. A "Schedule of Participation of Minority/Women's Business Enterprise" (Form TA-1022), or Disadvantaged Business Enterprise" (Form TA-1022F);

6. AAPHC-89 Approval to Subcontract.

Contract Documents will be supplied with the Authority's notice to the successful low bidder and must be executed and returned to the Authority within ten (10) days of receipt.

If a Pre-Award Meeting is held, it is requested that the Project Superintendent be present. The Contractor should be prepared to provide, upon request by the Authority, information regarding, among other things, the following:

1. Use of subcontractors, including who they will be and what items of work they will perform;

2. Suppliers and manufacturers;

3. Traffic control and safety;

4. Any anticipated problems that could affect the progression of the project.

CONTRACT AWARD

The award process cannot begin until the executed Contract Documents have been returned to the Authority and the successful Low Bidder has provided acceptable documentation with regard to his actions taken to comply with the M/WBE goals of this Contract or DBE Goals for Federally Aided Contracts.

ALL BIDDERS

PRE-BID INSPECTION

The prospective bidder must have in its possession the Contract Plans/Proposal and a Work Permit for identification purposes when conducting a pre-bid inspection of the Thruway/Canal facility.

The prospective bidder shall inform the appropriate Division Point of Contact (listed below) prior to visiting the site and shall strictly comply with all instructions and requirements.

- **New York State Thruway Authority Work Permit Application (TA-W41338)** is available at http://www.thruway.ny.gov/business/realproperty/index.html. The application shall be submitted to the appropriate Thruway Authority Division Permit Coordinator as indicated on page 2 of the application. The fee is waived for this Pre-Bid Inspection.

Division	Point of Contact	Phone
New York	Gail Winters	(845) 918-2510
Albany	Gary Raylinsky	(518) 436-2710
Syracuse	Jay Holbrook	(315) 438-2420
Buffalo	Paul Zakrzewski	(716) 635-6218

- **New York State Canal Corporation Canal Permit Application (TA-W99072)** is available at http://www.canals.ny.gov/business/realproperty/index.html#permits. The application shall be submitted to the appropriate Division Canal Permit Engineer as indicated on page 2 of the application. The fee is waived for this Pre-Bid Inspection.

Division	Point of Contact	Phone
Eastern - Albany Office	Garret O'Connor	(518) 471-5033
Western - Syracuse Office	Janet Deordio	(315) 438-2389
Western - Buffalo Office	Kevin Kerins	(716) 635-6252

Provisions of Section 107-05, Equipment Safety Procedures, contained in the Contract Proposal shall apply to all Pre-Bid Inspectors and shall be strictly adhered to while performing the pre-bid inspection.

PRECONSTRUCTION MEETING

A Pre-Construction Meeting will be held prior to the start of construction. The time, date and location will be coordinated by the Division Construction Engineer who will provide this information to the successful low bidder as soon as it is available.

WITHDRAWAL OF BID

A Contractor may at any time, upon at least fifteen (15) days written notice, withdraw its bid on a date sixty (60) days after bid opening or thirty (30) days after the properly executed contract documents have all been received by the Authority, whichever is later. The bid bond, bid deposit, and/or performance bond shall remain in effect until such period of written notice has expired provided the contract has not been approved by the Office of the State Comptroller in the interim.

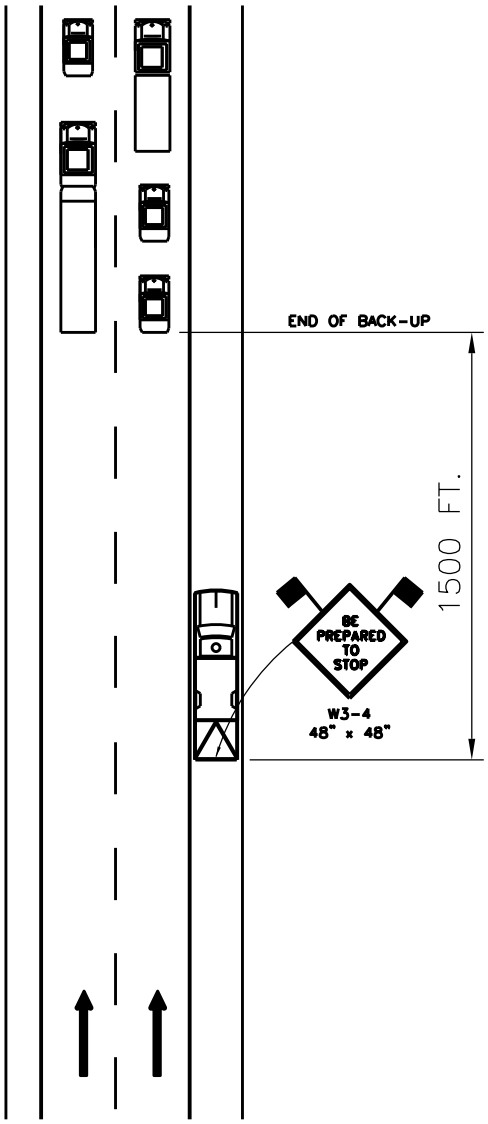
The Contractor and the Authority may agree in writing to extend the date upon which the bid may be withdrawn if the contract has not been approved by the Office of the State Comptroller.

QUANTITY SHEET SUMMARY FOR PROPOSAL

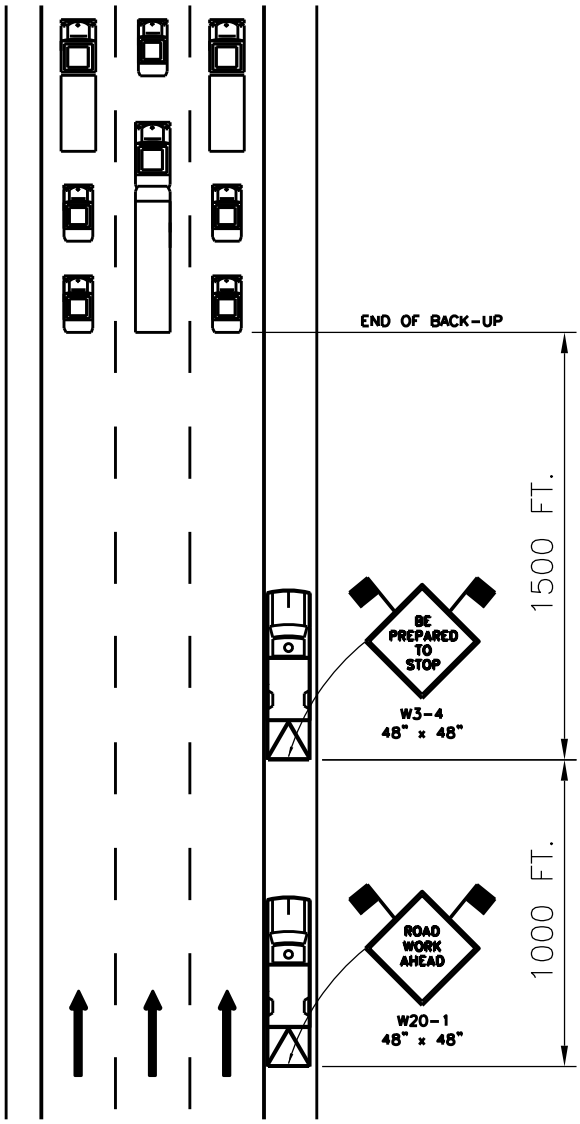
CONTRACT ID: D214509 PROJECT(S): B52952

CONTRACTOR :_____

ITEM NUMBER		DESCRIPTION	UNIT	QUANTITY
627.0001	25	GENERAL REQUIREMENTS	LS	1.000
627.0002	25	EXISTING CONDITIONS	LS	1.000
627.0003	25	CONCRETE	LS	1.000
627.0004	25	MASONRY	LS	1.000
627.0005	25	METALS	LS	1.000
627.0006	25	WOOD, PLASTICS AND COMPOSITES	LS	1.000
627.0007	25	THERMAL AND MOISTURE PROTECTION	LS	1.000
627.0008	25	OPENINGS	LS	1.000
627.0009	25	FINISHES	LS	1.000
627.0022	25	PLUMBING	LS	1.000
627.0023	25	HEATING,VENTILATING AND AIR CONDITIONING	LS	1.000
627.0026	25	ELECTRICAL	LS	1.000
627.0031	25	EARTHWORK	LS	1.000
697.0203	25	FIELD CHANGE ORDER (THRUWAY)	DC	50000.000
699.04	25	MOBILIZATION	LS	1.000



TWO-LANE SECTION



THREE-LANE SECTION

NOTE:

THE "BE PREPARED TO STOP" SIGN (W3-4) SHALL BE USED, WHERE CONDITIONS PERMIT, TO INFORM ONCOMING TRAFFIC OF A STOPPED OR VERY SLOW TRAFFIC CONDITION CAUSED BY STATIONARY CONSTRUCTION WORK ZONES. THE SIGN SHALL BE POSTED APPROXIMATELY 1500 FEET UPSTREAM OF THE END OF THE BACK-UP. WHEN THE END OF THE BACK-UP MOVES, THE SIGN SHALL ALSO BE MOVED TO MAINTAIN THAT SPACING.

IN SECTIONS WITH THREE OR MORE LANES, IF THE RESULTING LOCATION PLACES THE SIGN UPSTREAM OF THE FIRST WARNING SIGN FOR THE PROJECT, A "ROAD WORK AHEAD" SIGN (W20-1) SHALL BE PLACED APPROXIMATELY 1000 FEET IN ADVANCE OF THE "BE PREPARED TO STOP" SIGN.

A BACK-UP SHALL BE DEFINED AS A LINE OF STOPPED OR SLOWLY MOVING VEHICLES (25 MPH OR LESS) EXTENDING FROM THE BEGINNING OF THE TAPER TO THE FIRST WARNING SIGN OF THE WORK ZONE AND INVOLVING A DELAY OF AT LEAST 10 MINUTES.

THE "BE PREPARED TO STOP" SIGN IS NOT REQUIRED WHEN TRAFFIC BACK-UPS ARE CREATED UNDER NORMAL OPERATING CONDITIONS OUTSIDE THE LIMITS OF A WORK ZONE.

LEGEND

WORK VEHICLE (ATTENUATOR OPTIONAL)

WARNING FLAGS MINIMUM 18 x 18 IN.

NEW YORK STATE THRUWAY AUTHORITY
DEPARTMENT OF ENGINEERING SERVICES

TITLE: "BE PREPARED TO STOP" SIGNING FOR STATIONARY WORK ZONES

DRWN BY: CAD	DATE:	SCALE:	DWG. NO.
CHKD BY: TA	04/2013	N.T.S.	BPS

LIST OF NYSDOT STANDARD SHEETS

The following NYSDOT Standard Sheets apply: **NONE REQUIRED FOR THIS PROJECT.**

WORK TO BE DONE

The following is a general description of the work to be done under this Contract. This list is intended to give the Contractor a general description of the work involved in this Contract and is not a complete listing of all work to be done. All work shall be done in accordance with the Contract Documents even though not specifically mentioned in this list.

The Work consists of furnishing and installing a vehicle wash bay system at two (2) existing vehicle storage buildings located at the Henrietta and Batavia Maintenance sites. Work items include, but are not limited to, the following at each site:

- Within an existing 40’ by 50’ building partition, construct a reinforced concrete slab with a trench drain and hydronic radiant floor heat.
- Construct a mechanical room within the same building partition.
- Furnish and install commercial vehicle wash equipment and catwalks.
- Plumbing, HVAC, electrical, masonry and architectural work.
- At the Batavia site only, furnish and install an above-grade oil-water separator in the mechanical room.
- Refer to Contract Drawing G-100 for a detailed description of the Work.

SCHEDULE AND SUSPENSION OF WORK

The New York State Thruway is a limited access, high-speed, high-volume highway. Traffic shall be maintained in accordance with the *Manual on Uniform Traffic Control Devices (MUTCD)*, the *Work Zone Traffic Control Plans*, the *Standard Specifications* Section 619 and the following provisions:

A. WORK ZONE TRAFFIC CONTROL

1. Work Zone Traffic Control (WZTC) at the Project sites will be permitted for work site access, delivery of materials and equipment, and work operations.

2. Personal vehicles will NOT be allowed to park along the driveways or entrance ramps to the Project sites at any time.

3. During non-working hours, all equipment and materials shall be stored in a safe manner and in a location approved by the Engineer.

4. WZTC will **NOT** be permitted during holiday periods or when unforeseen circumstances arise, as described in Section B. *Work Restrictions*, unless indicated otherwise in the Contract Documents.

B. WORK RESTRICTIONS

1. **HOLIDAY PERIODS:** WZTC will **NOT** be permitted during holiday periods, unless indicated otherwise in the Contract Documents. The Authority or Engineer may permit work on Thruway facilities only if operations do not inhibit or distract traffic or Authority business at the the Project sites. Access to work sites from state and local roads will be permitted provided the municipality having jurisdiction for the road gives written permission. Holiday periods for this project shall be as follows:

2016						
HOLIDAY	FROM			TO		
	TIME	DAY	DATE	TIME	DAY	DATE
Labor Day	Noon	Thursday	09/01/2016	11:00 p.m.	Monday	09/05/2016
Columbus Day/ Thanksgiving (Canada)	Noon	Friday	10/07/2016	11:00 p.m.	Monday	10/10/2016
Veterans Day	Noon	Thursday	11/10/2016	11:00 p.m.	Friday	11/11/2016
Thanksgiving	Noon	Wednesday	11/23/2016	11:00 p.m.	Sunday	11/27/2016
Christmas/New Year's Day	Noon	Friday	12/23/2016	11:00 p.m.	Sunday	01/01/2017
2017						
HOLIDAY	FROM			TO		
	TIME	DAY	DATE	TIME	DAY	DATE
Dr. Martin Luther King, Jr. Day	Noon	Friday	01/13/2017	11:00 p.m.	Monday	01/16/2017
Presidents' Day	Noon	Friday	02/17/2017	11:00 p.m.	Monday	02/20/2017
Easter	Noon	Thursday	04/13/2017	11:00 p.m.	Monday	04/17/2017
Victoria Day (Canada)	Noon	Friday	05/19/2017	11:00 p.m.	Monday	05/22/2017
Memorial Day	Noon	Thursday	05/25/2017	11:00 p.m.	Monday	05/29/2017
Canada Day/Independence Day	Noon	Friday	06/30/2017	1:00 a.m.	Wednesday	07/05/2017
Civic Holiday (Canada)	Noon	Friday	08/04/2017	11:00 p.m.	Monday	08/07/2017
Labor Day	Noon	Thursday	08/31/2017	11:00 p.m.	Monday	09/04/2017

SCHEDULE AND SUSPENSION OF WORK

2. Proposed WZTC schedules shall be submitted to the Engineer for review and approval at least one week in advance of the earliest proposed work.

3. Work restrictions may be modified if:

   a. The Contractor has received permission through the Engineer, from the Division Director or designee, for temporary modification of the work restrictions for performance of specific construction operations for a specific time period.

      NOTE: Such requests must be based on current traffic volumes that would permit the requested temporary modification with little probability of causing disruption or delay to the public.

      The Contractor shall include full explanation of the benefits to the public and to the Authority, which would accrue in granting a temporary waiver for performance of the specific operations including calculations for any credit that may be offered. A contingency plan for action to be taken, should an unexpected traffic backup occur, shall accompany this presentation and will be one prime consideration in evaluating the request.

   b. The Contractor has received written authorization from the Division Director or designee to perform specific construction operations, violating the work restrictions during a specifically prohibited time period.

      NOTE: The Contractor shall submit a written request to the Authority's Division Director, with copy to the Engineer, for permission to perform specific construction operations at specific locations and times, including a detailed explanation of why the work cannot be performed in conformance with the Contract. Such requests must be received at the Division Office at least one full week before the date of the requested variance, and at least two full weeks should granting the waiver require making notice to the public regarding potential disruptions and delays.

   If written authorization to work is granted by the Authority, the Contractor shall be strictly limited to those operations approved in the authorization. In making application for a waiver, the Contractor agrees that any waiver of restrictions granted by the Authority is exclusively for the Authority's benefit and purposes, and as such is subject to revocation without requirement for advance notice. In addition, the disapproval of requests for waiver of contract requirements is not subject to administrative review or appeal under the contract.

C. GENERAL CONDITIONS

The Contract is to be completed on or before the specified completion date. If, for any reason, the Contractor fails to fulfill this obligation and requests an extension of time and the request is granted, the Authority, as a condition for extending the time of completion, shall retain the right to limit the Contractor's hours and/or days of work and/or impose conditions under which the work shall be performed in order that the Authority's business may not be unduly inconvenienced.

All the required liability and property damage insurance with the limits stated in this Proposal shall be effective and shall be continued in force throughout the life of this Contract including the stated periods of the suspension of the work.

The Contractor shall consider the foregoing requirement when preparing his/her "Schedule of Operations".

ADDITIONAL INSURED PARTIES

The following is a list of additional insured parties: none

NON-REVENUE PASS PLATES

Non-revenue pass plates will be furnished to the Contractor for use between:

Interchange 45 (Rochester-Victor) and Interchange 48A (Pembroke-Medina)

U-TURNS/CROSSOVERS

U-turns and crossovers shall not be permitted at toll plazas or on interchange ramps. In addition, tractor trailer combinations are prohibited from U-turns at any location on the Thruway system. These vehicles must exit the Thruway system and re-enter for all direction changes. U-turns are permitted within a maintenance facility, however, with prior approval from both Division Traffic Supervision and the Thruway Maintenance Supervisor 2 for that facility. All applicable traffic laws must be followed.

WORK / OCCUPANCY PERMITS

The Contractor shall obtain a construction work permit from the New York State Thruway Authority and shall abide by all provisions of the permit.

CONTRACTOR'S FIELD OFFICE

The location of the Contractor's Field Office shall be determined during the Pre-Construction Meeting. The site shall be approved by the Engineer prior to placing the office and the area shall be kept in a neat, clean condition at all times. The area shall not be used as a staging, storage, equipment or employee parking area.

SPECIAL NOTE

SPOIL AREA

The Contractor's attention is directed to the fact that no spoil area for surplus material is available for this contract within Authority/Corporation right-of-way. Therefore, all material to be removed from the job site shall be disposed of and/or managed by the contractor off Authority/Corporation property, in accordance with the off-site options of the spoil requirements of §107-10 *Managing Surplus Material and Waste*. The location(s) for offsite disposal shall be submitted to the Project Engineer for acceptance prior to removal from the site. The Contractor shall provide the Authority a copy of all easements and/or agreement letters received from landowner(s) of off-site disposal area(s) prior to disposal of any material. The easements and/or agreement letters must include a statement by the Contractor and the landowner that the disposal of the material is in compliance with all applicable Federal, State and local laws and regulations. All costs associated with the spoil area and removal of spoil material shall be included in the various items of the contract.

SPECIAL NOTE

UTILITIES

The Contractor is advised that to the best knowledge of the Authority utilities exist within the project limits as follows:

LOCATION/MILEPOST	UTILITY	BRIEF DESCRIPTION
Henrietta Maintenance at MP 362.4	Monroe County Water Authority	Potable water
Henrietta Maintenance at MP 362.4	Rochester Gas & Electric	Electricity
Henrietta Maintenance at MP 362.4	Rochester Gas & Electric	Natural gas
Henrietta Maintenance at MP 362.4	G4S Technology, LLC	Fiber optics
Batavia Maintenance at MP 390.1	City of Batavia.	Potable water
Batavia Maintenance at MP 390.1	National Grid	Electricity
Batavia Maintenance at MP 390.1	National Fuel Resources, Inc.	Natural Gas
Batavia Maintenance at MP 390.1	G4S Technology, LLC	Fiber optics

Authority utilities, including fiber optic facilities, are installed along the entire Thruway right-of-way and are not provided in this listing. Details of the fiber optic backbone and related fiber connections can be obtained through Asif Mall at (518) 471-5020. Information regarding connections to Cell/Radio Towers can be obtained through Tony Kirby at (518) 471-4357. All utility details for Authority facilities such as Toll Plazas and Barrier, Service Areas, Maintenance Areas, State Police Buildings, Headquarters and Division Buildings, etc., can be obtained through one of the following Authority Division Facilities Engineers:

New York Division	Michael Naccarato	(845) 918-2525
Albany Division	Dan Meier	(518) 471-5378
Syracuse Division	Kevin Post	(315) 438-2315
Buffalo Division	Sean Carrington	(716) 635-6224

The information provided above reflects data retrieved from the Permits Plus system as well as hard copy files. More detailed information may be available, such as plans and as-builts, and may be reviewed as needed.

Additional utilities may also exist within the project. The Contractor shall use caution while working near these utilities to avoid damage to them during construction. Any damage to these utilities shall be repaired at the Contractor's expense and to the satisfaction of the utilities owner.

The Contractor shall contact **Dig Safely New York** by calling **811** or **800-962-7962** in accordance with Section 107-07 of the Standard Specifications before commencement of construction activities.

Prior to any work, the Contractor and the Engineer shall verify the exact location of the above listed utilities and any other utilities within the project limits.

SPECIALTY ITEMS

The following is a list of items that are considered “Specialty Items” according to Section 108-05:

ITEM	DESCRIPTION
627.0008 25	Openings

SUPPLEMENTAL INFORMATION FOR BIDDERS

Supplemental information is available to bidders. As indicated below, information is either available on the Thruway Authority's website with the contract plans and proposal or available in electronic format from the Thruway Authority upon request prior to or after the letting date.

The bidder's signature on this proposal certifies that they have made themselves aware of the availability of the information indicated below prior to the letting date.

INFORMATION	NOT AVAILABLE	AVAILABLE ON THRUWAY AUTHORITY WEBSITE	AVAILABLE UPON REQUEST ON CD
Utility Estimate Sheets with Names of Utility Officials	X		
Earthwork Cross Section Sheets	X		
Earthwork Sheets	X		
Drainage Estimate Sheets	X		
Sign Face Layouts	X		
Logs of Subsurface Exploration		X	
Tabulated Results of Probings	X		
Tabulated Depth of Bed Rock	X		
Logs Showing Laboratory Description of Soil Samples		X	
Laboratory Test Data from Soil Samples		X	
Rock Outcrop Maps	X		
Granular Materials Resources Survey Reports	X		
Terrain Reconnaissance Reports	X		
Subsurface Data		X	
Granular Material Sources Report	X		
Pavement/Rock Cores (available for inspection only)	X		
Record Plans	X		
Applicable Asbestos Blanket Variances	X		
Storm Water Pollution Prevention Plan	X		
Shop Drawings		X	
Water Level Records (Canal Projects)	X		
Residency Sheets (Canal Projects)	X		
Foundation Reports	X		
CADD Files of Contract Plans (Unofficial - Not signed or stamped)	X		
Special Reports or Other Information	X		

Hard copies of the supplemental information indicated above are not available. Contractors shall be responsible for their own hard copies of this information at no additional cost to the Authority.

REVISIONS TO NYSDOT STANDARD SPECIFICATIONS

NEW YORK STATE THRUWAY AUTHORITY ADDENDUM TO THE STANDARD SPECIFICATIONS

The Standard Specifications published by the New York State Department of Transportation shall form a part of the agreement. The dated edition that applies to this contract is shown on the front cover of the proposal. All work contemplated under this contract is to be covered by, and be in conformance with, the Standard Specifications as modified by this Addendum, the contract proposal or the contract plans. Also, the bidder's attention is directed to the fact that the New York State Thruway Authority, acting through its duly authorized officers, is the contracting party herein and the specifications referenced above shall be read accordingly.

All special notes bound in this proposal shall be incorporated. If a conflict exists between the special specifications and/or provisions set forth in this proposal and the specifications and/or provisions set forth in the New York State Department of Transportation's Standard Specifications, those in the proposal shall govern.

Make the following changes to *Standard Specifications (USC) and dated as shown on the Title Page*:

TABLE OF CONTENTS

Substitute or **Add** the following sections:

102-01 LOCATION OF THRUWAY DIVISION OFFICES
102-08 STANDARD CLAUSES FOR ALL NEW YORK STATE THRUWAY AUTHORITY AND NEW YORK STATE CANAL CORPORATION CONSTRUCTION CONTRACTS AND FEDERALLY-FUNDED PROCUREMENT CONTRACTS (APPENDIX A), SUPPLEMENTAL TITLE VI PROVISIONS (CIVIL RIGHTS ACT) (APPENDIX A-1), AND SUPPLEMENTAL TITLE VI PROVISIONS (CIVIL RIGHTS ACT) (APPENDIX A-2)
104-11 REMOVAL AND REPLACEMENT OF BRIDGE IDENTIFICATION SIGNS
105-22 NON-REVENUE PASS PLATES
108-01 START AND PROGRESS OF WORK
108-07 OFFICIAL SHUTDOWN PERIOD
108-08 WORK DURING OFFICIAL SHUTDOWN PERIODS
109-11 RECOVERY OF MONIES BY THE AUTHORITY

Section 100
GENERAL PROVISIONS

SECTION 101 – ABBREVIATIONS AND DEFINITION OF TERMS

101-01 ABBREVIATIONS OF TERMS.

Delete the **abbreviations** DCEC, DCED, DCES, and DCETS and their respective expressions. Wherever these abbreviations are used in the specifications, **Substitute** as follows:

DCEC – Director of Construction Management
DCED – Director of Design
DCES – Director of Structures Design
DCETS – Director of Structures Design

101-02 DEFINITIONS OF TERMS.

Add **"Acceptance Testing.** Testing, conducted by the Engineer, to measure the degree of compliance to the Contract Documents."

Addenda; Delete the definition and **Substitute** "This TA Addendum and any supplemental additions, deletions and modifications to the provisions of the Standard Specifications published by NYSDOT, adopted by the New York State Thruway Authority, and listed on the front cover of this Contract Proposal."

Approved List; the "Materials Bureau" referenced shall be the New York State Department of Transportation Materials Bureau.

Add **"Assistant Division Director Engineering.** An employee of the New York State Thruway Authority, under the direction of the Division Director, who has been delegated the responsibility for supervision of the Division Construction Management staff."

Add **"Authority.** The New York State Thruway Authority, its employees and its designated representatives."

Add **"By Others.** The term "by others" refers to a person, firm, or corporation other than the Contractor or its surety, or persons, firms or corporations in a contractual relationship with the Contractor or the surety, such as a Subcontractor, supplier, fabricator or consultant at any tier. "By others" shall include the Authority or other public body."

Chief Engineer; Delete the definition and **Substitute** "The Chief Engineer of the New York State Thruway Authority or his/her designated representative."

Commissioner; Delete the definition and **Substitute** "The Chairman of the New York State Thruway Authority or his/her designated representative. The designated representative of the Chairman of the New York State Thruway Authority is the Chief Engineer of the New York State Thruway Authority."

Contract Agreement; **Delete** the last sentence and **Substitute** "A sample of the standard contract agreement is found elsewhere in this proposal."

Add **"Corporation.** The New York State Canal Corporation, its employees and its designated representatives."

Department; Delete the definition and **Substitute** "The New York State Thruway Authority/Canal Corporation". The Authority maintains a website at www.thruway.ny.gov."

Departmental Geotechnical Engineer; Delete the definition and **Substitute** "A Geotechnical Engineer in the employ of the New York State Thruway Authority or its designated inspection agency, acting at the request of the Chief Engineer, authorized to perform the duties required under these specifications."

Departmental Engineering Geologist; Delete the definition and **Substitute** "An Engineering Geologist in the employ of the New York State Thruway Authority or its designated inspection agency, acting at the request of the Chief Engineer authorized to perform the duties required under these specifications."

Add **"Department of Engineering.** The New York State Thruway Authority Department of Engineering."

Engineer OR Engineer-In-Charge; Delete the definition and **Substitute** "The Project Engineer representing the New York State Thruway Authority having direct supervision of the execution of the contract under the direction of the Thruway Division Director."

Field Change Payment (FCP); Delete the term "Field Change Payment (FCP)" and **Substitute** "Field Change Order (FCO)".

Final Agreement; Delete the definition and **Substitute** "Agreement between the New York State Thruway Authority and the Contractor, stating the total cost of the work done by the Contractor. This document, which may also be referred to as a "Final Supplemental Agreement", provides a final tabulation of the net increases or decreases in the Contract."

Geotechnical Engineering Bureau; Delete the definition and **Substitute** "The New York State Thruway Authority employee, or its designated inspection agency or representative, having responsibility for providing Geotechnical Engineering Services including laboratory testing of earthwork materials."

Major Item; Delete the bid price ranges and **Substitute** the following**:**

Total Contract Bid Price	Minimum Major Item Value
≤$1,000,000	$20,000
>$1,000,000 - $5,000,000	$50,000
>$5,000,000 - $20,000,000	$200,000
>$20,000,000	$500,000

Materials Bureau; Delete the definition and **Substitute** "The New York State Thruway Authority employee, or its designated inspection agency or representative, with responsibility for the quality assurance program for materials to be used on the contract, directed to secure samples, conduct tests and maintain records as prescribed for this contract."

Add "Median. That portion of a divided highway separating the traveled way. The median includes the median shoulders."

Add "Milepost. Location marker/delineators on the Mainline Thruway and Spurs (New England Thruway, Cross Westchester Expressway, Garden State Parkway Connection, Berkshire Spur, and the Niagara Thruway) and/or at overhead bridge sites. Milepost locations are approximate, having been initially referenced to centerline mileage, and shall not be utilized for measurement. Interchange ramps and roadways do not have location markers."

Add "Monthly Contract Payments. The Authority shall, once in each month and on such days as it may fix, make an estimate of the quantity of work done and of material which has actually been put in place in accordance with the terms and conditions of the contract, during the preceding month, and compute the value thereof and pay to the Contractor the moneys due in accordance with Public Authorities Law Section 2880, as detailed in 21 NYCRR Part 109 (Prompt Payment)."

Add "Notice to Proceed. Written notice to the Contractor to begin Work."

Office; Delete the definition and **Substitute** "Any of the subdivisions within the Department of Engineering of the New York State Thruway Authority."

Professional Service; Delete the term and definition and **Substitute** the following:

> "**Service.** A service is specialized work consisting of less than an entire contract pay item provided to the Contractor for a fee or other basis not generally accounted for through labor (prevailing wage rates), materials (invoices), and equipment billing (Blue Book rates). Services include, but are not limited to, professional engineering and surveying fees, dumping fees, utility charges, vehicle towing called out for the public, concrete pumping, hired trucking, owner-operator trucking and crane lifting operations. Pavement striping, guide rail removal and installation, scuba diving, welding, and drilling and grouting operations are recognized as subcontractor activities, not services."

Region; Delete the term and definition.

Regional Director; Delete the definition and **Substitute** "The Division Director of one of the four NYSTA Divisions, or a designated representative."

Add "**Regional Materials Engineer (RME)"** and **Substitute** "The Engineer or Engineer-In-Charge" wherever this title appears.

Standard Sheets; Delete the last sentence and **Substitute** "Unless otherwise stated, the standard sheets shall be those current on the advertised letting date."

State; Delete the definition and **Substitute** "When used, means the New York State Thruway Authority."

Subcontractor; Delete the definition and **Substitute** "Any individual, firm, or corporation to whom the Contractor sublets any part of the contract. Written consent from the Authority is required for subcontractors except for subcontractors that perform on-site work consisting of less than an entire contract pay item, and conduct work for an aggregate of less than 10 work days per calendar year. All subcontractors, whether or not they require approval, are responsible to pay employees prevailing wage rates and submit certified payrolls as required by the NYS Department of Labor, and shall comply with the provision for Extra Work as specified in Sections 109-05A. and 109-05B."

Add "**Thruway Authority Director of Construction Management.** The Director of Construction Management, Department of Engineering of the New York State Thruway Authority, or a designated representative, assists the Chief Engineer with Programmatic Quality Assurance and development of Policy."

Add "**Thruway Division.** A geographic section of the Thruway and Canal system used to designate or identify the location of the proposed work. There are four (4) such Thruway Divisions and their limits are generally described as follows:

A. New York Division. The portion of the Thruway south of Milepost 76.5 in Ulster County, including the entire Garden State Parkway connection, the New England Thruway (I-95) from Milepost NE 0.17 to Milepost NE 15.01, and the entire Cross Westchester Expressway (I-287).

B. Albany Division. The portion of the Thruway between Milepost 76.5 in Ulster County and Milepost 197.9 in Montgomery County, including the Berkshire Spur from Milepost B 0.00 to Milepost B 24.28. Also, the Champlain Canal between Waterford (intersection with the Erie Canal) and Whitehall (north end of Lock C-12), the Erie Canal between Waterford (intersection with the Champlain Canal) and east end of Lock E-10, and the Erie Canal from east end of Lock E-10 to west end of Lock E-16.

C. Syracuse Division. The portion of the Thruway between Milepost 197.9 in Montgomery County and Milepost 350.6 in Ontario County. Also, the Erie Canal from west end of Lock E-16 to Sylvan Beach (Oneida Lake), the Erie Canal from Sylvan Beach (Oneida Lake) to the Cayuga/Seneca County line at Montezuma, the entire Oswego Canal from Three Rivers Point to Lake Ontario, the Erie Canal from the Cayuga/Seneca County line to the Wayne/Monroe County line, and the Cayuga/Seneca Canal from the south end of Cayuga Lake and Seneca Lake to the intersection with the Erie Canal at Montezuma.

D. Buffalo Division. The portion of the Thruway west of Milepost 350.6 in Ontario County, including the Niagara Thruway (I-190) Milepost N 0.00 to Milepost N 21.1. Also, the Erie Canal from the Wayne/Monroe County line to Tonawanda (500 feet west of the Webster Street Bridge)."

Add "Thruway Division Construction Supervisor. An employee of the New York State Thruway Authority, under the direction of the Assistant Division Director Engineering, who has been delegated the responsibility for supervision of the Engineer."

Add **"Thruway Division Director.** The ranking staff employee of the Thruway Authority in a Thruway Division."

Add **"Thruway Division Traffic Supervisor.** An employee of the New York State Thruway Authority, under the direction of the Division Director, who has the responsibility for safety and control of all vehicular traffic on the Thruway."

Work Service; Delete the term and definition.

SECTION 102 - BIDDING REQUIREMENTS AND CONDITIONS

102-01 LOCATION OF REGIONAL OFFICES.

Delete this section in its entirety and **Substitute** the following:

"**102-01 LOCATION OF THRUWAY DIVISION OFFICES.** Buffalo Division - 455 Cayuga Road, Suite 800, Cheektowaga, New York 14225-0121; Syracuse Division - Suite 250, 2nd Floor, 290 Elwood Davis Road, Liverpool, New York 13088-0308; New York Division - 4 Executive Blvd., Suffern, New York 10901; Albany Division and Thruway Headquarters- 200 Southern Boulevard, Albany, New York 12209-2098."

102-02 EXAMINING THE CONTRACT DOCUMENTS AND THE WORK SITE.

Delete the first paragraph and **Substitute** the following:

"Information on letting schedules, contract documents, detailed plans of the work, contract proposals, supplemental information for bidders, amendments, and other information are available on the Authority's website at: www.thruway.ny.gov/business. Standard sheets are available on the Engineering > CADD Info > Drawings page of the Department of Transportation's Business Center website at: www.dot.ny.gov/business."

Delete the third paragraph and **Substitute** the following:

"Inquiries prior to the receipt of bids regarding any discrepancy, error, omission, intent or meaning of the Contract Documents shall be directed to an Authority designated contact named in the Proposal. Only amendments shall be considered binding. Oral responses shall not be used to modify the Contract Documents."

C. Subsurface Information.

Add the following to the end of the third paragraph:

"If no Quality Designations are given, Quality Level D shall be assumed."

102-04 PROPOSAL CONTENT.

Delete "three (3) decimal positions" in the first paragraph and **Substitute** "two (2) decimal positions".

102-05 PROPOSAL SUBMISSION.

Delete the first sentence of the second paragraph and **Substitute** "Amendments will be provided via electronic means on the Authority's website.

Delete the last two paragraphs of this section.

102-06 BID DEPOSIT.

Delete all the information in this section and **Substitute** the following:

"Bids must be secured with either a bid bond or a bid deposit. A bid bond must be in the amount of 25% of the total bid and must be on the Authority's Bid Bond Form (TA-44117) which is included in the Proposal. A bid deposit must be a certified check or cashier's check made payable to the New York State Thruway Authority or the New York State Canal Corporation in the amount specified in the bid proposal. (Bidders must also submit a Statement of Surety's Consent with the bid.) The retention and disposition of such bid bond or certified check or bank cashier's check by the Authority shall be pursuant to and in conformity with Section 38(2) of the Highway Law, as amended.

Bidders are advised that the Thruway Authority has determined, in the exercise of its discretion, that if the apparent low bidder has submitted a certified check or cashier's check with their bid, they will not be permitted to bond their bid. The second low bidder, if they have submitted a certified check or cashier's check will be permitted to bond their bid as a matter of right; the Thruway Authority form TA-4426 is to be used for this purpose and may be obtained from the Contracts Unit at Authority Administrative Headquarters only."

102-08 SAMPLE APPENDIX A - STANDARD CLAUSES FOR ALL NEW YORK STATE CONTRACTS.

Delete this section in its entirety and **Substitute** the following:

"102-08 STANDARD CLAUSES FOR ALL NEW YORK STATE THRUWAY AUTHORITY AND NEW YORK STATE CANAL CORPORATION CONSTRUCTION CONTRACTS AND FEDERALLY-FUNDED CONTRACTS (APPENDIX A).

The parties to the attached contract, license, lease, amendment or other agreement of any kind ("the contract" or "this contract") agree to be bound by the following clauses which are hereby made a part of the contract (the word "Contractor" herein refers to any party and its agents, successors and assigns, other than the Thruway Authority ("Authority") or Canal Corporation ("Corporation"), whether a contractor, licensor, licensee, lessor, lessee or any other party):

1. NON-ASSIGNMENT CLAUSE. This contract may not be assigned by the Contractor nor may its right, title or interest therein be assigned, transferred, conveyed, subcontracted, sublet or otherwise disposed of without the previous consent, in writing, of the Authority/Corporation and any attempts to assign the contract without the Authority's/Corporation's written consent are null and void.

2. COMPTROLLER APPROVAL. Unless otherwise provided by resolution of the Authority or Corporation Board, if this contract involves the expenditure of funds for goods or services in excess of $50,000, or the expenditure of funds for any other purpose in excess of $15,000, or if, by this contract, the Authority/Corporation agrees to give something other than money when the value or reasonably estimated value of such consideration exceeds $10,000, this contract shall not be valid, effective or binding upon the Authority/Corporation until it has been approved by the State Comptroller and filed in his office.

3. WORKERS' COMPENSATION AND DISABILITY BENEFITS. This contract shall be void and of no force and effect unless the Contractor shall provide and maintain coverage during the life of this contract for the benefit of such employees as are required to be covered by the provisions of the State Workers' Compensation Law. If employees will be working on, near or over navigable waters, a U.S. Longshore and Harbor Workers' Compensation Act endorsement must be included.

4. NON-DISCRIMINATION REQUIREMENTS. To the extent required by Article 15 of the State Executive Law (also known as the Human Rights Law) and all other State and Federal statutory and constitutional non-discrimination provisions, the Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, sex (including gender identity or expression), national origin, sexual orientation, military status, age, disability, predisposing genetic characteristics, marital status or domestic violence victim status. Furthermore, in accordance with State Labor Law §220-e, if this is a contract for the construction, alteration or repair of any public building or public work or for the manufacture, sale or distribution of materials, equipment or supplies, and to the extent that this contract shall be performed within the State of New York, Contractor agrees that neither it nor its subcontractors shall by reason of race, creed, color, disability, sex or national origin: (a) discriminate in hiring against any New York State citizen who is qualified and available to perform the work; or (b) discriminate against or intimidate any employee hired for the performance of work under this contract. If this is a building service contract as defined in State Labor Law §230, then, in accordance with §239 thereof, the Contractor agrees that neither it nor its subcontractors shall, by reason of race, creed, color, national origin, age, sex or disability: (a) discriminate in hiring against any New York State citizen who is qualified and available to perform the work; or (b) discriminate against or intimidate any employee hired for the performance of work under this contract. The Contractor is subject to fines of $50 per person per day for any violation of State Labor Law §§220-e or 239 as well as possible termination of this contract and forfeiture of all moneys due hereunder for a second or subsequent violation.

5. WAGE AND HOURS PROVISIONS. If this is a public work contract covered by Article 8 of the State Labor Law or a building service contract covered by Article 9 thereof, neither the Contractor's employees nor the employees of its subcontractors may be required or permitted to work more than the number of hours or days stated in said statutes, except as otherwise provided in the State Labor Law and as set forth in prevailing wage and supplement schedules issued by the State Labor Department. Furthermore, the Contractor and its subcontractors must pay at least the prevailing wage rate and pay or provide the prevailing supplements, including the premium rates for overtime pay, as determined by the State Labor Department in accordance with the State Labor Law. Additionally, effective April 28, 2008, if this is a public work contract covered by Article 8 of the New York State Labor Law, the Contractor understands and agrees that the filing of payrolls in a manner consistent with subdivision 3-a of Section 220 of the New York State Labor Law shall be a condition precedent to payment by the Authority/Corporation of any Authority/Corporation approved sums due and owing for work done on the project.

6. NON-COLLUSIVE BIDDING CERTIFICATION. In accordance with State Public Authorities Law §2878, if this contract was awarded based upon the submission of bids, the Contractor warrants, under penalty of perjury, that its bid was arrived at independently and without collusion aimed at restricting competition. The Contractor further warrants that, at the time the Contractor submitted its bid, an authorized and responsible person executed and delivered to the Authority/Corporation a non-collusive bidding certification on the Contractor's behalf.

7. INTERNATIONAL BOYCOTT PROHIBITION. In accordance with State Labor Law §220-f, if this contract exceeds $5,000, the Contractor agrees, as a material condition of this contract, that neither the Contractor nor any substantially owned or affiliated person, firm, partnership, or corporation has participated, is participating, or shall participate in an international boycott in violation of the Federal Export Administration Act of 1979 (50 USC App. §§2401 et seq.) or regulations thereunder. If such Contractor, or any of the aforesaid affiliates of the Contractor, is convicted or is otherwise found to have violated said laws or regulations upon the final determination of the United States Commerce Department

or any other appropriate agency of the United States subsequent to the contract's execution, such contract, amendment or modification thereto shall be rendered forfeit and void. The Contractor shall so notify the Authority/Corporation within five (5) business days of such conviction, determination or disposition of appeal.

8. SET-OFF RIGHTS. The Authority/Corporation shall have rights of set-off. These rights shall include, but not be limited to, the Authority's/Corporation's option to withhold for the purposes of set-off any moneys due to the Contractor under this contract up to any amounts due and owing by the Contractor to the Authority/Corporation with regard to this contract, or any other contract with the Authority/Corporation, including any contract for a term commencing prior to the term of this contract, plus any amounts due and owing to the Authority/Corporation for any other reason including, without limitation, monetary penalties, adjustments, fees, or claims for damages by the Authority/Corporation and third parties in connection therewith.

9. RECORDS. The Contractor shall establish and maintain complete and accurate books, records, documents, accounts and other evidence directly pertinent to performance under this contract (collectively, "Records") for a period of six (6) years (or any other longer period required by law) following final payment or the termination of this contract, whichever is later, and any extensions thereto. The Authority/Corporation, State Comptroller, State Attorney General and any other person or entity authorized to conduct an examination shall have access to the Records during normal business hours at an office of the Contractor within New York State, or, if no such office is available, at a mutually agreeable and reasonable venue within the State, during the contract term, any extensions thereof and said six (6) year period thereafter, for purposes of inspection, auditing and copying. As used in this clause, "termination of this contract" shall mean the later of completion of the work of the contract or the end date of the term stated in the contract. The Authority/Corporation will take reasonable steps to protect from public disclosure those Records which are exempt from disclosure under State Public Officers Law §87 ("Statute") provided that: (i) the Contractor shall timely inform an appropriate Authority/Corporation official, in writing, that said records should not be disclosed; (ii) said records shall be sufficiently identified; and (iii) designation of said records as exempt under the Statute is reasonable. Nothing contained herein shall diminish, or in any way adversely affect, the Authority's/Corporation's right to discovery in any pending or future litigation.

10. IDENTIFYING INFORMATION AND PRIVACY NOTIFICATION. All invoices or New York State standard vouchers submitted for payment for the sale of goods or services or the lease of real or personal property to the Authority/Corporation must include the payee's identification number, i.e., the seller's or lessor's identification number. The number is either the payee's Federal employer identification number or Federal social security number, or both such numbers when the payee has both such numbers. Failure to include this number or numbers may delay payment. Where the payee does not have such number or numbers, the payee, on its invoice or New York State standard voucher, must give the reason or reasons why the payee does not have such number or numbers.

The authority to request the above personal information from a seller of goods or services or a lessor of real or personal property, and the authority to maintain such information, is found in State Tax Law §5. Disclosure of this information by the seller or lessor to the Authority/Corporation is mandatory. The principal purpose for which the information is collected is to enable the State to identify individuals, businesses and others who have been delinquent in filing tax returns or may have understated their tax liabilities and to generally identify persons affected by the taxes administered by the State Commissioner of Taxation and Finance. The information will be used for tax administration purposes and for any other purpose authorized by law.

The above personal information is maintained at the New York State Thruway Authority/Canal Corporation, Department of Finance and Accounts, P.O. Box 189, Albany, New York 12201.

11. EQUAL EMPLOYMENT OPPORTUNITIES FOR MINORITIES AND WOMEN. In accordance with State Executive Law §312, if this contract is: (i) a written agreement or purchase order instrument, providing for a total expenditure in excess of $25,000, whereby the Authority/Corporation is committed to expend or does expend funds in return for labor, services, supplies, equipment, materials or any combination of the foregoing, to be performed for, or rendered or furnished to the Authority/Corporation; or (ii) a written agreement in excess of $100,000 whereby the Authority/Corporation is committed to expend or does expend funds for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereon; or (iii) a written agreement in excess of $100,000 whereby the owner of a State assisted housing project is committed to expend or does expend funds for the acquisition, construction, demolition, replacement, or major repair or renovation of real property and improvements thereon for such project, then the following shall apply and by signing this contract the Contractor certifies and affirms that it is Contractor's equal employment opportunity policy that:

(a) The Contractor will not discriminate against employees or applicants for employment because of race, creed, color, national origin, sex, age, disability, or marital status, and shall make and document its conscientious and active efforts to employ and utilize minority group members and women in its work force on Authority/Corporation contracts and will undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination. As used in this clause, "affirmative action" shall mean recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, lay-off or termination, and rates of pay or other forms of compensation.

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

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

The Contractor shall include the provisions of (a), (b) and (c) above in every subcontract over $25,000 for the construction, demolition, replacement, major repair, renovation, planning or design of real property and improvements thereon except where such work is for the beneficial use of the Contractor. Section 312 does not apply to: (i) work, goods or services unrelated to this contract; or (ii) employment outside New York State. The Authority/Corporation will consider compliance by a Contractor or its subcontractor with the requirements of any Federal law concerning equal employment opportunity which effectuates the purpose of this section. The Authority/Corporation shall determine whether the imposition of the requirements of the provisions hereof duplicate or conflict with any such Federal law, and if such duplication or conflict exists, the Authority/Corporation may waive the applicability of Section 312 of the Executive Law to the extent of such duplication or conflict. The Contractor shall comply with all duly promulgated and lawful rules and regulations of the Department of Economic Development's Division of Minority and Women's Business Development pertaining thereto.

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

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

14. LATE PAYMENT. Timeliness of payment and any interest to be paid to the Contractor for late payment shall be governed by State Public Authorities Law §2880 and 21 NYCRR Part 109.

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

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

17. PROHIBITION ON PURCHASE OF TROPICAL HARDWOODS. The Contractor certifies and warrants that all wood products to be used under this contract will be in accordance with, but not limited to, the specifications and provisions of State Finance Law §165 (Use of Tropical Hardwoods) which prohibits purchase and use of tropical hardwoods, unless specifically exempted, by the State or any governmental agency or political subdivision or public benefit corporation. Qualification for an exemption under this law will be the responsibility of the Contractor to establish to meet with the approval of the Authority/Corporation.

In addition, when any portion of this contract involving the use of woods, whether supply or installation, is to be performed by any subcontractor, the prime Contractor will indicate and certify in the submitted bid proposal that the subcontractor has been informed and is in compliance with specifications and provisions regarding use of tropical hardwoods as detailed in State Finance Law §165. Any such use must meet with the approval of the Authority/Corporation; otherwise, the bid may not be considered responsive. Under bidder certifications, proof of qualification for exemption will be the responsibility of the Contractor to meet with the approval of the Authority/Corporation.

18. NON-PUBLIC PERSONAL INFORMATION. The Contractor shall comply with the provisions of the New York State Information Security Breach and Notification Act (General Business Law Section 899-aa; State Technology Law Section 208). In addition to any relief or damages that may be imposed pursuant to the provisions of this Act, the Contractor shall be liable for the costs imposed upon the Authority which are associated with breach of the Act if caused by Contractor's negligent or willful acts or omissions, or the negligent or willful acts or omissions of the Contractor's agents, officers, employees or subcontractors.

19. IRAN DIVESTMENT ACT. In accordance with State Public Authorities Law §2879-c, if this is a contract for work or services performed or to be performed, or goods sold or to be sold, the Contractor subscribes and affirms, under penalty of perjury, that: by signing this contract, each person and each person signing on behalf of any other party certifies, and in the case of a joint bid or partnership each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each person is not on the list created pursuant to paragraph (b) of subdivision 3 of Section 165-a of the State Finance Law.

For the purposes of this clause, the term "person" shall be as defined in subdivision (1)(e) of Section 165-a of the State Finance Law.

20. OBSERVANCE OF LAWS. The Contractor agrees to observe all applicable Federal, State and local laws and regulations, and to procure all necessary licenses and permits.

21. NO WAIVER OF PROVISIONS. The Authority's/ Corporation's failure to exercise or delay in exercising any right or remedy under this contract shall not constitute a waiver of such right or remedy or any other right or remedy set forth therein. No waiver by the Authority/Corporation of any right or remedy under this contract shall be effective unless made in a writing duly executed by an authorized officer of the Authority/Corporation, and such waiver shall be limited to the specific instance so written and shall not constitute a waiver of such right or remedy in the future or of any other right or remedy under this contract.

22. ENTIRE AGREEMENT. This contract, together with this Appendix A and any other appendices, attachments, schedules or exhibits, constitutes the entire understanding between the parties and there are no other oral or extrinsic understandings of any kind between the parties. This contract may not be changed or modified in any manner except by a subsequent writing, duly executed by the parties thereto.

SUPPLEMENTAL TITLE VI PROVISIONS (CIVIL RIGHTS ACT) (APPENDIX A-1)

During the performance of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. COMPLIANCE WITH REGULATIONS. The contractor shall comply with the Regulation relative to nondiscrimination in Federally assisted programs of the Department of Transportation of the United States, Title 49, Code of Federal Regulations, Part 21, and the Federal Highway Administration (hereinafter "FHWA") Title 23, Code of Federal Regulations, Part 200 as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.

2. NONDISCRIMINATION. The Contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, religion, age, color, sex or national origin, sex, age, and disability/handicap in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by 49 CFR, section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.

3. SOLICITATIONS FOR SUBCONTRACTORS, INCLUDING PROCUREMENTS OF MATERIALS AND EQUIPMENT. In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin, sex, age, and disability/handicap.

4. INFORMATION AND REPORTS. The contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information and its facilities as may be determined by NYSDOT or the FHWA to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information the contractor shall so certify to NYSDOT's Office of Civil Rights or FHWA, as appropriate, and shall set forth what efforts it has made to obtain the information.

5. SANCTIONS FOR NONCOMPLIANCE. In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, NYSDOT shall impose such contract sanctions as it or the FHWA may determine to be appropriate, including, but not limited to:

(a) Withholding of payments to the contractor under the contract until the contractor complies; and/or

(b) Cancellation, termination or suspension of the contract, in whole or in part.

6. INCORPORATION OF PROVISIONS. The contractor shall include the provisions of paragraphs (1) through (6) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto.

The contractor shall take such action with respect to any subcontractor procurement as NYSDOT or the FHWA may direct as a means of enforcing such provisions including sanctions for non-compliance: Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request NYSDOT to enter into such litigation to protect the interests of NYSDOT, and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

SUPPLEMENTAL TITLE VI PROVISIONS (CIVIL RIGHTS ACT) (APPENDIX A-2)

The New York State Thruway Authority, in accordance with Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42 U.S.0 2000d to 2000d-4 and Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office the Secretary, Part 21, Nondiscrimination in Federally-assisted programs of the Department of Transportation and Title 23 Code of Federal Regulations, Part 200, Title VI Program and Related Statutes, as amended, issued pursuant to such Act, hereby notifies all who respond to a written Department solicitation, request for proposal or invitation for bid that it will affirmatively insure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, national origin, sex, age, disability/handicap and income status in consideration for an award."

Add the following:

"**102-09 STANDARD CLAUSES FOR NON FEDERAL-AID NEW YORK STATE CONTRACTS.**

A. MacBride Act Fair Employment Principles. In accordance with the MacBride Fair Employment Principles (Chapter 807 of the Laws of 1992), the Contractor hereby stipulates that the Contractor either (a) has no business operations in Northern Ireland, or (b) shall take lawful steps in good faith to conduct any business operations in Northern Ireland in accordance with the MacBride Fair Employment Principles (as described in Section 165 of the New York State Finance Law), and shall permit independent monitoring of compliance with such principles.

The MacBride Fair Employment Principles, found elsewhere in this Proposal, shall be completed and returned with the Contractor's bid.

B. Omnibus Procurement Act of 1992. It is the policy of New York State to maximize opportunities for the participation of New York State business enterprises, including minority and women-owned business enterprises as bidders, subcontractors and suppliers on its procurement contracts.

Additional information and Thruway Authority requirements regarding the Omnibus Procurement Act can be found elsewhere in the proposal."

102-12 D/M/WBE UTILIZATION.

C. Eligibility.

2. M/WBE Eligibility.

Delete the last sentence of the first paragraph and **Substitute** "An M/WBE directory is available on the New York State Contract System website at https://ny.newnycontracts.com/."

Delete "(716) 846-8200" in the second paragraph and **Substitute** "(855) 373-4692".

D. Counting D/M/WBE Participation Towards the D/M/WBE Goal(s).

3. Material Suppliers.

Delete the second sentence of the first paragraph and **Substitute** "60% of the expenditure to an M/WBE Material Supplier will be counted toward the M/WBE goals."

4. Brokers/Manufacturer's Representatives.

Add the following sentence after the third (last) sentence. "Per the New York State Department of Economic Development, only the monetary value for fees, or the markup percentage, will be credited when an MWBE broker is used (industry standards typically reflect a brokerage fee of 5-7% from the total contract amount)".

F. Requests For Waiver.

Delete "Office of Construction Civil Rights Unit" and **Substitute** "Authority's Compliance Unit".

H. D/M/WBE Pre-Award Utilization Package.

Delete the first and second paragraphs and **Substitute** the following:

"Within 10 calendar days after bid letting, the Apparent Low Bidder shall submit a complete D/M/WBE Pre-Award Utilization Package, as outlined below, to the Authority's Compliance Unit."

For Non-Federal Aid Contracts Only:

I. Bidder's Failure to Comply.

Delete all the information in this section and **Substitute** the following:

"By signing this bid proposal and any resulting agreement or contract, the parties recognize and agree that Contractor failure to carry out the requirements of the Authority's M/WBE program, or non-compliance with the M/WBE participation goals established for this contract (absent a showing of good faith efforts as set out elsewhere in this Section and the obtaining of a waiver granted by the Authority) constitutes:

1. A breach of contract upon which the Authority may assess liquidated damages as a separate remedy; further liquidated damages may accrue if the Authority determines that future efforts to achieve compliance will not fully remedy the breach.

2. A specific and determinable harm or damage to the Authority and its Construction Program and, as such, constitutes a basis for the imposition of any or all of the contractual remedies stated in this document, whether in this section or elsewhere. Upon such non-compliance or breach, and after notification to the Contractor, the Authority may initiate contractual remedies, which it may deem appropriate, as well as calculate a monetary reduction in the final contract payment, as a stipulated assessment to be deducted from the final payment.

This assessment, which may be in addition to, and not as a substitute for any other penalty or monetary assessment under this contract deducted from the final payment as a penalty for non-compliance with Contract D/M/WBE Specifications. This will be computed by multiplying the AAP-19, (TA-1022), contract value by the approved program percentage(s), (but not more than the goal percentage) and subtracting from that amount the dollar payments for those functions actually performed by certified D/M/WBEs as set forth in the approved form AAP-19, (TA-1022).

In instances where a Contractor can adequately document or substantiate its good faith effort made to meet the specified goal percentage(s), to the satisfaction of the Authority, no reduction in payment will be imposed or liquidated damages assessed. The standards listed in 102-12.G Good Faith Efforts will be used as a guide to determining whether or not a good faith effort has been made."

102-14 FORM OF CONTRACT AND BID BOND.

Delete the first sentence and **Substitute** "The form of contract and bid bond, if given, shall be those found in this proposal."

102-15 SAMPLE FORM OF BID BOND.

Delete all the information in this section and **Substitute** "The Bid Bond (TA-44117) contained in this Proposal shall apply."

102-17 SAMPLE FORM OF ITEMIZED PROPOSAL/JURAT.

Delete all the information in this section and **Substitute** "The Itemized Proposal contained within this Proposal shall apply."

SECTION 103 – CONTRACT AWARD AND EXECUTION

103-01 CONTRACT AWARD.

Add the following after the second paragraph:

"The following are examples of reasons that are considered sufficient for the disqualification of a Bidder and the rejection of its Proposal:

1. Submission of more than one Proposal for the same work from an individual, firm, partnership, corporation, or combination thereof, under the same or different names. Reasonable grounds for believing that any individual, firm, partnership, corporation, or combination thereof, is interested in more than one Proposal for the work contemplated may cause the rejection of all Proposals in which such individual, firm, partnership, corporation, or combination thereof, is interested.

2. Evidence of collusion among Bidders. Participants in such collusion will not be permitted to submit bids for future work of the Authority until reinstatement as a qualified Bidder by the Chief Engineer.

3. Uncompleted work which, in the judgment of the Authority, might hinder or prevent the prompt completion of this Contract, if awarded."

Delete the fourth paragraph and **Substitute:**

"A Contractor may at any time, upon at least fifteen (15) days written notice, withdraw its bid on a date sixty (60) days after bid opening or thirty (30) days after the properly executed contract documents have all been received by the Authority, whichever is later. The bid bond, bid deposit, and/or performance bond shall remain in effect until such period of written notice has expired provided the contract has not been approved by the Office of the State Comptroller in the interim. The Contractor and the Authority may agree in writing to extend the date upon which the bid may be withdrawn if the contract has not been approved by the Office of the State Comptroller."

Delete the sixth paragraph and **Substitute**:

"Contract award on a joint venture proposal will place upon the joint participants complete liability, jointly and individually, for contract performance.

Contracting corporations, which are chartered in a state other than New York, as well as individuals or firms doing business under fictitious names, are required to register with the NYS Department of State authorizing them to do business in New York, before they can be awarded a contract."

103-02 EXECUTION OF CONTRACT.

Add the following after the second paragraph:

"When a joint bidder returns a signed contract for a joint venture proposal to the Chief Engineer, a certified copy of a resolution of the board of directors of each participating corporation must be included that clearly indicates the work to be performed by both parties. The resolution must authorize the joint venture with the other party participant(s) for the specific contract. Each corporation must also submit a copy of its corporate powers. The participants in any joint venture must make the designation in writing, addressed to the Chief Engineer.

The designations are as follows:

1. The name of the person who will be in charge of the project for the joint Contractors. This person must have complete authority to speak for and bind the joint Contractors in all matters relating to the contract. It is this person to whom all notices, orders, directions, and determinations concerning the project may be given by the Chief Engineer. Notices orders, directions, or determinations given to this designated person, or to one of the joint Contractors, will be considered to have been given to all parties.

No change in the person designated to be in charge of the project will be recognized by or be binding upon the New York State Thruway Authority, until the participants in the joint venture give written notice of such change. In the event of the inability or unwillingness to serve, death or disability of the person in charge of the project, it is the responsibility of the joint Contractors to advise Chief Engineer, in writing, over their joint signatures, of such inability or unwillingness to serve, death or disability within 24 hours after the occurrence, and then to designate a successor.

2. A mailing address for the receipt of all estimates, acceptance and final settlement certificates, payments, notices, orders, directions, and determinations for the performance of the work. The

mailing address will be considered the joint Contractors' address and any communications directed to such address will be considered to have been received by the joint Contractors.

All checks for the payment of estimates and the final settlement certificate will be made to the order of the joint Contractors in the same form in which they have signed the contract and will be mailed to the designated mailing address.

Change of the mailing address will not be recognized by or be binding upon the New York State Thruway Authority, until written notice, signed by the joint Contractors, has been received by the Chief Engineer.

If the contract, together with the Surety Bonds and the Insurance Certificate(s) providing adequate insurance coverage, as provided in Section 107-06, is not properly executed and returned, the proposal guarantee will be forfeited to the New York State Thruway Authority as liquidated damages."

103-06 SAMPLE FORM OF CONTRACT AGREEMENT.

Delete all the information in this section and **Substitute** "A Sample New York State Thruway Authority/Canal Corporation Agreement is included elsewhere in this Proposal."

103-07 SAMPLE FORM OF FAITHFUL PERFORMANCE BOND.

Add the following:

"New York State Thruway Authority forms will be supplied to the apparent low bidder. These forms are materially the same as the NYSDOT form."

103-08 SAMPLE FORM OF LABOR AND MATERIAL BOND.

Add the following:

"New York State Thruway Authority forms will be supplied to the apparent low bidder. These forms are materially the same as the NYSDOT form."

SECTION 104 - SCOPE OF WORK

104-02 CHANGES, CONTINGENCIES, EXTRA WORK AND DEDUCTIONS.

Delete the second and third sentences of the first paragraph and **Substitute** the following:

"Whenever the Authority determines that from any unforeseen cause the terms of any contract should be altered to provide for changes, contingencies, extra work, or the deletion of work, an order-on-contract or field change order may be issued to the Contractor who shall promptly proceed with the performance of the work and the furnishing of the materials and equipment necessary for its accomplishment in accordance with the pertinent specifications."

Delete "Section 697 *Field Change Payment*" in the second paragraph and **Substitute** "the Field Change Order item".

104-08 MAINTAINING TRAFFIC.

A. Closing of Highway.

Add the following:

"According to §107.01 of the Thruway Regulations, the Thruway Authority's Executive Director, or his designee, may order that the Thruway system, or any portions thereof, be closed to all or part of the public for such time as in his judgment may be necessary."

B. Use of Restricted Highway.

Delete this section in its entirety and **Substitute** the following:

"***B. Restricted Highway.*** The Thruway, during periods of construction, cannot be designated a "Restricted Highway" pursuant to Section 104A of the Highway Law and Section 1625 of the Vehicle and Traffic Law. The Contractor is, therefore, advised that the provisions of Section 401(7)(f) of the Vehicle and Traffic Law relating to registration of special purpose construction vehicles shall apply to all such vehicles engaged in work under this contract, whether owned, leased or rented."

Add the following:

"104-11 REMOVAL AND REPLACEMENT OF BRIDGE IDENTIFICATION SIGNS.

Bridge identification plaques, bridge identification number (B.I.N.) plates, milepost markers, and street name signs attached to bridge superstructures shall be protected during the Contractor's operations or removed, stored and remounted after construction is completed, without any additional cost to the Authority."

SECTION 105 - CONTROL OF WORK

105-03 METHODS AND EQUIPMENT.

Add the following after the second paragraph:

"Equipment which the Engineer feels could damage Thruway Facilities shall not be allowed to operate until adequate protective measures are provided such as wooden mats, bridging devices or rubber pads. The Engineer's approval of such protective devices shall not relieve the Contractor from responsibility for damage.

The Contractor shall be responsible for keeping equipment in good working condition. Operators shall be knowledgeable in all aspects of equipment operation and shall know the limitations of the equipment. Under no circumstances, including changed or unforeseen work conditions, shall the Authority be held responsible or reimburse the Contractor for equipment damaged or broken during the progress of this Contract."

B. Structural Painting.

Delete the third and fourth paragraphs.

105-12 LOAD RESTRICTIONS.

Add the following:

"Only New York State legal loads are allowed on the Thruway. Special Hauling Permits, required for special or occasional overweight and/or oversize loads exceeding NYS legal limits, are issued at the discretion of the Authority and only under special conditions and for use at designated times and locations.

Application should be made to the New York State Thruway Authority Special Hauling Unit, Albany Headquarters, (518) 436-2793 at least 72 hours in advance. The Special Hauling Unit will fax the Contractor a NYS Thruway Special Hauling Permit Application. The Contractor must complete the

application and fax it to the Authority's Special Hauling Unit at (518) 449-3198. The fax should include a cover sheet with the following information:

- Contract Number
- Award and Completion dates of the Contract
- Thruway entry and exit points

The Special Hauling Unit will review the information for accuracy. If the application is approved, the special hauling permit will be assigned a number and any applicable restrictions will be noted. The permit will be faxed to the Contractor along with a cover letter addressed to the attention of "Toll Personnel". The cover letter must accompany the Special Hauling Permit when presented at the tollbooth by the Contractor's driver. No fee will be charged to the Contractor.

Any changes to the permit will require notification and approval of the local Division Traffic Office. This Office may be reached by calling 1-866-691-8282 and asking for the Traffic Duty Officer. This office is open 24 hours a day, 7 days a week.

Design approval of any shop drawing (e.g. steel erection procedures) does not constitute approval of a Special Hauling Permit. Notice of movement of any permitted oversized and/or overweight vehicle must be given at least 24 hours in advance of the scheduled move. Receipt of an Authority issued Special Hauling Permit does not constitute issuance of a permit for highways under NYSDOT or other jurisdictions, and vice versa."

105-14 DISPUTED WORK AND DISPUTE RESOLUTION.

D. Review Time Periods for Disputes.

Delete "Regional Director" wherever it appears and **Substitute** "Thruway Division Director".

Add the following to the end of the second paragraph:

"Copies of this notice of dispute shall also be provided to the Director of Construction Management and to the Office of the Chief Engineer."

Delete Parts 1, 2 and 3 and **Substitute** the following:

"The Commissioner Review Stage of the Disputed Work Provisions, the administration of which has been delegated by the Thruway Authority Chairman to the Chief Engineer of the Thruway Authority, does not exist as a third chance to convince the NYSTA of the merits of the dispute; it is intended to provide a mechanism whereby work may continue under protest, the contract will be completed, and the Contractor's claims will be properly qualified, quantified, and documented for a later resolution. These aims are accomplished as follows: an evaluation is made of the documentation submitted in the appeal; the work is directed to continue, either declaring the disputed work to be extra to the contract, or otherwise, fully defining the dispute and the documentation required criteria for possible settlement during the Contract Close Out Process or as a claim in accordance with law and the provisions of the Contract. The Commissioner Review Stage determination regarding disputed work is administratively binding but does not diminish the Contractor's rights.

Documentation presented at each Dispute stage must stand on its own merits. The process is self-correcting, providing Contractors an opportunity to provide proofs or documentation noted as lacking in the prior stage for the subsequent stage. The Disputed Work process is not progressively administered, each stage is assumed to be complete. Therefore, an appeal of the denial of a prior stage would be expected to include a narrative explaining the dispute, documentation of timely notice and verified documentation of costs, and explanation as to why the prior denial may be in error or incomplete with new information validating the Contractor's position in the dispute. Should a Contractor, who feels a Disputed Work determination is unsatisfactory or in error, locate additional factual information they believe would alter a prior Disputed Work determination, the Director of

Construction Management may reopen the matter on its original basis and/or merit at any time prior to the completion of the Final Supplemental Agreement by the Engineer."

H. Contract Closeout Process.

Delete this section in its entirety and **Substitute** the following:

"***H. Administrative Construction Contract Settlement Procedure.*** In an attempt to reach mutually satisfactory resolutions to contract disputes between the Authority and its construction Contractors, the Authority affords the Contractors a final opportunity to meet and discuss their unresolved disputes with the General Counsel and the Chief Engineer or their representatives. The Administrative Construction Contract Settlement Procedure, described below, is not a fourth stage of disputed work. This procedure provides an opportunity to address disputes and other matters of equity that do not necessarily fit neatly within the bounds of the Disputed Work clauses of the General Specifications, as modified and adopted by the Authority. Contractor presentations should include any new facts and findings, and should be directed to illustrate why the Disputed Work determinations at the project and review levels were not justified.

In this procedure, after Acceptance, but before Final Payment, the Contractor makes a written request to the Chief Engineer for a meeting to discuss those matters that remain unresolved, which have exhausted the formal disputed work process during the contract life. The Contractor must submit an Agenda for the meeting with this request. At the meeting, the Contractor shall present information on each issue on their Agenda. Representatives of the Department of Engineering and Legal Department will attempt to resolve the issues with the Contractor within the framework of the contract. Any subsequent contract modification is subject to approval by the State Comptroller and any other shareholders to the Contract. The Contractor will be notified of the Authority's final position in writing. If any dispute or claim, or portion thereof, remains unresolved following the meeting(s) and the payment of the final agreement, the Contractor may file a claim in accordance with law and the provisions of the Contract."

105-16 SHOP DRAWING APPROVAL.

Add the following:

"The Contractor shall review, redline and approve-stamp shop drawings and samples from its suppliers prior to submission to the Engineer. By approving and submitting shop drawings and samples, the Contractor represents that he has determined and verified all field measurements, field construction criteria, materials, catalog numbers and similar data and that he has checked and coordinated each shop drawing and sample with the requirements of the contract documents. Shop drawings will be reviewed and approved by the Engineer (or the Thruway Authority or its agent). The reviewer cannot verify field dimensions. All substitutions and/or deviations must be noted including a proposed credit. Any deviation from the requirements of the contract documents, unless the Contractor has informed the Project Engineer of the deviation in a separate writing at the time of submission and received written approval of the specific deviations, is unacceptable. If inadvertently "approved", that approval will be invalid. Once approved, the Contractor is responsible to submit a reproducible set of shop drawings for inclusion in the final project records.

Any waiver of specifications or contract requirements is exclusively for the Authority's benefit and purposes, and as such is subject to revocation without requirement for advance notice or statement of cause. Also, approval or disapproval of requests for waivers will be transmitted without statement of reason or cause, and shall not be subject to administrative review or appeal under the contract.

Prior to final payment, the contractor shall provide the Thruway with the original approved shop drawings and complete two sets of final signature approved shop drawings in the Tag Image File Format (tiff) on separate compact discs. Tiff images shall be CCITT group IV, 2D compression minimum 200 dpi."

105-20 OPENING HIGHWAY TO TRAFFIC PRIOR TO CONTRACT FINAL ACCEPTANCE.

Delete all the information in this section and **Substitute** the following:

"Opening sections of the project to traffic prior to completion may be desirable or may be necessary due to conditions inherent in the work, changes in the Contractor's work schedule, or conditions or events unforeseen at the time the project was bid. Such openings shall be made only when so directed by the Engineer. Under no condition shall such openings constitute acceptance or a part thereof, or a waiver of any provisions of the contract.

The contract documents indicate, insofar as possible, which sections of the highway are to be opened prior to completion. The Contractor shall make no claim for and shall have no right to additional compensation or extension of contract time for opening sections of the project to traffic as indicated in the contract documents, or resulting from partial acceptance or changes in the Contractor's work schedule, or for reasons that are due to the fault of the Contractor or any other party, including utilities.

Additional compensation or extension of contract time for completion of other items of work on sections of the project opened to traffic for reasons other than those indicated in the preceding paragraph will be made as provided in the contract or in a supplementary agreement.

If the Contractor is dilatory in completing shoulders, drainage structures, or other features of the work, the Engineer may so notify the Contractor in writing and establish therein a reasonable period of time in which the work is to be completed. If the Contractor is dilatory, or fails to make a reasonable effort toward completion in this period of time, the Engineer may then order all or a portion of the Project opened to traffic. On such sections which are so ordered to be opened, the Contractor shall conduct the remainder of its construction operations so as to cause the least obstruction to traffic, and shall make no claim for and shall have no right to additional compensation or extension of contract time.

On sections of the project opened to traffic, whether indicated in the contract documents or not, traffic control and maintenance of the roadway shall be in accordance with Section 619."

105-21 CIVIL RIGHTS MONITORING AND REPORTING.

Delete the first paragraph and **Substitute** the following:

"The Contractor shall use the current version of the Authority approved civil rights reporting documentation on all contracts. The Contractor shall submit complete, accurate data to the Authority for each month, not later than the 15th of the following month, using the Authority approved civil rights reporting format. Data shall be current through the end of the last full payroll week for that month, or as otherwise approved by the Engineer to coordinate with contract payment submittals."

Add the following:

"105-22 NON-REVENUE PASS PLATES. Non-revenue pass plates will be furnished for the use of the General Contractor's and approved subcontractor's equipment and vehicles, and for suppliers' vehicles while making deliveries to the project. In no case will free passage on the Thruway be granted beyond the Interchanges bracketing the project, or from the Interchange near the Contractor's place of business to the job site, unless such place of business shall be located between the same two interchanges as the job site. The use of these pass plates shall be in accordance with the conditions of the individual authorization. General conditions are given below:

A. Pass plates are not for commuting and no privately owned vehicles shall be parked on the Thruway. For purposes of this section, a privately owned vehicle is defined as any vehicle not covered by the prime contractors insurance.

B. Pass plates shall be used on working days only.

C. Pass plates shall be presented to the toll collector whenever entering a toll lane. Unstaffed emergency lanes at toll plazas will not be opened to permit unrestricted entry or exit by Contractor's or supplier's vehicles.

D. The Contractor shall maintain a log identifying the vehicle to which each pass plate is assigned.

E. Pass plates shall remain with the assigned vehicles at all times while the vehicle is on the Thruway. Under no circumstances shall the Contractor leave pass plates at the toll plaza.

F. Vehicles leaving the Thruway beyond the pass plate limits without a pass plate or entering or leaving the Thruway at a toll station beyond the pass plate limitations will be charged for the trip in accordance with the normal toll rates and regulations. The Contractor will not be reimbursed for tolls after pass plates have been issued.

G. The Contractor will be held responsible for the use and return of all pass plates. The Contractor shall report any lost or stolen pass plates to the Engineer stating the specific pass plate lost or stolen and shall be responsible for any unauthorized use of the pass plate prior to such notification.

H. The misuse of the pass plates will constitute cause for revocation of this privilege and the Contractor will not be reimbursed for tolls. In accepting pass plates the Contractor agrees that revocation for reasons of misuse shall not constitute grounds for claim.

I. Upon completion of the contract, the Contractor shall return all pass plates issued for the project or shall account for all unreturned pass plates by identifying the vehicles to which the pass plates were last issued. Final acceptance of the contract cannot be processed until all pass plates have been accounted for. When an uncompleted work agreement is entered into, pass plates must be accounted for prior to return of the deposit.

J. An administrative charge of $50.00 will be deducted from monies owed to the Contractor for each pass plate not returned to the Authority upon completion of the work.

The Contractor should make a written request to the Engineer for the number of pass plates required for the project upon receipt of notification of the pre-award conference. Additional pass plates will be available later upon request."

SECTION 106 - CONTROL OF MATERIAL

106-01 SOURCES OF SUPPLY.

Delete "notify the Deputy Chief Engineer, Structures (DCES), with a copy to the Engineer, of" in the first line of the first paragraph and **Substitute** "submit to the Engineer".

106-04 MATERIAL CERTIFICATION AND APPROVED LIST.

Add the following after the third paragraph:

"The Contractor is hereby notified that for Thruway Authority Federally Aided Projects, the New York State Department of Transportation is the Thruway Authority's Agent for all off-site materials quality assurance services, except granular materials, asphalt concrete and Portland cement concrete plant inspection. Materials quality assurance will be in accordance with the Department's standard specifications and quality assurance procedures and the acceptance/rejection decisions under the Contract have been fully delegated to the Department as the Thruway Authority's Agent. Reference is herein made to "*Materials Inspection Manual*" issued by the New York State Department of Transportation, Materials

Bureau, which presents a brief outline of procedures used by the New York State Department of Transportation in determining the acceptability of materials arriving at project sites. The Materials Inspection Manual is available on the NYSDOT website."

106-09 EQUIVALENTS.

Delete all the information in this section and **Substitute** the following:

"Whenever products are specified by the name, trade name, make or catalog number or any manufacturer or supplier, the intent is not to limit competition but to establish a standard of quality which the Thruway Authority has determined to be necessary. Contractor's may recommend alternate products, but shall have the burden of proving at his own cost and expense to the satisfaction of the Thruway Authority that a proposed product is equal to a stipulated reference product. If the Contractor fails to comply with the provisions of this subsection, or if it is determined that the proposed product is not equal to that named, the Contractor shall supply the product named.

The Contractor shall have no claim for an extension of time or for damages due to time required by the Thruway Authority to consider a product proposed by the Contractor or because the Engineer disapproves of such a product. Where optional materials or methods are specified, or where "or equal" submissions are approved, the Contractor shall make all adjustments to contingent work necessary to accommodate the option he selects, all at his own expense.

Where the phrase "No Substitutions Allowed**"** or similar wording appears in a specification, the Authority has determined that the specified product is required and no equivalents will be considered by the Authority."

106-11 BUY AMERICA.

Delete "Section 146 of the State Finance Law" in the first line of the first paragraph and **Substitute** "Section 2877-a of the Public Authorities Law."

SECTION 107 - LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

107-05 SAFETY AND HEALTH REQUIREMENTS.

C. Emergency Contact Person.

Delete this section in its entirety and **Substitute** the following:

"***C. Emergency Call Out List.*** At the preconstruction meeting, the Contractor shall provide the Authority a list of a minimum of four (4) responsible personnel, available on a 24 hour basis, for call out if conditions arise that require the Contractor's attention at the construction site. In addition to providing on- and off-hour phone numbers, all persons on the Call Out List shall be equipped with telephone call activated paging devices which display the call back number, or cell phones, or other approved paging devices. Any person on the Emergency Call Out List shall have the authority to promptly call out personnel and resources necessary to respond to an emergency and protect the public. The Call Out List shall also include field office and main office telephone numbers and be updated as changes occur."

F. Restricted Areas.

Add the following after the first sentence of the first paragraph:

"The nature of and materials used in this protection measure shall be at the Contractor's discretion subject to approval by the Engineer. The cost of the protection measures shall be included under the

various items of this contract."

Add the following after the last bullet:

"Work areas at structures shall be completely fenced to the satisfaction of the Engineer to protect the public and prevent unauthorized entry. In addition, positive protection shall be provided during non-working hours in areas where bridge rail tubes and/or posts are removed to ensure that individuals on the structure will not fall through the rail opening to the area below."

H. Fall Protection.

Delete the first paragraph and **Substitute** the following:

"The Contractor shall provide fall protection for all workers, in full compliance with 29 CFR 1926, and ensure that its workers use all necessary safety devices attendant thereto. Should a Contractor utilizing scaffolding / platforms / ladders fail to adhere to the legal provisions and intent of both OSHA and the Labor Law (Section 240), work will be suspended until full compliance is reinstituted and an OSHA or NYS Labor Department Inspector has inspected the work site and deemed it to be in full compliance with Labor Law/OSHA Standards. Contractor personnel failing to utilize safety equipment, methods, and procedures as required by the Labor Law and OSHA shall be immediately removed from the project. No exception to these requirements can, or will be tolerated or permitted. The minimum fall protection requirements include the following:"

O. Equipment Safety Procedures.

Delete this section in its entirety and **Substitute** the following:

"***O. Equipment Safety Procedures (Vehicle Operations, etc.).*** The following provisions relating to vehicle and equipment operation**,** in conjunction with the Contract Documents, will be strictly enforced by the Engineer during all phases of construction for this project. Any necessary modification shall be as approved by the Authority. The final responsibility for the installation of adequate safety precautions, and for the protection of the traveling public and Contractor's personnel, shall rest with the Contractor. The Contractor shall include their proposed equipment safety procedures in the project Safety and Health Plan.

1. General. The following applies to vehicles and motorized equipment traveling on the Thruway and shall apply to all work on the project, including but not limited to, the activities of all subcontractors, manufacturers, fabricators, material suppliers, independent truckers and owner-operators.

a. Truck tailgates shall be kept clean at all times.

b. Vehicle and equipment light lenses and reflectors will be cleaned as often as necessary during operations.

c. Fire extinguishers provided on vehicles shall be in good working order at all times and operators shall be familiar with their use.

d. When a vehicle is parked on the shoulder, the door adjacent to the Thruway pavement shall not be left open. An open vehicle door shall never be allowed to project over the Thruway pavement.

e. Operators shall never pull up beside another vehicle on the roadway. Instead the operator should pull onto the shoulder away from the pavement either in front or behind the other vehicle. Conversations should be held on the side of the stopped vehicles away from the pavement.

2. *Moving Equipment.*

a. All Contractor vehicles and/or equipment shall be furnished with amber radial lights and double amber flashing lights or be followed by a vehicle displaying amber radial light and simultaneous flashing directional signals.

b. All work operations, including paving, rolling, grading, supplying of material, and traveling of supervisory personnel, shall always be in the direction of normal traffic unless noted otherwise in the Contract or approved by the Engineer.

c. Contractor vehicles or equipment that are to be moved between separate work sites during daylight hours may travel on the Thruway Mainline pavement if:

- The vehicles or equipment have rubber tires; and
- The vehicles or equipment are capable of maintaining a highway speed in excess of 40 mph.

d. Contractor vehicles or equipment that are to be moved between separate work sites during daylight hours may travel on the shoulder if **all** of the following conditions are met:

- The vehicles or equipment have rubber tires;
- The vehicles or equipment are capable of maintaining a highway speed in excess of 25 mph;
- The maximum distance for transporting the vehicle or equipment is no more than 2 miles;
- The shoulder is wide enough to accommodate the vehicle or equipment;
- The vehicle or equipment using the shoulder does not encroach upon the travel lane;
- There are no impediments within the two-mile transport limit that would decrease the width of the shoulder.

e. If any of the aforementioned conditions cannot be met, the vehicle or equipment to be moved between the work sites shall be hauled on a trailer.

f. When traveling in convoy, a space of at least 900 feet shall separate successive vehicles.

g. Contractor vehicles or equipment to be transported on the Thruway during twilight hours or after dark shall be capable of maintaining a highway speed in excess of 65 mph or shall be hauled on a trailer.

3. *Work Zone.*

a. A stopped or slow moving truck on the pavement shall never be used as the first warning a motorist receives of a work area restriction ahead.

b. Vehicles and/or equipment shall never be parked on opposite shoulders nor shall workers be allowed to occupy these areas at the same time. An escape area must always be provided for emergency use.

c. A closed lane is a refuge for disabled vehicles or emergencies. Hazards such as pavement removals or excavated shoulders etc. shall be delineated in accordance with the work zone traffic control plans and/or Section 619, during non-work hours.

4. *Parking Equipment.*

a. Contractor equipment, when not in use, and materials awaiting installation shall be properly stored, stockpiled, and sited in a protected location (i.e. behind a physical barrier or in such a manner that horizontal clearance of at least 30 feet is provided from the outside edge of the traveled way) and shall not constitute a traffic hazard nor interfere with drainage courses. Materials or equipment shall not be left in front of or within the deflection distance behind guide rail and safety appurtenances so as to compromise their performance.

b. During the work day, equipment necessary for construction may only be parked in a closed lane or closed shoulder as far as practicable from traffic. If this is not possible, such equipment shall be parked entirely off the pavement and shall display two 18-inch by 18-inch red-orange or orange flags.

c. Parked vehicles shall display simultaneous flashing directional signals (four-way flashers). Single directional flashing lights shall not be displayed by parked vehicles.
d. No loading and unloading of equipment, material, or men shall be permitted in the mall unless it is a protected work site.
e. At the end of each work day, all Contractors' equipment and any extraneous traffic protection devices shall be removed from closed traffic lanes, shoulders and other sites and placed in protected locations.

5. Operating in the Work Zone

a. Equipment shall be under the full control of the operator at all times and shall not be operated in a reckless manner.
b. A spotter shall guide the backing of any vehicle or equipment with restricted visibility to the rear. This rule applies in any location where workers on foot, pedestrians, private vehicles or similar hazards may be present.
c. If the operator loses visual contact, the vehicle shall immediately be brought to a full stop until visual contact with the spotter is reestablished.
d. Vehicles or equipment shall not be backed onto Thruway pavement. If the operations require such a procedure, it shall be done only within a protected work zone.

6. Work Operations.

a. Truck tailgates shall be closed when not in use. The tailgate may be flat to accommodate an operation, but may never hang below a horizontal position.
b. A spotter shall guide the backing of any vehicle or equipment with restricted visibility to the rear. This rule applies in any location where workers on foot, pedestrians, private vehicles or similar hazards may be present.
c. If the operator loses visual contact, the vehicle shall immediately be brought to a full stop until visual contact with the spotter is reestablished.
d. Dump truck boxes may be raised only under the control of a spotter, unless the vehicle is in an area clearly marked to be free of overhead wires and safe for dumping.
e. Dump truck boxes shall be lowered prior to moving, except when dumping into a paver or similar operations, under the control of a spotter.
f. All equipment shall comply with electrical safety requirements, and shall operate under the control of a spotter, whenever working within 17 feet of an overhead line. The distance shall be measured as the actual distance between the overhead line and the nearest point on the vehicle.

7. Entering and Leaving Work Zones. The operations of loading and unloading of materials, equipment and men shall only be conducted in closed lanes and shoulders. To minimize the hazard to the traveling public, the Contractor's operations shall be governed by the following requirements:

a. When approaching a work area, operators shall reduce the speed of the vehicle and indicate by directional signals intent to drive out of the traffic stream and into the work area. Flashing signals shall be kept on while parked within the work zone.
b. No vehicle or equipment shall be stopped or parked where it will interfere with the visibility of any sign.
c. All trucks re-entering the traffic stream from the work areas, except when exiting the downstream end of a closed lane, shall have the assistance of traffic observer.
d. All trucks re-entering the pavement from the shoulder, shall attain a reasonable speed before pulling onto the pavement, after making sure that no vehicle is approaching in the lane. Approaching vehicles shall be allowed to pass.
e. Trucks shall not re-enter the traffic stream from a median shoulder less than 10 feet wide.

8. Violations. If, in the opinion of the Engineer, the operating rules of the contract are not being fully adhered to by the Contractor or his subcontractors:

a. Liquidated damages shall be deducted from any money due the Contractor, not as a penalty but as liquidated damages; until the violation or violations are corrected to the satisfaction of the Engineer. Unless otherwise stated in the Contract Documents:
- Multiple violations in any calendar day, or part, thereof, and/or multiple violations consisting of the same violation remaining uncorrected for multiple calendar days, shall be assessed with a like number of liquidated damage charges, and
- The amount of such liquidated damages shall be the amount per calendar day specified in Table 108-1 *Schedule of Liquidated Damages*.

b. Any operator found in violation of the above rules by the Engineer or his/her representative will be removed from the project immediately, and will not be allowed to work on any Authority project for a minimum of one (1) year.

9. U-turns. U-turns are prohibited on the Thruway with the following exception. Drivers with non-revenue pass plates (where required) and possessing a U-turn Authorization permit may U-turn construction vehicles and equipment at designated crossovers listed in this Proposal. Vehicle operation shall be in accordance with the conditions of the individual permit Authorization. General conditions are given below:

a. Vehicles and equipment that will U-turn shall be in compliance with all Federal and State rules and regulations and equipped with a rotating amber beacon which shall be visible from all directions for a minimum of 1000 feet during daylight. Strobe lights will not be allowed. If visibility of the amber beacon is blocked by a portion of the vehicle or equipment, additional beacons shall be provided.

b. When a designated crossover is to be used for contract operations, the Contractor shall install a driveway entrance assembly on both right and left shoulders of the traveled way consisting of a 48-inch by 48-inch W2-2 Intersection Warning sign supplemented with a 36-inch by 18-inch NYW5-16 Driveway Entrance plaque with the legend "TRUCKS". All sign panels shall be black on fluorescent orange. The driveway entrance assemblies shall be installed approximately 1000 feet upstream of the U-turn. All signs shall be covered or removed and stored when not in use.

c. For daily stationary lane closures, U-turns shall not be made between 1.5 miles before and 1 mile after a work zone if the work zone includes the closure of the right lane of a two-lane roadway. U-turns may be permitted from and into the work zone when the work zone is in the leftmost lane(s) and a designated crossover exists within the limits of the work zone.

d. Any damage to median areas, shoulders and designated U-turns caused by the Contractor's equipment shall be repaired as directed by and to the satisfaction of the Engineer at no expense to the Thruway Authority.

e. U-turns are prohibited within toll plazas. The driver must exit the toll plaza, turn around on the local road system, and then reenter the Thruway.

f. Application for U-turn authorization and non-revenue pass plates should be made through the Engineer (after award) or the Division Construction Office (pre-award)."

R. Confined Spaces.

Add the following after the last paragraph:

"Work operations in confined space and permit-required confined space as defined in 29 CFR 1910, Section 146 are particularly hazardous. These operations shall be specifically addressed in the Contractor's comprehensive Project Specific Safety and Health Plan and, in the case of permit-required spaces, a supplemental plan detailing the permit-required space program that the Contractor will follow and of any hazards confronted or created in permit-required spaces. These plans shall be submitted for review prior to the start of work. Indicated confined spaces are not intended to limit or define Contractor or subcontractor regulatory compliance requirements. In addition to confined spaces indicated on the drawings, other confined spaces may be present or created by the work of this

contract. The Contractor shall furnish, at no additional cost to the Thruway Authority, personnel and equipment to allow the Engineer to enter confined space and permit-required confined space in compliance with in 29 CFR 1910, Section 146."

S. Fire and Explosion Prevention.

Add the following after the last paragraph:

"The Contractor is advised that the storage of any flammable materials beneath, or within the proximity of any structure, at any time, is strictly forbidden by the NYSTA. Failure to comply will result in the Engineer stopping all work until all such materials are removed to a satisfactory site or off the project".

107-06 INSURANCE.

Delete all the information in this section and **Substitute** the following:

"A. General. The Contractor must procure prior to commencement of work under this Agreement, and maintain until this Agreement is completed and the New York State Thruway Authority (the Authority) has accepted all work performed thereunder, insurance of the kinds and in the amounts specified by the Authority herein, covering all operations under this Agreement, whether performed by the Contractor or its subcontractors, in accordance with the following conditions:

1. All insurance required by this Agreement shall be obtained at the sole cost and expense of the Contractor.

2. All insurance required by this Agreement shall be maintained with insurance carriers licensed to do business in New York State, and acceptable to the Authority, with an A.M. Best rating of "A-" or better.

3. All insurance required by this Agreement shall be primary to any the Authority insurance policy or the Authority self-insurance program, which shall be excess and non-contributory.

4. The Contractor shall require that any approved subcontractors carry insurance with the same limits and provisions set forth herein, except for the Owners/Contractors Protective Liability Policy.

5. The Contractor shall furnish the Authority with Certificate(s) of Insurance on ACORD Form 25, accompanied by additional insurance documents as required by the Authority, for each insurance carrier involved. Such Certificate(s) shall be executed by a duly authorized representative of the insurance carrier, certifying such authorization and showing compliance with the Authority insurance requirements set forth herein. The Contractor shall furnish the Authority with a copy of each Endorsement required herein. For work to be performed within New York State, proof of Workers Compensation and Disability Benefits Insurance shall be submitted on the appropriate forms as listed in Sections B.7 and B.8.

6. All policies, by specific endorsement, shall provide for written notice to the Authority no less than thirty (30) days prior to the cancellation, non-renewal, or material alteration of any insurance policies referred to therein. Any such notice shall be sent by mail to: Insurance Compliance Section, Office of Investments and Asset Management, New York State Thruway Authority, P.O. Box 189, Albany, New York 12201-0189.

7. If insurance policies utilized for Authority projects contain deductibles, they must be declared as such with applicable levels on the Certificate(s) of Insurance and the Authority Supplemental Insurance Certificate. Insurance policies with deductibles in excess of $50,000 will require review

and approval by the Authority. Additional security or other requirements may be imposed at the sole discretion of the Authority.

8. Insurance policies with Self-Insured Retentions (SIR's) of up to $50,000 will generally be accepted when the SIR program is administered by a third party administrator and a complete description of the program is provided to the Authority's Office of Investments and Asset Management. Self-Insured Retention programs in excess of $50,000 must receive prior approval and meet additional security requirements. The Authority, at its sole discretion, reserves the right to require the Contractor to provide additional collateral or to reject the use of an SIR by the Contractor. The Contractor will be solely responsible for all claims expenses and loss payments within the retention limit.

9. The Contractor shall provide certified copies of all declarations pages or of the insurance policies themselves, upon request by the Authority, within twenty (20) days of such request.

10. Failure of the Authority to demand such certificates, policies, endorsements, or other evidence of full compliance with the Authority insurance requirements, or failure of the Authority to identify a deficiency from evidence that is provided, shall not constitute or be construed as a waiver of the Contractor's obligation to maintain such insurance.

11. Failure to maintain the required insurance and provide proof of such coverage to the Authority may, in the Authority's sole discretion, result in termination of this Agreement, or in delay or stoppage of payments.

12. At least two weeks prior to the expiration of any policy required by this Agreement, evidence of renewal or replacement policies of insurance with terms at least as favorable to the Authority as the required minimum amounts set forth in Section B. must be furnished to the Authority.

13. By requiring insurance, the Authority does not represent that certain coverages and limits will necessarily be adequate to protect the Contractor and such coverages and limits shall not be deemed a limitation on the Contractor's liability under the indemnities granted to the Authority under any provision of this Agreement.

14. The Contractor and its subcontractors shall waive all rights against the Authority, the State of New York, and its agents, officers, directors, and employees, for recovery of damages to the extent these damages are covered by the CGL policy, and Business Auto Policy, and Umbrella policy, as required.

15. The Contractor shall provide a copy of these Authority Insurance Requirements to its insurance producer(s) and insurance carrier(s).

B. Coverages. The specific types and amounts of insurance that the Contractor must provide pursuant to this Agreement are as follows:

1. Commercial General Liability Insurance. The Contractor shall maintain a combination of Commercial General Liability (CGL), with no less than the following limits and coverages:

Agreement value:	Occurrence	Aggregate
Under $10 Million (See Section B.)	$1,000,000	$2,000,000
$10 Million - $25 million	$5,000,000	$5,000,000
$25 Million - $50 million	$10,000,000	$10,000,000
Over $50 Million	$25,000,000	$25,000,000

- Products/Completed Operations Aggregate: $2,000,000

- Personal/Advertising Injury Liability: $1,000,000
- Fire Damage Legal Liability: $100,000
- Medical Expense: $5,000

CGL Insurance shall cover liability arising from premises, operations, independent contractors, products/completed operations, personal injury, advertising injury, and contractual liability.

If the activity involves construction work near railroad stations, yards, or tracks, the exclusion for explosion, collapse and underground work (XCU) must be deleted.

If the activity involves construction or demolition near railroad stations, yards, or tracks, the General Liability policy must delete the exclusion of coverage for work done within 50 feet of railroad property.

The General Aggregate shall apply separately to the subject matter (Project) of the Agreement, and the Contractor shall provide an appropriate Project Endorsement, using ISO Form CG 25 03 11 85 or its equivalent, to the Authority for this purpose.

The Authority and the State of New York shall be included as an Additional Insured, using ISO Additional Insured Endorsement CG 20 10 11 85 or its equivalent, under the CGL policy and the Umbrella policy, as required. This includes, but is not necessarily limited to the parties listed in the Special Note entitled *Additional Insured Parties.* Failure to list a firm, organization or municipality, etc. does not eliminate the requirement to provide such coverage.

2. Commercial Umbrella Liability Insurance. The Contractor shall maintain Commercial Umbrella Liability Insurance (Umbrella) on a "follow form" basis with a limit of no less than $3,000,000 for each occurrence and aggregate for agreements over $1,000,000 and less than $10,000,000.

3. Owners/Contractors Protective Liability Insurance. The Contractor shall obtain a separate Owners/Contractors Protective Liability (OCP) Policy written on a project basis for the benefit of the Authority, its officers, agents, and employees, and the People of the State of New York, with respect to all operations under this Agreement by the Contractor or its subcontractors, including in such coverage any omissions and supervisory acts of the Authority, its officers, agents, and employees. The New York State Thruway Authority shall be the named insured in the OCP Policy, which shall be promptly furnished to the Authority. OCP policy limits shall be no less than: $1,000,000 per occurrence/$2,000,000 aggregate.

4. Builders' Risk Insurance. For all building construction projects, the Contractor shall provide a Builders' Risk Insurance policy covering all risks in completed value form. Such policy shall cover the total value of the work performed, as well as the value of any equipment, supplies, and/or material for the project that may be in storage (on or off the site) or in transit. The policy shall cover the cost of removing debris, including demolition as may be legally necessary by the operation of any law, ordinance or regulation, and for loss or damage to any owned, borrowed, leased or rented capital equipment, tools, including tool of their agents and employees, staging towers and forms, and property of the Authority held in their care, custody and/or control. Such policy shall name as insured's the Authority, and the Contractor. The Builders' Risk policy shall contain the following endorsements:

The Authority and Contractor shall be named as loss payee for the Work in order of precedence as their interest may appear.

5. Railroad Protective Liability Insurance. In the event that any work to be performed under the Agreement involves railroad property or railroad right-of-way, the Contractor shall provide and maintain a Railroad Protective Liability (RRP) Policy in the amounts required by the respective railroad.

a. The policy must name the Railroad as the Named Insured. No Additional Insured's will be listed on the policy (see requirements for the deletion of the 50' Railroad Exclusion on the Commercial General Liability policy).

b. Evidence of Railroad Protective Liability Insurance must be provided on the ACORD 25 insurance certificate form, a detailed Binder pending issuance of the ACORD 25 certificate, or on an ISO-RIMA or equivalent form approved by the Railroad and meet any other requirements as specified by the Railroad and or the Authority.

c. Definition of "physical damage to property" must be amended to mean direct and accidental loss of or damage to *"all property of any Named Insured and all property in any Named Insured's care, custody or control".*

6. Business Auto Liability Insurance. The Contractor shall maintain Business Automobile Liability coverage, with no less than a $1,000,000 Combined Single Limit, which shall cover liability arising out of the Contractor's use of any motor vehicle, whether owned, leased, hired, or non-owned.

If the Agreement involves removing hazardous waste from the Project site, or the Project involves environmental exposures, pollution liability coverage equivalent to that provided under the ISO Broadened Pollution Liability Coverage for Covered Autos endorsement (CA 9948) shall be provided, and the Motor Carrier Act endorsement (MCS 90) shall be attached.

7. Workers' Compensation Insurance. For work to be performed in NYS, the Contractor shall provide and maintain coverage during the life of this Agreement for the benefit of such employees as are required to be covered by the Workers' Compensation Law.

If the Agreement involves work on or near a shoreline, a U.S. Longshore and Harbor workers' Compensation Act Endorsement must be provided.

Evidence of Workers' Compensation coverage must be provided on one of the following forms specified by the Commissioner of the Workers' Compensation Board:

a. C-105.2 – Certificate of Workers' Compensation Insurance;

b. U-26.3 – Certificate of Workers' Compensation Insurance from the State Insurance Fund;

c. GSI-105/SI-12 – Certificate of Workers' Compensation Self Insurance.

All forms are valid for one year from the date the form is signed/ stamped, or until policy expiration, whichever is earlier.

8. NYS Disability Benefits Insurance. For work to be performed in NYS, the Contractor shall provide and maintain coverage during the life of this Agreement for the benefit of such employees as are required to be covered by the Disability Benefits Law.

Evidence of Disability Benefits coverage must be provided on one of the following forms specified by the Commissioner of the Workers' Compensation Board:

a. DB-120.1 – Certificate of Insurance Coverage under the NYS Disability Benefits Law.

b. DB-155 – Certificate of Disability Self Insurance.

c. CE-200 – Certificate of Attestation of Exemption. (Note: This form will only be accepted as evidence of an exemption from providing Disability Benefits.)"

107-07 PROTECTION OF UNDERGROUND FACILITIES.

E. Quality Level Designations.

Add the following:

"If Quality Level Designations are not shown in the Contract Documents, Quality Level D shall apply."

107-08 PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPE.

C. Restoration.

Add the following:

"8. Any damage to delineators, milemarkers, and safety appurtenances to remain caused by the Contractor's operations shall be repaired or replaced at no expense to the Thruway Authority. Any delineators, milemarkers or safety appurtenances which have been moved to facilitate any operation shall be reset in their original location. Unless otherwise shown in the Contract Documents, the cost of any necessary resetting shall be included in the price bid for all items of work; no separate payment will be made."

107-09 DAMAGE

D. Prompt Response to Claims by the Public.

Delete the last five sentences and **Substitute** the following:

"The Contractor shall promptly address all damage claims of the public and, if not paid directly, claims shall be promptly turned over to the Contractor's insurance company without prejudicing the validity of the claim. There should be an interval of no more than ten (10) working days between receipt of a written claim by the Contractor and receipt by the insurance company. The Contractor shall notify the Authority when the claim is either turned over to the insurance company or paid directly. The insurance company is expected to investigate, determine and adjust such claims promptly and fairly with notice to the Authority as an additional named insured.

If the insurance company denies a claim, the Contractor must make sure that the insurance company provides the Authority with an explanation of its investigation and conclusion. A denial by the insurance company does not relieve the Contractor of its responsibility to comply with contract provisions. If the Authority determines that the Contractor has performed responsibly in accordance with the contract provisions, which includes documentation of performance of an acceptable schedule of patrols, the Contractor will have no further responsibility under the Contract. The Authority will monitor claims by the public. If the Contractor fails to comply with this process or denies a claim without proper cause and justification, the Authority will settle the claim to the claimant's satisfaction at the Contractor's expense including Authority administrative expenses ($250 minimum)."

107-10 MANAGING SURPLUS MATERIALS AND WASTE.

B. Spoil.

Delete the second and third sentences in the second paragraph and **Substitute** the following:

"Potential embankment slope flattening areas and/or spoil areas, which may be used for disposal of excess soil and rock and spoil on Thruway right of way, are shown on or listed in notes on the contract plans and/or in the contract proposal. Disposal of excess soil and rock and spoil in any other areas of the Thruway right of way, without the written permission of the Division Director or a designee, is prohibited. The Authority makes no assurance that appropriate spoil areas within the right of way will be available for this contract."

SECTION 108 - PROSECUTION AND PROGRESS

108-01 PROGRESS SCHEDULE.

Delete this section in its entirety and **Substitute** the following:

"108-01 START AND PROGRESS OF WORK.

A. General Requirements. No on-site work may be performed until the contract is awarded. The Thruway Authority may issue a Thruway Work Permit, for Contractor employees, to make field measurements before award of the contract is received. Unless otherwise indicated in the Schedule

and Suspension of Work requirements, or if written consent to begin at a later date is given by the Division Director or his/her Agent, the Contractor must commence operations within 10 days of the award of this contract. The Contractor shall notify, in writing, the Chief Engineer and the appropriate Division Director, as well as any parties designated by the Authority, 10 days prior to starting or stopping work. The Contractor will be required to give the proper municipalities and utility companies at least 48 hours' notice before doing any work which may interfere with the operations of their utilities.

1. Pre-Award Project Schedule. At the pre-award meeting, or within such time as determined by the Thruway Division Director, the successful low bidder must furnish to the Engineer, a project schedule showing the order in which the Contractor proposes to carry on the work, the date on which it will start the major items of work and activities to be performed (including but not limited to excavation, drainage, paving, structures, mobilization, etc.) and the critical features (including procurement of materials, plant and equipment) and the contemplated dates for completing the same, considering seasonal weather limitations; and phase duration or milestone events, if applicable. The chart shall be in a suitable scale to indicate graphically the total percentage of work scheduled to be completed at any time. The Authority may also require that this pre-award schedule include a time and money curve.

2. Obligation to Progress the Project. The Contractor shall employ and supply a sufficient force of workers, materials and equipment and shall prosecute the work with such diligence so as to maintain the rate of progress indicated on the progress schedule to prevent work stoppage and ensure completion of the project within the contract time. Any additional or unanticipated costs or expense required to maintain the schedule shall be solely the Contractor's obligation and shall not be charged to the Authority unless provided for in other provisions of the contract.

3. Failure to Submit Project Schedule. If the Contractor fails to submit a progress schedule within the time period described or any revision or update when required, the Engineer may withhold approval of progress payment estimates pursuant to Article 8 of the contract until such time as the Contractor submits the required progress schedule.

B. Detailed Requirements.

1. Schedule Requirements. The construction of the project shall be planned and recorded with a conventional critical path method (CPM) schedule in the form of an activity on node diagram based on the principles defined by the most recent issue of the Construction Planning & Scheduling Manual published by the Associated General Contractors of America. An activity on arrow diagram or Gantt chart may be used in conjunction with a CPM, if approved by the Engineer. The schedule shall be used by the Contractor for coordination and monitoring of all work under the contract including all activities of subcontractors, vendors, and suppliers. The cost of preparing the CPM schedule, including updating monthly shall be included in the total amount bid for all contract items.

The Contractor shall, within 30 calendar days after the award, submit a complete Schedule of Operations to the Engineer, fully describing the intended progress of the work and showing in detail how the work will be completed within the time limit specified in the contract, including completion of the intermediate phases as required to provide the number of open traffic lanes specified by the dates specified. This submission shall be in electronic format created using the latest version of the project scheduling software required as part of the Engineer's Office computer system. Additionally, a PERT chart styled hard copy printout shall also be provided to the Engineer. The purpose of this requirement is to insure adequate planning and execution of the work.

A pre-award and/or a pre-construction meeting will be held with the successful low bidder. At this meeting, it is expected that the successful low bidder will furnish, and be prepared to discuss, their complete schedule of operations, in CPM format. While not fulfilling mobilization item requirements, a 60 calendar day, preliminary schedule of proposed Contractor activities may

be submitted at this meeting to enable the beginning of contract work preparation such as material orders, preparation of working drawings, and mobilization of equipment while the CPM schedule is being prepared. The Contractor's schedule will be used by the Engineer for coordinating Thruway operations, evaluating progress of the work, comparing the work performed to the contract time and phasing requirements, monitoring and coordinating the work of all related contracts, and to assign necessary resources for inspection and administration of the contract.

For "Incentive/Disincentive", "A+B Projects" or other forms of contract where project completion and/or phase completion is utilized to determine payments, no contract work items may be pursued on the project unless the complete schedule of operations has been submitted to and found acceptable by the Engineer. Any delay due to Contractor failure to submit an acceptable schedule is a non-excusable delay.

2. Schedule Submittal. As stated above, the Contractor must, within 30 calendar days after the award, submit a complete schedule of operations to the Engineer. Acceptance of the Contractor's Schedule as meeting the requirements of this subsection and the mobilization item shall not be construed to imply approval of any particular method or sequence of construction or to relieve the Contractor of providing sufficient materials, equipment and labor to guarantee completion of the project in accordance with the contract proposal, plans and specifications. Nor shall acceptance be construed to modify or amend the agreement or the date of completion therein. Schedules deviating from the Schedule and Suspension of Work requirements of the contract are unacceptable, unless the Contractor has made application in a separate writing and received written approval of the requested change, and if such a schedule is inadvertently "approved" that "approval" will be invalid. Contractor requests for alternative scheduling to that outlined on the Plan Staging/Phasing and the Schedule and Suspension of Work requirements in this proposal, will be entertained as a request for a waiver of specifications. Bids shall be based upon the scheduling and phasing in the bidding documents.

3. Technical Requirements for the Schedule. The schedule of operations must be prepared in the critical path format utilizing activity nodes with identification numbers, arrows and pertinent symbols to fully describe the activities and their duration, the progress of the work and the order in which the Contractor proposes to carry on the work, the date on which it will start the major items of work (including but not limited to excavation, drainage, paving, structures, mobilization, soil erosion and sediment control, etc.), the critical features (including procurement of materials, plant and equipment) and the contemplated dates for completion of the same. No activity duration shall be longer than 15 work days. The NYSTA requires that the progress schedule, at a minimum, include the following items: (a) activities required for the performance of all items of work, including sequence and interdependence; (b) seasonal weather limitations; (c) time and money curve, and (d) all phase duration or milestone events, holidays and shutdown periods shall be shown as applicable.

The scheduled activities are to be described so that the work is easily identifiable and the progress of each activity can be measured. For each activity, the Contractor shall identify the trade or entity performing the work, the duration of the activity in days worked, the resources involved by trade, the equipment involved, the location of the work and the total dollar value. The Contractor shall also provide the works days per week, holidays, number of shifts per day, number of hours per shift, and major equipment to be used for each activity. If requested by the Engineer, the Contractor shall furnish production rates or other information needed to verify the reasonableness of the activity duration. Allowance for time lost to seasonal weather conditions such as precipitation and temperature, shall be included in the planning and scheduling of all activities.

4. Schedule of Submittals (TA-4010). In addition to the schedule of operations, within thirty (30) calendar days of the contract award, the Contractor must also submit a Schedule of Submittals (TA-4010) required under the contract. Submittals include shop drawings, working drawings, coordination drawings, required permits, erection/demolition plans, product data,

samples, quality assurance and quality control submittals (i.e. design data, test reports, certificates, manufacturer's instructions, or field reports) and information submittals. No portion of the work requiring a shop drawing or sample submission may be started until the appropriate submission has been approved by the Engineer. This schedule of submittals be shall coordinated with the list of subcontracts, and the schedule of operations, arranged in chronological order by dates required by the construction schedule and show a scheduled submission date for each submittal, identifying the earliest activity affected by each of the submittals (time allowance for reviews, any resubmittals, ordering, manufacturing, fabrication, and delivery must be included when establishing scheduled dates). This schedule of submittals shall be updated and revised monthly and/or with each schedule submission, to reflect the actual progression of the work. Failure to submit a revised Schedule of Submittals, as requested by the Engineer, shall constitute non-compliance in accordance with the provisions of the contract.

5. Contingency within the Schedule. Any contingency within the schedule, i.e. a difference in time between the project's early completion and required contract completion date, and "float" in the approved CPM construction schedule belongs to the project and not to any party to the contract.

6. Float Manipulation Not Permitted. The Contractor shall not sequester "float" through such strategies as calendar manipulation, or extending durations to fill up available float time.

7. Schedule Maintenance and Required Updating. During the time of the contract, the Contractor is required to maintain an "as-built" schedule updated and revised monthly reflecting the actual progression of the work, showing actual dates of activities started and completed, the percent of work completed to date on each activity started but not yet completed, the current allocation of staff resources and major equipment and the status of critical materials showing actual progression of the work vs. the approved schedule. The schedule of actual progression shall be available to the Engineer at all times. The Contractor shall also provide updated activity number sorts, total float early start sorts, a 60 day look-ahead bar chart, and a narrative report. The narrative report shall include a description of problem areas, current and anticipated delaying factors and their estimated impact on performance of other activities and mandated contract dates, and the explanation of corrective action taken or proposed. Failure to submit an "as-built" schedule and monthly schedule updates, or updates as requested by the Engineer, shall constitute non-compliance in accordance with the provisions of the contract.

The Engineer will conduct periodic reviews of the updated schedule at progress or other meetings. This review, which may address slippage, remedies, revisions, and other relevant issues, may result in the need for submission of revised schedules. The Contractor's appropriate field and scheduling personnel must attend this review.

If, in the opinion of the Engineer, the specified work falls behind that schedule, the Contractor shall take such actions as necessary to improve its progress. If the Contractor is behind schedule any month, the Contractor shall indicate what measures it will take in the next thirty (30) days to put the work back on schedule so as to meet the contract completion date specified in the contract. The Contractor shall not be entitled to any additional compensation unless provided for in other provisions of the contract on account of the requirements to put the work back on schedule. In preparing the revised schedule, the Contractor shall consider increasing its work force, construction plant and equipment, or the number of work shifts, etc. If the Engineer finds the proposed plan not acceptable, he/she may require the Contractor to submit a new plan. The Authority may request that progress meetings be held by the Contractor at least on a monthly basis and be attended by the Engineer who shall monitor the Contractor's progress and performance.

8. Changes to the Approved Project Schedules. The CPM construction schedule must accurately reflect the manner in which the Contractor intends to proceed with the project and shall incorporate the impact of delays and orders-on-contracts when these factors can be accurately determined. All changes made to the schedule, i.e. the addition of activities, changes in

logic or changes in the activity durations shall be submitted in writing and shall be subject to approval by the Engineer before inclusion in the CPM construction schedule. To initiate changes to the approved schedule, the Contractor must meet with the Engineer and provide the information necessary to prepare a revised (updated) activity on node diagram. No revision to any contract milestones, or contractually mandated schedule provision will be permitted without written authorization from the Engineer.

9. Compliance with the Schedule. The Contractor will be required to proceed with the construction in a sequence that is consistent with the "Schedule of Operations" or to submit a revised schedule. Should the Contractor or any subcontractor fail to maintain progress according to schedule or cause delay to another Contractor or subcontractor, that Contractor or subcontractor shall provide such additional manpower, equipment, additional shifts, or other measures as directed to bring the operations back on schedule.

The Contractor shall employ and supply a sufficient force of workers, materials and equipment and shall prosecute the work with such diligence so as to maintain the rate of progress indicated on the approved schedule to prevent work stoppage and ensure completion of the project within the contract time. Any additional or unanticipated costs or expenses required to maintain the schedule shall be solely the Contractor's obligation and shall not be charged to the Thruway Authority unless provided for in other provisions of the contract. In the Event a notice is received of a change to the contract which is likely to cause or is causing delays, the Contractor shall notify the Engineer, in writing, within 10 calendar days of the effect, if any, of such change, or extra work, or suspension or other conditions upon the project construction schedule and shall state in what respects, if any, the approved CPM construction schedule should be revised with the reasons therefore. The reasons for these revisions must be succinct, comprehensive, and factual to merit consideration."

108-02 COMPLETION DATE

Delete the first paragraph and the first sentence of the second paragraph and **Substitute** the following:

"Unless an extended time for completion has been granted, the completion of all work under this Contract shall be accomplished on or before the specified completion date for the entire project and the work shall be completed on the intermediate phases as required to provide the number of open traffic lanes specified by the dates specified. In order to comply with this requirement, the Contractor must employ sufficient forces of labor, materials, and equipment to progress the work in an expeditious manner. The Contractor's attention is directed to the fact that multi-shift operations may be required. Also, the Contractor may elect to work at night in order to complete work by the specified phase or project completion dates. If night work operations are requested, the Contractor shall seek the Authority's guidance. Unless otherwise stated in the contract documents, when electing to work at night, work shall be in accordance with Section 619-3.19 *Nighttime Operations*. The cost of furnishing any or all labor, protective measures, lighting and equipment necessary to accomplish the nighttime work operations to the satisfaction of the Engineer shall be included in the total sum bid for the Basic Work Zone Traffic Control item."

108-03 FAILURE TO COMPLETE WORK ON TIME

B. Liquidated Damages.

Delete the third sentence "Liquidated Damages will not apply to contracts containing no work within the roadway limits."

Add the following:

"C. Failure to Complete Stage/Phase on Time. Should such be a term and condition of the Contract, the amount specified in the proposal for "liquidated damages" shall be calculated, as specified,

and deducted from any money due the Contractor, as long as work shall remain uncompleted for a stage/phase after the date specified in the contract for an intermediate completion.

D. Failure to Complete Stage/Phase/Contract Prior to Official Shutdown per the Contract. Unless otherwise specified, if traffic is not returned to its normal lanes in accordance with Section 108-07 *Official Shutdown Period* by the 30th day of November, the Contractor shall not cease work on any items required for the safe return of traffic to its normal lanes in preparation for an official shutdown and the onset of winter weather conditions and Authority snow and ice control maintenance. In addition, the Contractor shall take all measures available, both ordinary and extraordinary (e.g., temporary surfacing, use of winter concreting methods, erection of heated work enclosures, use of precast concrete elements, etc.) to progress stage/phase/contract completion, until Thruway or local traffic is returned to its normal lanes and an official shutdown is able to be instituted (See section 108-07). Any additional efforts or temporary works, as may be necessary, are solely the Contractor's responsibility; they shall be subject to approval by, and performed at no additional cost to the Thruway Authority. For each calendar day that any work shall remain uncompleted for a stage/phase/contract prior to an official shutdown, the amount per calendar day specified in the proposal for "liquidated damages" shall be deducted from any monies due the Contractor.

E. Damages Due to Other Non-Performance. If, in the opinion of the Engineer, specific conditions of the contract are not being fully adhered to by the Contractor or his subcontractors (e.g. the work area is not maintained in accordance with the Thruway Traffic Plan, the Schedule and Suspension of Work Restrictions), all remedies under the contract will be addressed. In addition to other remedies, special specifications and/or special notes may stipulate that liquidated damages be deducted from any money due the Contractor, not as a penalty but as liquidated damages; until the violation or violations are corrected to the satisfaction of the Engineer. Unless otherwise stated in the contract documents:

1. Multiple violations in any calendar day shall be assessed with a like number of liquidated damage charges; and
2. The amount of each assessed liquidated damages shall be the amount per calendar day specified in Table 108-1 *Schedule of Liquidated Damages*."

108-05 SUBLETTING OR ASSIGNING THE CONTRACT.

Add the following to the first paragraph:

"Subcontractors will not be approved by the New York State Thruway Authority until such time as they are registered with the New York State Department of State. In no event shall the Contractor perform work amounting to less than 30 percent of the original total contract price, including specialty items, with its own organization."

Delete the second, third and fourth sentences in the second paragraph and **Substitute** the following:

"Subcontractors and truckers requiring approval shall not begin work until approval has been granted by the Director, Construction Management. Work shall not be assigned by a subcontractor to a lower tier subcontractor. Work performed by a subcontractor requiring approval prior to receiving approval will be suspended by the Engineer and payment for work done prior to approval will be withheld."

A. Subcontractors.

Delete the second bulleted sentence under "Subcontractor approval is not required for" and **Substitute** the following:

- Services.
- Firms that perform the on-site completion of a portion of the work that does not constitute a complete contract item, and that occurs over less than an aggregate of 10 work days on the contract site.

108-07 SEASONAL SHUT-DOWN.

Delete this section in its entirety and **Substitute** the following:

"**108-07 OFFICIAL SHUTDOWN PERIOD.** An official shutdown period may be included in the contract documents. During an official shutdown period, all field construction activities shall be suspended. For the safety and convenience of the traveling public during the official shutdown period, the Contractor shall comply with the following:

1. The traveled way shall have full lane and shoulder capacity restored, without crossovers, lane restrictions or diversions. Shoulders shall be paved.

2. The traveled way shall be smooth, free from defect or distress, and free of surface irregularities and depressions that hold or retain water.

3. The traveled way shall be well drained with all drainage facilities and ditches fully open and operative to adequately drain the traveled way and the remainder of the right-of-way areas.

4. The traveled way shall be fully delineated by pavement markings, signs, delineators, and guiding devices. Use of cones, barrels, or barricades for delineation during an official shutdown during winter months is unacceptable unless required in the contract documents.

5. The traveled way shall have roadside obstacles and hazards protected by either intact existing or newly constructed safety appurtenances.

6. Materials or equipment shall not be left in front of or within the deflection distance behind guide rail and safety appurtenances so as to compromise their performance.

7. All temporary or permanent erosion control shall be in place for any disturbed areas; any seeded areas mulched with cellulose mulch that have not established a vegetative cover shall be protected by the addition of a layer of straw mulch.

8. The work site shall be in a clean and orderly condition, and all rubbish, unusable and waste material resulting from operations shall be removed from the site.

9. Recycled and/or virgin bulk or other materials awaiting installation shall be properly stored, stockpiled, and sited or protected so that they shall not constitute a traffic hazard nor interfere with drainage courses.

During an official shutdown period, the Authority will assume responsibility for minor roadway repairs and snow and ice control, and will respond to all incidents within the contract limits, as is done outside of the contract limits. However, repair of major failures in the traveled way and any activities related to work performed or completed by the Contractor shall remain the Contractor's responsibility. The establishment of an official shutdown period shall not be cause for change in the Contractor's insurance requirements or for any change in liability for the Contractor's actions or negligence. The start of an official shutdown period shall be subject to a field acceptance by the Engineer to ensure that the traveled way, within the contract limits, will safely carry traffic throughout the shutdown period and that the work site is in proper condition to be left unattended for the shutdown period."

Add the following:

"***108-08 WORK DURING OFFICIAL SHUTDOWN PERIODS.*** Although an official shutdown period is defined as a period during which all field construction activities are suspended, the performance of specific work may be allowed or even required during such periods by the Schedule and Suspension of Work or by Contractor request, as approved by the Division Director. During this time, the Contractor shall not interfere

with the operations of the Thruway Authority, and all Thruway or local traffic must be safely maintained by the Contractor (see §108-07) in its normal lanes and all conditions for the official shutdown shall be maintained at all times. No lane closures or other interference with traffic may be instituted during an official shutdown period without the advance permission of the Division Director.

If, in the opinion of the Engineer, any of the contract requirements assuring that the traveled way, within the contract limits, will safely carry traffic are not fully adhered to by the Contractor or their subcontractors, no payment will be made for the Basic Work Zone Traffic Control item and liquidated damages, if any, will also be assessed for that day or days until the violation or violations are corrected to the satisfaction of the Engineer. If the Basic Work Zone Traffic Control item is not included in the proposal, the deduction for violation of these contract requirements shall be in accordance with table 619-6, Basic Work Zone Traffic Control Non-Payment, as amended by this Addendum, for each day that the violation occurs. This amount shall be deducted from monies otherwise due the Contractor.

In making application for any waiver of specifications or contract requirements, the Contractor agrees that any waiver granted by the Authority is exclusively for the Authority's benefit and purposes, and as such is subject to revocation without requirement for advance notice or statement of cause. Also, approval or disapproval of requests for waivers will be transmitted without statement of reason or cause, and shall not be subject to administrative review or appeal under the contract. Any additional efforts or temporary works, as may be necessary to progress work during an official shutdown period are solely the Contractor's responsibility; they shall be subject to approval by, and performed at no additional cost to the Thruway Authority."

SECTION 109 – MEASUREMENT AND PAYMENT

109-04 PARTIAL PAYMENTS.

Add the following:

"For documentation purposes, this payment is converted into and paid for as a specific quantity of that Item (ton, feet, each, etc.), according to the Item's specification."

109-05 EXTRA WORK AND TIME RELATED COMPENSATION.

B. Force Account Work.

1. Contractor Costs.

a. Labor.

ADD "as detailed in the subsections below" to the end of the first sentence.

(1) Wages and Fringe Benefits.

DELETE the first and second sentences in the first paragraph and **SUBSTITUTE** the following:

"Each class of labor will be reimbursed separately at the actual payroll rate. An average rate based on different classes of labor will not be accepted. The wage rate, and fringe benefit rate, for an individual worker may be up to 150% of the prevailing wage rate, for the work being performed, provided the Contractor documents through certified payrolls that the worker has and continues to be paid more than the prevailing wage for contract work."

(3) Workers Compensation Insurance.

Add the following**:**

"Individual self-insured contractors shall provide a copy of their NYS Workers Compensation Board Self Insurance Security Deposit Calculation for the purpose of determining reimbursement."

b. Materials.

Add the following after the third sentence in the first paragraph:

"Transportation charges shall be included on the invoice when appropriate. When transportation is paid for as equipment and operator, and the equipment and operator perform additional work, not related to material delivery, the portion of the transportation charges allowed for "materials" shall be prorated appropriately."

c. Equipment.

(2) Ownership Costs.

Add the following to the end of the second paragraph:

"Upon request, the Contractor shall provide the Engineer with the documentation that was submitted to and used by the Blue Book to establish the modified rates."

Add the following to the end of the fourth paragraph:

"For the purpose of calculating non-operating hours, the total of the operating hours plus the non-operating hours shall neither exceed 8 hours in a day nor 40 hours in a week."

Delete "176 hours a month" at the end of the sixth paragraph and **SUBSTITUTE** "176 hours per 30 day period."

(3) Operating Costs.

Add the following after the word "consumables" in the first sentence:

"unless specifically mentioned in the Blue Book as being included in the equipment rate"

(4) No Established Rate.

Add the following after the first sentence:

"Upon request, the Contractor shall provide the Engineer with the documentation that was submitted to and used by the Blue Book to establish rates."

(6) Backup Equipment.

Add the following after the first sentence:

"Reimbursement shall be limited to 8 hours per day and 40 hours per week."

d. Insurance.

Delete the first sentence and **Substitute**:

"The contractor will be reimbursed for Commercial General Liability, Commercial Umbrella Liability, Owners/Contractors Protective Liability, Builders' Risk, and Railroad Protective Liability insurances required in accordance with 107-06 Insurance, at the rate paid by the Contractor, in accordance with the method procured from its insurer(s)."

(2)
Delete "§109-05B.1.a. through §109-05B.1.f." and **Substitute** "§109-05B.1.a. through §109-05B.1.c. and §109-05B.1.e. through §109-05B.1.f."

D. Time Related Dispute Compensation.

3. Non-Recoverable Costs.

a.
Delete "109-05D.1.h" and **Substitute** "109-05D.1.i".

b.
Delete "109-05D.1.i" and **Substitute** "109-05D.1.j".

109-06 CONTRACT PAYMENTS.

Delete "$1,000" in the first paragraph and **Substitute** "$5,000".

Delete "$50,000" in the first paragraph and **Substitute** "$100,000".

For Non-Federal Aid Contracts Only:

Add the following to the end of the first paragraph:

"When a performance bond is approved, 5% shall be retained from each progress payment or estimate until final acceptance of the work."

Add the following to the end of the fourth paragraph:

"If the contract is funded by monies from the New York State Department of Transportation, separate payment may be made by both the State of New York and the New York State Thruway Authority."

Delete the last paragraph and **Substitute** the following:

"The following Contractor submittals covering the current estimate period must be submitted to and checked by the Engineer for the Engineer's certification that payment can be made:

a. If Form AAP-21c is not being used, a notarized Affidavit of Payment to Subcontractors, NYSTA Form TA 44118 (or notarized NYS HC 258 form); required for every estimate after the Contractor has received their first payment.

b. Certified payrolls for the Prime and each Subcontractor.

The Contractor's attention is called to the fact that processing of progress payments is contingent upon Contractor documentation of compliance with all Contract requirements. Forms listed below may be required and shall cover the period since the last reporting period. Specific forms and schedule will be stipulated at the pre-award or pre-construction meeting: TA 1017-9 Employment Utilization Reports (Contractor, Each Sub, Composite; No Negative Reports Required), TA 1023-9 Subcontractor Payment, and TA 1046-9 Weekly Training Progress Report. In addition the following reporting shall reflect up-to-date status: TA 1022-9 D/M/WBE Utilization, TA 1024-9 Workforce and Training Utilization Plan, TA 1041-9 Training Report, TA 1058 Actual Utilization Plan for all Subcontractors, and TA 1064-9 Contractor's Annual EEO Report.

No completed quantity will be included in the progress payment unless all required documentation for the installation is received in a timely fashion. Failure by a Subcontractor to provide certified payrolls and/or required documentation for the performance of their work items will make those work items ineligible for inclusion in the Prime Contractor's progress payment.

No direct payment will be made for any of the work described and specified under the caption "General Notes" or for any work described and specified under the caption "Special Notes" unless specifically stated in the note. The cost there of shall be included in the prices bid for the various contract items.

The value of the Engineer's office and the mobilization item are not included in the calculation of the work done for determining eligibility for the first progress payment.

The Department of Engineering has determined that it will require an audit period of thirty (30) days for all progress billings. All payments made under this contract will be processed in conformation with Public Authorities Law §2880, as detailed in 21 NYCRR Part 109 (Prompt Payment), which requires the Authority to make payment on highway construction projects within certain time frames. If the Authority unjustifiably fails to pay within the prescribed time, it may be required to pay interest for each day in excess of the prescribed time."

For Non-Federal Aid Contracts Only:

109-07 PROMPT PAYMENTS BY THE CONTRACTOR.

Delete all the information in this section and **Substitute** the following:

"In accordance with Section 139-f(2) of the State Finance Law, the Contractor shall pay each Subcontractor and materialman for the value of work performed pursuant to contract no later than seven (7) calendar days from the receipt of each payment the Contractor receives from the Authority. Payment by the Contractor to Subcontractors or materialmen shall reflect the quantities or percentage of work completed by the Subcontractor or materials furnished by the materialman, and paid by the Authority; and such payment shall be based upon the actual conditions of the subcontract or purchase order.

The Contractor may retain not more than 5% from each progress payment or estimate from the subcontractor and/or materialman until final acceptance of work. The Contractor may deduct an amount necessary to satisfy any claims, liens or judgments against a Subcontractor or materialman which have not been fully discharged.

When the Contractor and subcontractor determine that all work items and/or activities of the subcontractor have been satisfactorily completed and paid for, thereafter the Contractor shall pay the retained amounts (if any) to that subcontractor within forty-five (45) days after receipt of an invoice from such subcontractor. The retained amount shall be paid irrespective of whether the Authority has released the retained amounts to the Contractor.

Any delay or postponement of payment from the above-referenced time frames for payment or return of retainage may occur only upon written notice to the Engineer with a written explanation of the reasons for the delay or postponement.

The Contractor shall maintain an accounting system acceptable to the Authority to track payments made by the Authority to the Contractor and payments made by the Contractor to each Subcontractor,

Manufacturer, Fabricator or Material Supplier by item and by date. The Contractor shall enter payment data into the current Authority approved civil rights reporting system in accordance with Section 105-21 *Civil Rights Monitoring and Reporting*, with any exceptions noted and explained."

109-09 FINAL ACCEPTANCE AND FINAL AGREEMENT.

C. Contract Final Acceptance.

Add the following:

"Items in the contract will only be accepted, in place, at the time of the Final Contract Inspection by the New York State Thruway Authority, providing they were of satisfactory quality at the time of construction and are still of satisfactory quality at the time of the final inspection. The following three (3) inspections will be made in addition to the normal inspections to ensure all contract requirements are met and the work is complete and acceptable. The purpose of each of these inspections is to furnish the Contractor a written list of contract exceptions, omissions, and deficiencies so that the work can be progressed to timely completion in accordance with the contract documents.

1. Detailed Inspection. The detailed inspection will be made when the work is substantially complete. A copy of the detailed inspection list will be furnished to the Contractor. When this inspection progresses over any length of time, copies of the list will be furnished as the inspection progresses so that the Contractor may proceed with the required work without delay.

2. Final Inspection. The Contractor will be advised of the date and time of final inspection. A copy of the final inspection list containing all incomplete or unsatisfactory items and the time allowed to complete the work will be furnished to the Contractor.

3. Joint Inspection for Physical Completion. The joint inspection for physical completion will be made by the Engineer accompanied by the Contractor and the representatives from the Authority to verify completion of the exception items listed in the final inspection list. The verification of the completeness of all the exception items will enable the "Acceptance" by the Chief Engineer. The purpose of having the "Acceptance Date" is to establish and record a date when all physical work of a contract is completed in accordance with contract requirements and to provide for the date of commencement of any guarantee period and a firm date in the consideration of the liquidated damages.

For non-federal aid projects, upon final acceptance, seventy percent (70%) of the withheld retainage may be released."

D. Final Payment.

Delete all the information in this section and **Substitute** the following:

"The provisions of Article 10 of the Contract Agreement shall apply. All payments made under this contract will be processed in conformation with Public Authorities Law §2880, as detailed in 21 NYCRR Part 109 (Prompt Payment) per §109-06. The Department of Engineering has determined that it will require an audit period of sixty (60) days for a final billing. In order for the Authority to process the final supplemental agreement and the final payment in an expeditious manner, Contractors are advised of the following general procedure:

Following the completion of all required work and a final inspection by the Authority, the Contractor shall have 30 calendar days to provide the following documents and submissions to the Engineer:

- Final documentation to support any Outstanding Claims and Disputes filed during the progress of the work;
- Extra Work Cost Accounts;
- Final Supplemental Agreement (TA 4108A,B, & D), with or without signature;
- Final Labor Affidavits (TA 44115-9);
- Wage Rates Subcontractor (TA 44105-9);
- Approved Reproducible Shop Drawings;
- Material Certifications;
- Certified Payrolls;
- Tax Clearance for "Foreign" (out of State) Corporations or entities;

- D/M/WBE Payment Report (TA 1023) (Note: The TA 1023 report is provided to the NYSTA OEOC until all payments are complete. Status at this time should reflect all paid contract quantities) Final Actual Utilization Plan for All Subcontractors (TA 1058; for FA Projects use TA 1058F);
- Non-Revenue Pass Plates.

The above list is general, every item may not be applicable to every contract and other documents and submissions may be required to properly process the final supplemental agreement. Any time taken by the Contractor beyond the 30 calendar day period after final inspection to satisfy or furnish the above information may delay the approval of the final supplemental agreement and the subsequent final payment process. The final supplemental agreement must be approved by the State Comptroller before the final payment process can begin."

F. Initiation of Claim.

Delete this section in its entirety and **Substitute** the following:

"***F. Acceptance of Final Payment.*** The acceptance by the Contractor, or by anyone claiming by or through the Contractor, of the final payment shall constitute and operate as a release to the Authority from any and all claims of any liability to the Contractor for anything theretofore done or furnished for or relating to or arising out of the work done thereunder, and for any prior act, neglect, or default on the part of the Authority or any of its officers, agents, or employees unless the Contractor serves a detailed and verified statement of claim upon the Authority not later than 40 days after signature of final agreement by the Contractor. As contract payments are routinely made via electronic funds transfer, and final agreements do not include any further payment to the Contractor, acceptance of final payment shall be deemed to be signature of the final agreement by the Contractor, or signature of the final agreement by the Chief Engineer if the Contractor has failed to respond within 180 days after being provided the final agreement. Such statement shall specify the items and details upon which the claim will be based and any such claim shall be limited to such items. Should the Contractor refuse to accept the final payment it shall constitute a waiver of any right to interest thereon.

Notwithstanding the provision of the Court of Claims Act or of any other statute, the Contractor expressly understands and agrees that no action shall lie or be maintained by the Contractor, or anyone claiming by or through the Contractor, against the Authority upon any claim arising out of or based upon this contract or by reason of any act or omission or requirement of the Authority or its agents, unless such action shall be commenced within six months after delivery of the final payment. No payment to the Contractor by the Authority shall limit or qualify any defense, claim or counterclaim otherwise available to the Authority relating to this contract."

For Non-Federal Aid Contracts Only:

109-10 UNCOMPLETED WORK AGREEMENTS.

Add the following after the last paragraph:

"In lieu of the above, providing there is sufficient contract retainage, the Contractor may authorize the Authority to continue to withhold a portion of the cash and/or securities, retained from contract payments, equal to at least double the value of the uncompleted work agreement. All other provisions of this subsection shall remain in force and unchanged."

Add the following:

"***109-11 RECOVERY OF MONIES BY THE AUTHORITY.*** Whenever it is provided in the contract documents that the Contractor shall pay or return monies for any reason, or that the Authority or Engineer may charge against the Contractor certain costs, assessments, or fines, or that the Authority can recover any sum for any reason from the Contractor, the Authority may offset the monies from amounts otherwise due to the Contractor. It is understood that the Authority may determine, in its sole discretion that any monies are due the Authority, and upon such determination it has available to it any monies due or that may become due the Contractor under the contract and any other contracts between the Contractor and the Authority.

Such other contracts shall include joint ventures in which the Contractor is a participant but only to the extent of its participation. The right to offset against the Contractor as herein provided is in addition to and does not affect the right of the Authority to seek recovery against the Contractor or surety under the contract, bonds, or as otherwise allowed by the law."

Section 200
EARTHWORK

SECTION 203 – EXCAVATION AND EMBANKMENT

203-1.01 Definitions.

H. Suitable Material.

Delete the last two paragraphs and **Substitute** the following:

"Reclaimed Asphalt Pavement (RAP) and Recycled Portland Cement Concrete Aggregate (RCA) shall not be considered suitable materials for embankment or side slope construction."

203-3.02 Unclassified Excavation and Disposal.

B. Disposal of Surplus Excavated Materials.

Add the following:

"Spoil areas, which may be used for the disposal of surplus construction materials on Thruway right-of-way, are shown on or listed in the contract plans and/or the contract proposal. Disposal of

surplus construction materials in any other areas on Thruway right-of-way, without the written permission of the Division Director or designee, is prohibited."

Section 400
HOT MIX ASPHALT

SECTION 401 – PLANT PRODUCTION

401-1 DESCRIPTION.

Add the following:

"The Engineer is responsible to maintain a program of quality documentation, quality assurance, inspection, and sampling to provide reasonable assurance to the Thruway Authority, as Owner, that both hot mix asphalt materials and pavements in the completed construction substantially conform to contract requirements. The Engineer shall be afforded access to the Contractor's or Producer's plant, equipment, and testing results for checking the performance of the Contractor's approved quality control procedures. The Contractor shall provide labor, equipment and traffic control to take samples and to assist the Engineer in checking grades and surface smoothness, costs thereof to be included in the bid prices for the individual items. In areas where there is an apparent or suspected deficiency, the Contractor shall collect core samples for the Engineer on request. The Contractor shall patch all areas where samples are taken with hot mix asphalt properly tamped to fill all voids and struck off flush with the surface, A.O.B.E.

The Engineer will review and verify the performance of the Contractor's Quality Control Plan. Finding Contractor failure to competently perform Quality Control as submitted shall constitute cause for total rejection of the involved paving and/or other action as may be indicated by the finding. The Engineer may at any time, notwithstanding previous sampling, reject and require the Contractor to dispose of any batch of bituminous mixture that does not meet mix design properties and/or specification requirements due to temperature, oxidation, contamination, segregation or incomplete coating of aggregate. Such rejection may be based on only a visual inspection, see also section 105-08.

The Engineer's Testing Laboratory is responsible to perform quality assurance testing as delineated in the Item Specification and in Materials Method 5.16. The Contractor's attention is directed to the fact that NYSDOT MM5.16 and other inspection methods employed by the Thruway Authority are quality assurance plans, not quality control plans. The Contractor is cautioned not to depend upon the results of the Authority's inspection tests and methods for project quality control. Results of any retesting, except in the case of an obvious error in the original testing, shall be combined statistically with the original test, and allowable tolerances reduced statistically for the modification of testing method."

401-2 MATERIALS.

401-2.01 Hot Mix Asphalt Designs.

Delete the first paragraph and **Substitute** the following:

"For each bituminous mixture required by the plans or the proposal, the Contractor shall formulate and submit to the Engineer, a SUPERPAVE Mix Design and a Job Mix Formula (JMF) that satisfies the requirements of this section and the mixture design criteria as written in Materials Method 5.16, Superpave Hot Mix Asphalt Mixture Design and Mixture Verification Procedures. In addition, the JMF shall state the mineral aggregate sources and types, the grade and source of bituminous material used in the mixture, and the type and source of any asphalt fillers, additives, anti-strip agents or modifiers.

The Contractor is responsible for procuring the samples of materials, and performing the required SUPERPAVE mix design tests in accordance with NYSDOT Materials Method 5.16, SUPERPAVE Hot Mix Asphalt Mixture Design and Mixture Verification Procedures. An independent testing firm may be employed if they have sufficient experience and expertise to accomplish the desired tests. The name of such intended firm shall be submitted to the Authority for approval prior to any tests being performed. The Authority or its representative may monitor the entire testing procedure. SUPERPAVE Mix Design testing may be waived by the Engineer for a JMF submitted with evidence of recent NYSDOT Regional Approval. If applicable, NYSDOT Regional approved JMF and SUPERPAVE Mix design must be produced using asphalt cement treated with an approved heat stable anti-stripping additive.

If for any reason a change in production plant, aggregate, asphalt, asphalt modifier, or anti-strip additive occurs or is contemplated, a separate JMF and SUPERPAVE mixture design to fit each change in material or gradation shall be submitted for the review of the Engineer. Changes in Performance Graded Binder content or anti-strip additive can be made by the Division Construction Engineer or representative, providing the resultant mixture has properties within the specified mechanical and volumetric properties.

Review of the Contractor's Mix Design is for reasonableness only. Authorization to begin production shall not constitute an acceptance or endorsement of the methods or the quality of materials so produced and controlled, which shall be the sole responsibility of the Contractor."

401-2.02 Aggregates.

Add the following to the second paragraph:

"Crushed gravels utilized for coarse aggregate in the production of any Hot Mix Asphalt Mixture to be placed on traffic lanes and ramps on the Mainline Thruway and Spurs shall be processed so that 90% of all particles larger than 4.75 mm have a minimum of two (2) fractured faces and 95% shall have a minimum of one (1) fractured face. Where MM 5.16 requires higher percentages of fractured faces, the higher percentages shall be used."

401-2.04 Performance-Graded Binder.

Add the following:

"Only Mixtures submitted with evidence of current NYSDOT Regional Approval will be accepted for use. In addition, all SUPERPAVE mixtures and NYSDOT Regional approved SUPERPAVE mixtures shall be evaluated to determine moisture susceptibility in accordance with AASHTO T283, "Resistance of Compacted Asphalt Mixtures to Moisture Induced Damage."

SECTION 402 – HOT MIX ASPHALT (HMA) PAVEMENTS

402-2 MATERIALS.

402-2.01 General.

Add the following:

"At the Pre-Award or Pre-Construction Meeting, the Contractor shall submit the name and location of the intended sources of supply for all bituminous pavement products. Hot mix asphalt will be accepted only from a NYSDOT approved automated plant certified in accordance with Materials Method 27."

402-3 CONSTRUCTION DETAILS.

402-3.01 Temperature and Seasonal Limitations.

B. Seasonal Limits.

Add the following:

"Weather and Seasonal Limitations may be waived based on written application to the Division Director, cc the Engineer, for specific paving operations under specific conditions or during specific time periods. Such applications must be accompanied by a detailed explanation of the Methods and Quality Control Procedures that will be utilized by the Contractor, at no additional expense to the Authority, to assure and demonstrate to the Authority that uniformly acceptable end product results are being achieved. Such application shall also include a detailed explanation of why the work could not be performed in conformance with the contract, and delineate the benefits that will accrue to the Authority and the Public if the requested waiver is granted.

If a waiver is granted, the Contractor shall be strictly limited to those operations approved, including performance of the Methods and Quality Control Procedures submitted. In making application for a waiver, the Contractor agrees that any waiver of restrictions granted by the Authority is exclusively for the Authority's benefit and purposes, and, as such, is subject to revocation without requirement for advance notice or statement of cause. Approval or disapproval of requests for waiver will be transmitted without statement of reason or cause, and are not subject to administrative review or appeal under the contract."

402-3.06 Spreading and Finishing.

E. Top Course Texture and Color.

Add the following:

"Subsurface course bituminous concrete mixtures may be delivered from more than one plant providing that no placing or compaction difficulties are evident to the Engineer. Surface course mixtures shall not be delivered from more than one plant without the express permission of the Engineer."

F. Reference Line.

Add the following:

"For paving at structures, including approaches, the use of a taut reference line will be required to insure satisfactory paving results for all structures pavement courses. The substitution of a "ski", "floating beam" or other type of moving reference will not be permitted on asphalt pavers used on structures pavements.

For mill and repaving work, automatic HMA pavers shall be equipped with a moving reference of at least 30 feet in length, i.e., grade averaging system. Physical reference for grade, slope and profile control shall be from the milled surface in front of the paver and the freshly laid hot mat in back of the paver. The Engineer may approve another grade control system, as long as it meets the above criteria."

402-3.09 Joints.

B. Longitudinal.

Delete the second paragraph and **Substitute** the following:

"Unless otherwise permitted in the contract documents, the HMA shall be laid such that no significant pavement surface disturbance is created between active lanes at the completion of the working day. The maximum longitudinal edge elevation (step) change shall be 0.5".

For mill and repaving work, HMA top course shall be laid in such a way to insure the requirements of surface tolerance and ride quality result. Minor deviations in elevation (<1 inch) of the longitudinal joint (an edge) may occur when paving against existing (pre-contract) asphalt. When this edge is exposed, appropriate warning signs and temporary striping shall be provided as shown on the detail "Thruway Traffic Plans for Uneven Lanes".

Approval to leave any type of surface disturbance or an exposed edge must be requested in writing in advance of paving operations. If approval is granted to leave a longitudinal pavement joint, of any type, exposed to traffic, the paving operation shall be planned so the edge is only exposed to traffic for one day/night and the adjacent lane shall be paved during the next allowable paving period in accordance with the Schedule and Suspension of Work restrictions of the contract. Weekend evenings are considered allowable paving periods when allowed by the Schedule and Suspension of Work. Therefore, the Contractor shall pave on a weekend evening if an edge is exposed."

2. Option B - Tapered Wedge Joint.

Add the following:

"Approval to use tapered wedge joints and/or to expose Thruway Traffic to the resultant pavement surface disturbance must be requested in writing one (1) week in advance of the paving operations. If approval is granted to leave a tapered wedge joint exposed to traffic, the paving operation shall be planned and executed so the edge is only exposed to traffic for one night and is not exposed over weekends or holiday periods in accordance with the Schedule and Suspension of Work restrictions. Tapered wedge joints will be approved for use only in conjunction with multi-lift pavement overlays or new pavements. Unless required by and shown in the contract documents, longitudinal tapered wedge joints shall not be utilized in conjunction with single lift pavement projects; nor will a temporary longitudinal tapered wedge constructed by pavement milling operations be approved."

C. Exposed Longitudinal Joint.

Delete this section in its entirety.

Add the following:

"402-3.14 Correction of Deficiencies. If any portion of pavement fails to comply with minimum acceptable quality requirements, the Contractor is required to make corrections as directed by the Engineer and as herein specified. It is required that such corrections will be made as work progresses and not reserved for a separate operation at some later date. No payment will be made for material placed in excess outside of the specified allowable tolerances over grade or nominal plan dimensions, for corrective work of any type, or for material that must be removed to correct deficiencies. Time lost on the Contractor's CPM schedule due to the necessity to perform corrective work is time fully under the Contractor's control and is neither compensable nor excusable.

The Contractor shall replace deficient pavements as directed by the Engineer and in accordance with §105-08 *Removal of Unacceptable and Unauthorized Work* so as not to interfere with the operations of the Thruway Authority or others using the area. Existing pavement shall be removed as necessary to provide square joints for the full depth of the course. The Engineer will verify the thickness of the hot mix asphalt mat after compaction using a penetration probe; average thickness of a sublot would be determined by averaging five such readings. The area for correction of deficiencies in surface smoothness and surface grade tolerance shall be those areas which fail to satisfy quality requirements. The area to be replaced for deficiency of in-place voids shall be the total area paved with the deficient paving lot.

A. For minus thickness deficiencies in a sublot of the surface course, the only acceptable repair methods are removal and replacement or placement of an overlay layer. The corrective work shall begin and end at a rebate; feather edging will not be permitted.

B. Where more than 1/4 inch above the required grade, correct deficiency by removal as necessary to comply with the specifications, except where an approved contour pattern satisfying riding quality and drainage as shown on the contract drawings has been established to the satisfaction of the Engineer.

C. For deficiency in smoothness tolerance, correct any deficiency by means approved by the Engineer and subject to all other provisions herein.

D. For deficiency of air voids, remove and replace deficient pavement in accordance with all requirements specified herein.

E. For deficiency involving a honeycomb surface in the mat at longitudinal joints, or at construction joints, the surface shall be sealed with an asphalt filler/sealer material approved by the Engineer.

F. For deficiency involving longitudinal tearing of the mat during compaction, remove and replace deficient pavement in accordance with all requirements specified herein.

G. For deficiency involving "flushing", remove and replace deficient pavement in accordance with all requirements specified herein."

402-5 BASIS OF PAYMENT.

Add the following:

"Paving work will be considered for progress payment based upon production in conformance with the approved JMF, and satisfactory placement in accordance with the appropriate item of construction. Hot mix asphalt will only be accepted, in place, at the time of the final contract inspection by the New York State Thruway Authority, providing it was of satisfactory quality at the time of construction and is still of satisfactory quality at the time of the final inspection. Only at that time will final payment be documented (see TA Addendum §109-09 *Final Acceptance and Final Agreement*). In the event any portions of pavement fail to comply with minimum acceptable quality requirements at the time of the final inspection, the Contractor will be required to make corrections as directed by the Engineer and as specified in §402-3.14."

Section 550
STRUCTURES

SECTION 555 – STRUCTURAL CONCRETE

555-3 CONSTRUCTION DETAILS

555-3.02 Falsework.

Add the following:

"The Engineer's review of falsework plans submitted by the Contractor shall not relieve the Contractor of its responsibility to provide for the safety and health of his employees, or to provide structurally sound, adequate falsework."

555-3.03 Forms.

A. General.

Add the following to the first paragraph:

"The Engineer's review of form work plans submitted by the Contractor shall not relieve the Contractor of responsibility for attaining satisfactory results."

Section 600
INCIDENTAL CONSTRUCTION

SECTION 606 – GUIDE RAILING, MEDIAN BARRIER, AND CONCRETE BARRIER

606-2 MATERIALS

606-2.08 Resetting Guide Railing, Median Barrier, Anchorage Unit Assemblies and End Assemblies.

Add the following:

"Should plans call for resetting any corrugated beam guide rail and/or corrugated beam median barrier installed without support bolts, the Contractor shall supply and install new support bolts as per the appropriate Standard Sheets. The cost of furnishing and installing these support bolts shall be included in the unit price bid for the appropriate item for resetting guide rail or median barrier."

Add the following:

"606-2.15 Beam Lengths. Corrugated rail panels shall be 13 feet 6 inches in length, and box beam sections shall be 18 feet in length, unless otherwise specified."

606-3 CONSTRUCTION DETAILS

606-3.01 General.

Add the following:

"***G. Non-standard Post Spacing.*** Non-standard post spacing may become necessary when connecting a new guide rail system to an existing guide rail system or fixed object (including existing bridge rail transitions), when connecting two existing guide rail systems, or to avoid cross culverts, drainage inlets, etc. Non-standard post spacing is acceptable if the guidelines below are followed:

1. Non-standard post spacing shall not be located within a guide rail transition, bridge rail transition, end assembly or attenuator.

2. A maximum of two panels with non-standard post spacing shall be allowed at any location within a run of new or reset guide rail.

3. Non-standard post spacing shall never be greater than the normal post spacing of the rail system being utilized for the connection. Any non-standard post spacing must be less than the standard post spacing but more than half the standard spacing. If a space less than the following is required, an adjacent section shall also be cut creating two (2) adjacent, non-standard sections of similar size:

a. Box Beam Guide Rail/Median Barrier – 3'

b. Corrugated Beam Guide Rail/Median Barrier – 6'-3"
c. Heavy Post Blocked Out Corrugated Beam Guide Rail/Median Barrier – 3'-2"

4. Special field cut and drilled (not burned) sections will be required.

5. The cost of this work, including furnishing and installing any additional posts, blockouts, hardware, field galvanizing, etc. shall be included in the unit price bid for the appropriate guide rail/median rail item."

H. Grading into Rail Systems. Guide rail, median barrier, and concrete barrier systems within 30 feet of the traveled way shall be installed such that the slope between the traveled way and the system is 1 vertical: 10 horizontal or flatter (1 vertical: 6 horizontal for cable systems). If the contract calls for work between the traveled way and existing rail, these slope rates shall not be exceeded. Earthwork required to meet these criteria shall be paid under their appropriate items."

SECTION 619 – WORK ZONE TRAFFIC CONTROL

619-1 DESCRIPTION

619-1.02 Basic Work Zone Traffic Control.

Delete the second sentence in the third paragraph.

A. Surface Condition, Debris, Drainage and Dust Control.

Add the following:

"Work shall be provided along the entire Contract Limits."

Add the following:

"***O. Maintain Existing Pavement Markings.*** Work shall consist of maintaining existing pavement markings within the contract limits."

619-2 MATERIALS

619-2.02 Basic Work Zone Traffic Control.

G. Barrier/Shadow Vehicles.

Delete the last paragraph.

H. Construction Signs.

3. Sign Covers.

Delete the third sentence.

Add the following:

"Fabric sign covers shall not be allowed."

619-3 CONSTRUCTION DETAILS

619-3.01 General.

Delete the third sentence in the second paragraph.

Add the following to the end of the second paragraph:

"Slowing/Stopping Thruway Traffic for Work Activities. Slowing/stopping Thruway traffic may be permitted for work activities, such as moving a lane closure, removing or setting bridge steel, or other work-related situations requiring a traffic slowdown/stoppage for a brief period of time (generally 5 minutes; but, in certain cases, up to 20 minutes). Slowing/stopping Thruway traffic is considered a planned event and is permitted only with specific authorization from Division Traffic through the Engineer and with State Police personnel available and on site. Slowing/stopping Thruway traffic is not to be confused with a closure of the Thruway.

The request for a slowdown/stoppage of Thruway traffic should describe the work to be performed while traffic is slowed/stopped and include a schedule of operations for proposed slowdowns/stoppages. Once authorized, traffic slowdowns/stoppages are strictly limited to the conditions listed in the authorization, including any and all restrictions as to days, hours and length of time permitted for the operation.

Once an initial approval has been received, the Contractor shall notify the Engineer at least 48 hours prior to a planned slowdown/stoppage. The Engineer will coordinate on site between the State Police and the Contractor for the slowdown/stoppage. Traffic shall not be slowed/stopped unless State Police are on site to stop the traffic.

A. Traffic Slowdown. The "traffic slowdown" is a procedure used to create a gap in traffic in order to perform a work activity. The intent of this procedure is to slow traffic without bringing it to a stop. The traffic slowdown should begin far enough in advance of the work space to enable completion of the work before traffic arrives and has to be stopped.

1. Minimum Requirements.

a. In sections with two lanes, one marked State Police vehicle and one Contractor vehicle are required for the actual slowdown/stop. An additional truck is required to display a BE PREPARED TO STOP (W3-4) sign.

b. In sections with three or more lanes, one marked State Police vehicle and two Contractor vehicles are required, one to display a BE PREPARED TO STOP (W3-4) sign and one to display a ROAD WORK AHEAD (W20-1) sign.

c. The Contractor shall provide a pilot/chase vehicle (last car through) to confirm to the work crew that traffic is clear (i.e., has been slowed as planned).

d. All Contractor vehicles shall be equipped with a radio and rotating amber beacons visible from all directions. During the slowdown and for the duration of any actual stoppage, these vehicle(s) shall have rotating amber beacons activated and the State Police vehicle will display its emergency lights.

e. Flaggers shall block all entrance lanes/ramps (including entrances from toll plazas, service areas, parking areas, rest areas, tandem truck lots, etc.) within the area of the traffic slowdown/stop. An advance warning sign, Flagger symbol (W20-7) or ROAD WORK AHEAD (W20-1), for each ramp shall be placed 300 to 500 feet in advance of the flagging station.

2. Procedure. The procedure for slowing traffic requires the marked State Police vehicle and Contractor vehicle(s) to be positioned in front of approaching traffic. Once safely in front of traffic, the State Police/Traffic Supervisor/Contractor vehicles slow down to a reasonable speed (25 to 35 MPH). The pilot/chase vehicle is positioned in advance of the State Police vehicle and travels to the work zone at highway speed staying behind the last vehicle in the gap created by the traffic slowdown.

a. In sections with two (2) lanes, the State Police vehicle occupies one (1) lane and the Contractor vehicle occupies the other lane. A vehicle with a "BE PREPARED TO STOP" sign mounted behind the vehicle and facing oncoming traffic (this vehicle is called the Warning Vehicle) shall be on the right shoulder at the slowdown start point. Once the traffic slowdown is started, the warning vehicle remains stationary until a traffic queue develops. At that time, the position of the warning vehicle shall back up so it is positioned 1500 feet upstream of the end of the traffic queue. If necessary, the warning vehicle moves (driven forward/backwards on the shoulder) so the 1500-foot spacing is maintained.

b. In sections with three (3) or more lanes, the State Police vehicle occupies one (1) lane and the Contractor's vehicles occupy the remaining lanes. The "BE PREPARED TO STOP" warning vehicle shall be positioned as described above. Additionally, a second warning vehicle with a "ROAD WORK AHEAD" sign shall be positioned 1000 feet upstream of the "BE PREPARED TO STOP" warning vehicle. As necessary, this vehicle also moves so the 1000-foot spacing is maintained.

c. The pilot vehicle, positioned in front of the rolling block, proceeds with the normal flow of traffic and notifies the work crew of the last vehicle(s) before the rolling block. The work crew then proceeds quickly to accomplish the intended operations.

d. Should it be necessary to actually stop traffic, the slowdown should begin approximately ½ mile in advance of the point of closure, gradually bringing traffic from highway speeds to a halt.

B. Brief Stoppages. Traffic slowdowns/stoppages may be authorized for brief and specific activities such as moving a piece of equipment across the road or other momentary tasks that can be done in a very short period of time (typically less than two (2) minutes). The Contractor shall notify the Engineer at least 48 hours prior to a planned slowdown/stoppage. The Engineer will coordinate on site between the State Police and Contractor personnel for the slowdown/stoppage. Traffic shall not be slowed/stopped unless State Police are at the scene to stop the traffic. A "BE PREPARED TO STOP" sign should be used in the manner described in the Traffic Slowdown section."

Add the following to the end of this section:

"Conducting Contract Work. Contract work shall be conducted so as to minimize interference with the operations of the Thruway. The following general conditions apply in addition to those which may be provided elsewhere in the contract documents:

A. General. The New York State Thruway is a limited access, high-speed highway. The Contractor is advised that the Thruway cannot be designated a "Restricted Highway" according to Section 104-08 of the Standard Specifications. The work area is subjected to traffic which must be maintained in accordance with the Schedule and Suspension of Work and the work zone traffic control plans. The work zone traffic control plans were designed in accordance with National and State standards to promote safe and efficient work zones for both workers and the traveling public. Other temporary traffic control measures, as may be required by OSHA to ensure work site safety, are the sole responsibility of the Contractor.

B. Work Zone Traffic Control Plans. If Thruway standard work zone traffic control plans have been included in the contract documents or as part of a work permit, the type and placement of all

temporary traffic control devices required for the work zone(s) will be identified. Variables, however, such as vertical and horizontal alignment, proximity of interchanges, sight distance or operational characteristics may necessitate additional channelizing devices (drums, cones, etc.) for longer patterns. No additional payment will be made for these additional devices.

No alterations shall be made to the work zone traffic control plans without the concurrence of the Engineer and the Division Traffic Supervisor. The only exception is in an emergency, and then only as directed by the State Police. If the Contractor is notified by the Engineer or the State Police of practices violating the provisions of this contract, Thruway Authority Rules and Regulations, or the Vehicle and Traffic Law, immediate remedial action(s) shall be taken to the satisfaction of the Engineer and/or the State Police.

C. Work On or Under Bridges.

1. A minimum vertical clearance of 14'-6" shall be maintained at all times. For bridges with a minimum vertical clearance less than 14'-6", the existing minimum vertical clearance shall be maintained. In either case, rigging or other devices shall not protrude over the roadway to lessen the minimum vertical clearance.

2. Extreme care shall be taken to prevent construction materials or work debris from falling off a bridge. Work operations shall not be performed over any open traffic lane, railroad right-of-way or waterway unless shielding is installed by the Contractor. Platforms, nets, screens or other protective devices shall be provided to contain any falling material. If the Engineer determines that adequate protective devices are not being used, work shall be suspended until such devices are provided. If material falls into the containment or to an area below a bridge, the Contractor shall have it removed and disposed in a timely manner. The Contractor's bid shall include the cost of furnishing, installing, maintaining, removing and disposing all platforms, nets, screens and other protective devices deemed necessary to complete the work."

619-3.02 Basic Work Zone Traffic Control.

A. Surface Condition, Debris, Drainage and Dust Control.

Add the following to the end of the second paragraph:

"A pavement joint resulting in a longitudinal vertical face ½ inch to 1 inch in height between travel lanes that is exposed to traffic during non-working hours shall be signed and delineated in accordance with Thruway drawing "Uneven Lanes" found elsewhere in the proposal."

Add the following to the beginning of the fifth paragraph:

"Unless otherwise stated in the contract documents, traffic will not be allowed to ride on milled pavement."

Add the following to the end of this section:

"Shoulders must be available to the traveling public at all times except when the adjacent lane is closed or work is being performed on or near the shoulder. Any damage to the shoulders which may be used by the traveling public shall be repaired immediately using materials equal to the existing shoulder material."

D. Maintain Existing Roadside Signs, Delineators and Markers.

1. Maintenance.

Add the following:

"Right shoulder milepost and tenth-milepost markers shall be maintained at all times during all stages of work. Where work operations require temporary relocation of these markers, they shall be placed adjacent to the work area within view of the traveled way. Upon completion of the work operations, or as directed by the Engineer, the markers shall be reset to their original position. Unless otherwise shown in the contract documents, the relocation and resetting of these markers shall be at no cost to the Authority."

E. Maintain Existing Guide Rail, Median Barrier, and Bridge Rail.

Add the following to the end of this section:

"Shifting Traffic Lanes. Travel paths shall not be moved laterally closer to a roadside obstacle or fixed object exposed by construction operations until guide rail, bridge rail, pier protection, and/or median barrier is established to shield traffic from the roadside obstacle or fixed object.

Removal and Replacement of Pier Protection and Transitions. Existing pier protection and transitions shall remain in place and be maintained until construction operations in the immediate vicinity require removal. Once removed, these systems and/or component parts shall be replaced prior to the opening of any adjacent traffic lane. If this provision cannot be met, temporary concrete barrier shall be installed in place of the pier protection and transitions at no cost to the Authority unless indicated otherwise in the contract documents."

H. Construction Signs.

2. Mounting Temporary Signs.

Delete the last paragraph beginning with "…except they may be mounted, when approved by the Engineer…" and ending with "…visibility of the sign by motorists."

5. Special Use Work Zone Signs.

Delete the fifth, sixth and seventh paragraphs and **Substitute** the following:

"BE PREPARED TO STOP (W3-4) and ROAD WORK AHEAD (W20-1) signs are required, where conditions permit, to inform oncoming traffic of a stopped or very slow traffic condition caused by construction activities. These signs shall be furnished and deployed in accordance with the Thruway detail "Be Prepared to Stop Signing for Stationary Work Zones" provided elsewhere in this proposal."

K. Pavement Edge Drop-Off Protection.

Delete this section in its entirety and **Substitute** the following:

*"**K. Pavement Edge Drop-Off Delineation.*** A drop-off is an abrupt elevation difference (1 vertical: 3 horizontal or steeper) between two adjacent surfaces. A drop-off can occur (1) at the edge of the traveled way or within the shoulder, (2) at the outside edge of shoulder, or (3) beyond the edge of shoulder. A traveled way is defined as the portion of roadway for the movement of vehicles, exclusive of shoulders.

All pavement drop-offs within 10 feet of the traveled way that are not separated from traffic with temporary barrier should be returned to grade within 7 days of the work that produced the drop-off. If subbase material is used to return the surface to grade, it shall be placed and compacted in accordance with Section 304 and maintained in a condition suitable for use as a refuge for disabled vehicles and

an escape area for emergency use. Except for short repair areas of less than 50 feet, opposite shoulders shall not both be brought to grade using subbase material; at least one shoulder shall be paved. If subbase material is used to return a shoulder to grade and is later required to be removed, the placement and removal of the material shall be at no cost to the Authority.

If the Contractor's methods require traffic control not specified in the plans, the Contractor shall submit proposed temporary traffic control plans to the Engineer for approval a minimum of 30 days prior to performing the work. Any additional costs shall be the responsibility of the contractor.

If Contractor operations result in a drop-off, the delineation described in the following tables shall be used unless indicated otherwise in the contract documents. All work, except temporary concrete barrier and pavement striping, will be paid under the Basic Work Zone Traffic Control item unless otherwise noted.

1. Drop-Off at Edge of Traveled Way or Within Shoulder. A drop-off at the edge of the traveled way or within the shoulder shall be treated as follows:

TABLE 619-4A
DROP-OFF AT EDGE OF TRAVELED WAY OR WITHIN SHOULDER

Drop-Off Depth	Conditions	Delineation
≤ 1 in.	Pavement edge marking or STARs installed	No additional delineation required.
	Neither pavement edge marking nor STARs installed (See Note 1)	Drums, vertical panels, or tall cones at 132 ft. spacing offset 4 ft. from edge of traveled way.
> 1 in. and ≤ 2 in.	Pavement edge marking installed	No additional delineation required.
	Pavement edge marking not installed (See Note 2)	Drums, vertical panels, or tall cones at 132 ft. spacing placed at the edge of traveled way.
> 2 in. and ≤ 18 in.		Delineate in accordance with Thruway drawing "Work Zone Traffic Control for Miscellaneous Operations".
> 18 in.	< 50 ft. in length <u>and</u> less than 24 hour duration	Delineate in accordance with "no shoulder" detail on Thruway drawing "Work Zone Traffic Control for Miscellaneous Operations".
	≥ 50 ft. in length <u>or</u> longer than 24 hour duration	Temporary concrete barrier required.

Notes:
1. The Contractor shall place pavement edge stripes prior to opening an adjacent lane to traffic unless STARs are in place or otherwise approved by the engineer.
2. The Contractor shall place pavement edge stripes prior to opening an adjacent lane to traffic unless otherwise approved by the engineer.

When an underdrain is installed adjacent to the traveled way, the trench shall be brought to grade before the adjacent lane is open. The trench shall be maintained to provide a surface level with the traveled way and the adjoining shoulder.

2. Drop-off at Outside Edge of Shoulder. Provided there is a uniform shoulder surface, with no drop-off in the area between the outside edge of a travel lane and the outside edge of shoulder, drop-offs occurring at the outside edge of shoulder due to the Contractor's operations shall be treated as follows:

TABLE 619-4B
DROP-OFF AT OUTSIDE EDGE OF SHOULDER

Drop-Off Depth	Pavement Edge Marking or STARs Installed (See Note 4)	Shoulder Width	
		< 4 feet	≥ 4 feet
≤ 2 in.	N/A	See Note 1	See Note 1
> 2 in. and ≤ 4 in.	Yes	See Note 1	See Note 1
	No	See Note 2	See Note 2
> 4 in. and ≤ 18 in.	Yes	See Note 3	See Note 2
	No	See Note 3	See Note 3
> 18 in.	N/A	Delineate in accordance with Table 619-4A for Drop-Off Depth > 18 in.	

Notes:
1. No additional delineation required.
2. Outside edge of shoulder delineation shall be provided in accordance with the detail on Thruway drawing "Work Zone Traffic Control for Miscellaneous Operations".
3. The shoulder shall be closed in accordance with the "No Shoulder" detail on Thruway drawing "Work Zone Traffic Control for Miscellaneous Operations".
4. The Contractor shall place pavement edge stripes prior to opening the adjacent lane to traffic unless STARs are in place or otherwise approved by the Engineer.

3. Drop-Off Beyond Edge of Shoulder. Provided there is a uniform surface with no drop-off in the area between the outside edge of a travel lane and the outside edge of shoulder, drop-offs occurring beyond the edge of shoulder due to the Contractor's operations shall be treated as follows:

TABLE 619-4C
DROP-OFF BEYOND EDGE OF SHOULDER

Drop-Off Depth	≤ 20 Ft. From Edge of Traveled Way	> 20 Ft. and ≤ 30 Ft. From Edge of Traveled Way
< 4 in.	No additional delineation required.	No additional delineation required.
≥ 4 in. and < 24 in.	Edge of shoulder delineation shall be provided in accordance with Thruway drawing "Work Zone Traffic Control for Miscellaneous Operations".	No additional delineation required.
≥ 24 in.	Delineate in accordance with Table 619-A for Drop-Off Depth > 18 in.	

Field conditions may require additional delineation not accounted for in the plans or the preceding section. Delineation required by the Authority shall be paid under the appropriate items in the contract or as additional work. Delineation requested by the Contractor or necessitated by the Contractor's means and methods shall be at no cost to the Authority."

N. Contract Site Patrol.

Delete all the information in this section and **Substitute** the following:

"The Contractor shall inspect the entire contract zone, within the contract limits, both prior to and within a reasonable time after award of the contract in order to place themselves on notice of conditions that exist. The responsibility to patrol the project site and to respond to conditions, regardless of cause or fault, in full conformity with contract provisions clearly applies to the full limits of the contract, and not just the area in which the Contractor happens to be working. This obligation begins when the contract is awarded and continues until final acceptance of the work, regardless of whether any other contract operations are underway. In addition, Contractors are expected to maintain routine patrols of the entire contract zone throughout the life of the contract, regardless of whether work is in progress or suspended for any period of time.

The only exception to this obligation is in the case of an official shutdown period. During an official shutdown period, the Authority will assume responsibility for minor roadway repairs and snow and ice control, and will respond to all incidents within the contract limits, as is done outside of the contract limits. However, repair of major failures in the traveled way and any activities related to work performed or completed by the Contractor shall remain the Contractor's responsibility. The establishment of an official shutdown period shall not be cause for change in the Contractor's insurance requirements nor shall there be any change in liability for the Contractor's actions or negligence."

Add the following:

"***O. Maintain Existing Pavement Markings.*** The Contractor shall be responsible for maintaining the existing pavement markings within the project limits in an as-received condition for the life of the contract, as directed by the Engineer."

619-3.06 Temporary Pavement Markings.

A. Divided Highways.

Delete this section in its entirety and **Substitute** the following:

"***A. Thruway Mainline.*** On the Thruway Mainline, the Contractor shall install broken lines a minimum of 4 feet long at 40-foot spacing to separate traffic lanes in the same direction. The Contractor shall install solid edge lines for a minimum of 100 feet either side of the apex of the gore. In addition, the Contractor shall install solid edge lines prior to opening the lane to traffic unless STARs are in place, in which case the Contractor has up to 7 calendar days to install the solid edge lines."

619-5 BASIS OF PAYMENT

619-5.01 General.

A. Non-Payment.

Delete Table 619-7 and **Substitute** the following:

TABLE 619-7 BASIC WORK ZONE TRAFFIC CONTROL NON-PAYMENT		
Original Contract Amount		**Nonpayment Amount**
From More Than	**To and Including**	
$ 0	$ 500,000	$ 400
$ 500,000	$ 2,000,000	$ 800
$ 2,000,000	$ 5,000,000	$ 1,000
$ 5,000,000	$ 10,000,000	$ 1,500
$ 10,000,000	$ 20,000,000	$ 2,000
$ 20,000,000	-----	$ 6,000

B. Liquidated Damages.

Delete all the information in this section and **Substitute** the following:

"For each calendar day during which there are substantial deficiencies in compliance with the requirements of this section, liquidated damages will be assessed in addition to non-payment for deficiencies."

Add the following:

"***D. Non-Performance.*** Failure to maintain the work area to the satisfaction of the Engineer, in accordance with the work zone traffic control plans, the Schedule and Suspension of Work, and/or the specific conditions of the contract, will be considered a substantial deficiency and no payment will be made in accordance with Table 619-7."

619-5.06 Temporary Pavement Markings.

Delete the last sentence and **Substitute** the following:

"No additional payments shall be provided for markings required because the Contractor failed to place the next pavement course or the final pavement markings as specified under Section 619-3.06A."

619-5.19 Nighttime Operations.

Delete "portable lighting" in the first sentence and **Substitute** "nighttime operations".

SECTION 625 – SURVEY OPERATIONS

625-3 CONSTRUCTION DETAILS

619-3.02 Survey Operations.

C. Automated Stakeout and Automated Machine Guidance Operations.

Add the following:

"Contractors using precision GPS-guided equipment operating in the 900 MHz ISM band within a 1,000-foot line-of-sight of any toll lane, open-road tolling facility or TRANSMIT reader must program the radio equipment to 918 MHz to avoid the 912 MHz portion of the ISM band."

Section 700
MATERIALS and MANUFACTURING

SECTION 723 – LIGHTING

723-60 ANCHOR BOLTS

MATERIALS REQUIREMENTS.

Delete all the information in this section and **Substitute** the following:

"Anchor bolts shall meet the requirements of ASTM A325 or ASTM A449. Hex nuts, hardened washers and plate washers as described or shown on the Contract Drawings shall be supplied for each anchor bolt. Hex nuts shall be Heavy Hex conforming to ASTM A563, Grade DH or ASTM A194, Grade 2H. Hardened washers shall be ASTM F436. Plate washers shall be ASTM A36 steel. The nuts, washers and anchor bolts shall be galvanized in accordance with the requirements for Type II or Type V galvanizing as stated in Section 719-01, Galvanized Coatings and Repair Methods. The anchor bolt dimensions shall be as shown on the plans."

SECTION 729 – TEMPORARY TRAFFIC CONTROL DEVICES

729-12 TRUCK-MOUNTED AND TRAILER MOUNTED IMPACT ATTENUATORS

SCOPE.

Delete "barrier trailers" and **Substitute** "barrier vehicles and shadow vehicles."

REVISIONS TO
NEW YORK STATE THRUWAY AUTHORITY ADDENDUM
TO THE STANDARD SPECIFICATIONS

The following revisions have been incorporated into the New York State Thruway Authority Addendum to the Standard Specifications since its initial issuance of January 1, 2016:

1. **109-05 EXTRA WORK AND TIME RELATED COMPENSATION**, ***B. Force Account Work***, ***1. Contractor Costs***, *c. Equipment, (2) Ownership Costs;* in the sentence added to the end of the fourth paragraph, "8 hours in a shift" was changed to "8 hours in a day." (01/21/16)

2. References to a specific publication date of the NYSDOT Standard Specifications have been removed from the opening paragraphs. The effective edition (date) of the Standard Specifications for an NYSTA contract will be indicated on the front cover of the proposal. (03/29/16)

3. **102-08 STANDARD CLAUSES FOR ALL NEW YORK STATE THRUWAY AUTHORITY AND NEW YORK STATE CANAL CORPORATION CONSTRUCTION CONTRACTS AND FEDERALLY-FUNDED PROCUREMENT CONTRACTS (APPENDIX A):**

   - "Procurement" has been deleted from the title of this section. (03/29/16)
   - 4. NON-DISCRIMINATION REQUIRMENTS; information regarding equal employment opportunity rights has been updated. (03/29/16)
   - IRAN DIVESTMENT ACT has been inserted as Article 19 and the succeeding articles have been renumbered. (03/29/16)

4. **102-12 D/M/WBE UTILIZATION, D. Counting D/M/WBE Participation Towards the D/M/WBE Goal(s),** ***3. Material Suppliers;*** the % of the expenditure to an M/WBE Material Supplier counted toward the M/WBE goals was reduced from 100% to 60%. (05/16/16).
   4. Brokers/Manufacturer's Representatives; a sentence was added at the end of the paragraph per updated New York State Department of Economic Development policy that the monetary value for fees, or the markup percentage, will be credited when an MWBE broker is used. (05/16/16).

SPECIAL SPECIFICATIONS

SPECIAL NOTE
SPECIAL SPECIFICATION PAY ITEM NUMBERS

The Contractor's attention is directed to the special specification pay item formats used in this contract. Special specification pay items may be presented in two (2) different formats:

Format 1: Pay items for a special specification will have three (3) digits to the left of the decimal point and up to eight (8) digits to the right of the decimal. Spaces may appear in the third to sixth places after the decimal. The 7th and 8th digits to the right of the decimal will represent the origin of the specification.

Format 2: Pay items for a special specification will have three (3) digits to the left of the decimal point and up to eight (8) digits to the right of the decimal. Dashes may appear in the third to sixth places after the decimal. The 7th and 8th digits to the right of the decimal will represent the origin of the specification.

Where items in this contract appear in multiple formats, the formats shall be equated to each other as illustrated below:

FORMAT 1	**FORMAT 2**
XXX.XX XX	XXX.XX--------XX
XXX.XXXX XX	XXX.XXXX----XX
XXX.XXXXXXX	XXX.XXXXXXXX

1. DESCRIPTION:

1.01 Furnish all labor, materials, equipment and services necessary to complete the work as indicated on the Contract Plans and the attached Specification Summary.

1.02 All work shall conform to the requirements specified in Part 1 – General (or Common Components and Concerns for Section 010000), of the Sections listed.

2. MATERIALS:

2.01 The materials shall be as specified in Part 2 – Products, of the Sections listed.

3. CONSTRUCTION DETAILS:

3.01 The construction details shall be as specified in Part 3 – Execution, of the Sections listed.

4. METHOD OF MEASUREMENT:

4.01 This item shall be measured for payment on a lump sum basis for the work completed in accordance with the Contract Documents and as directed by the Engineer.

5. BASIS OF PAYMENT:

5.01 Payment for this item shall be made at the lump sum bid price bid. The lump sum price bid shall include cost of furnishing all labor, material, equipment and appliances necessary to complete the work as indicated on the Contract Plans and as specified herein in the Sections listed.

5.02 Detailed Estimate:

A. Before the first certificate of payment is issued for the work under this item, submit a detailed estimate of quantities and prices for all materials, labor, and other items included under this item, which shall aggregate the contract lump sum price bid for this item. Prepare the detailed estimate in the same sequence as the Sections listed.

B. The detailed estimate shall be supported by such evidence, including certified copies of subcontracts, as the Engineer may require.

C. The detailed estimate must be approved by the Engineer who may revise it as, in his/her reasonable judgment, is necessary to make the various items conform to their true values. The value of each certificate of payment will be based on the approved detailed estimate.

5.03 Monthly payments will be made for this item in proportion to the total amount of work completed.

1. SPECIFICATION SUMMARY

1.01 This item includes the following specifications:

A. Section 010000 – General Notes
B. Section 011000 – Summary
C. Section 014523 – Special Inspection and Testing
D. Section 015000 – Temporary Facilities and Controls

1.02 This item shall include, but not be limited to, the following:

A. The general administrative requirements of the work of this Contract.
B. Requirements not found in the Standard Specifications but an integral part of most building related construction projects. These requirements are listed in Section 01 0000 – General Notes.
C. Temporary facilities and controls required to conduct the work of this Contract.

SECTION 010000 – GENERAL NOTES

PART 1 - COMMON COMPONENTS AND CONCERNS

1.1 GENERAL

A. All work included under this contract is to be governed by and in conformance with the New York State Department of Tran sportation's (NYSDOT) Standard Specifications with all provision s in effect as of May 1, 2016 except as modified in these Plans and by the Proposal.

B. The Contract Documents (Plans and Specificati ons) utilize specification item numbers from or in the NYSDO T Standard Specifications format. Special Specifications for buil ding related construction work have been written utilizing item number series "627.00XX - - 25". The "XX" is listed as "01 through 48" in accordance with th e divisions of the Construction Specification Institute's (CSI) MasterFormat classification standard.

C. The Contractor may include the cost for provi ding required insurances and bonds under it em number 627.0001 - - 25.

D. The project descriptions are general outlines of th e work and shall not be construed as co mplete descriptions of the work to be performed under this Contract. In addition, the project descriptions do not necessarily indicate the construction sequence.

E. The Contractor is advised that additional "Notes" will be found on the drawings. Such "Note s", while pertaining to the specific sheets they are placed on, also supplement the General Notes listed herein.

F. The Contractor shall protect his work ers at all ti mes in conformance with applicable OSHA regulations.

G. Whenever items in the Contract require materials to be removed and disposed, the cost of using an approved disposal area and transportation to the area shall be included in theunit price bid forthose items.

H. The Contractor is to visit the site before bidding, to become familiarized with the field conditions and to judge the extent andnature of thework to be done under the contract. No extra compensation will be allow ed to the Contractor because of the Contractor's failure to include in his/her bid all items and materials which the Contractor is requi red to furnish in accordance with the Contract Documents. The Contractor m ust h ave in his/her possessio n a set of project plans and specifications for identification purposes when visiting the site.

I. All dimensions and existing conditions shall be field verified by the Contractor.

J. The Engineer will deter mine the location of the Contractor staging area based on available space and ongoing operations.

K. The Contractor shall be responsible for restoring the site to its original conditi on unless indicated otherwise.

1.2 CODE COMPLIANCE AND STANDARDS

A. All work to be done under this Contract shall conform to the New York State Uniform Fire Prevention and Building Code (19 NYCRR) and its reference standards.

B. The Contractor shall comply with all applicable laws which pertain to the work to be done. The Contractor shall also comply with the owner's instructions and regulations pertaining to signs, advertising, fire and/or smoke.

C. The Contractor shall obtain, maintain and pay for all permits, fees and licenses legally required and shall give all notices, and comply with all laws, rules and regulations applicable to the work.

D. Where provisions of the pertinent codes, standards, regulations or Contract Documents conflict, the most stringent provision shall govern.

E. Prior to beginning construction work on or in buildings, the Contractor or any of the subcontractors involved shall obtain a Construction Permit from the NYSTA Syracuse Division Code Compliance Specialist.

1.3 CONFINED SPACE ENTRY

A. Contractor shall be solely responsible to comply with all regulations regarding worker safety, including confined space entry. Contractor to submit confined space plan to the Engineer for review and approval.

B. Confined space and permit-required confined space are defined in Title 29, Part 1910, Section 146 of the Code of Federal Regulations (29 CFR 1910.146).

1. Indicated confined spaces are not intended to limit or define Contractor's or subcontractors' regulatory compliance requirements. In addition to confined spaces indicated on the drawings, other confined spaces may be present or created by the work of this Contract.

2. Furnish, at no additional cost to the Thruway Authority, personnel, as directed, to allow the Engineer to enter confined space and permit-required confined space in compliance with Title 29, Part 1910, Section 146 of the Code of Federal Regulations (29 CFR 1910.146).

1.4 MATERIALS AND LABOR

A. All materials, equipment and articles used permanently in the work which become the property of the Thruway Authority shall be new unless specifically stated otherwise.

B. Whenever any product is specified by the name, trade name, make or catalog number or any manufacturer or supplier, the intent is not to limit competition but to establish a standard of quality which the Thruway Director, Office of Construction Management (hereinafter referred to as "Director of Construction Management") has determined is necessary. The words "or equal" shall be deemed inserted in each instance. The Contractor may use any product equal to that named in the Contract Documents which is approved by the Engineer and which meets the requirements of the Contract Documents, providing the Contractor gives timely notice of his/her intent in

accordance with the submittal and scheduling requirements of the NYSDOT's Standard Specifications of May 1, 2016, Section 100, and the NYS Thruway Authority Addendum dated 05/16.

C. The Contractor shall have the burden of proving at his own cost and expense to the satisfaction of the Engineer that the proposed product is equal to the named product. The Engineer may establish criteria for product approval. The Director of Construction Management shall determine in his/her absolute discretion whether a proposed product is to be approved.

D. If the Contractor fails to comply with these provisions, or if the Engineer determines that the proposed product is not equal to that named, the Contractor shall supply the product named.

E. The Contractor shall have and make no claim for the extension of time or for damages because the Engineer requires a reasonable period of time to consider a product proposed by the Contractor or because the Engineer disapproves such a product.

F. Where optional materials or methods are specified, or where "or equal" submissions are approved, the Contractor shall make all adjustments to contingent work necessary to accommodate the option he/she selects.

G. **Royalties and Patents:** The Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and shall save the Thruway Authority harmless from loss on account thereof, except that the Thruway Authority shall be responsible for all such loss when a particular design, process or the product of a particular manufacturer or manufacturers is specified.

1.5 TOPOGRAPHIC SURVEY AND UTILITIES

A. The location, nature, and alignment of underground utilities are based on utility evidence visible at the ground surface and are considered to be schematic only.

B. Survey information does not claim to show all underground utilities, others may exist in the work area. Identification of all utilities within the work area shall be sole responsibility of the Contractor.

C. The Contractor and subcontractors are directed to contact **"DIG SAFELY NEW YORK"** by calling 811 prior to starting work.

D. The Contractor shall protect overhead and underground utilities to prevent damage or interruption of services. The Engineer and utility owner shall be notified if utility is disturbed. The cost of restoring service or repair of any damage shall be borne by the Contractor.

1.6 USE OF PREMISES

A. For the duration of the construction period, Contractor activities including the use of the site shall be coordinated to minimize interference with ongoing Thruway Authority operations, tenant(s), the traveling public, or other Contractor.

B. All Contractor activities are subject to approval of the Engineer.

C. Limit use of premises to work areas indicated. Do not disturb portions of site beyond areas in which the work is indicated.

D. Keep driveways and entrances serving the premises clear and available to the Authority, other Contractors and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

1. Schedule deliveries to minimize use of driveways and entrances by construction operations.

2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

E. Work hours shall be established by the Authority through the Engineer. The Contractor shall notify the Engineer of the intent to start work 48 hours in advance.

F. Maintain existing building in weather tight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during the construction period

G. The Contractor shall inform the Engineer of work area access requirements. The Engineer will coordinate and schedule access with Thruway Authority staff to obtain and ensure timely availability of work areas.

H. Utility shutdowns shall be approved by the Engineer. Schedule interruptions with the Engineer for time and duration. Interruptions shall be limited to minimize impact on operations.

I. Be responsible and accountable for employees, suppliers, subcontractors and their employees, with regard to their use of the premises. Direct them to comply with the Thruway Authority regulations and with the security and traffic regulations.

J. Comply with applicable Federal Hazard Communication Standard and State of New York Right-To-Know Law provisions and supply copies of the appropriate safety data sheets (SDS) to the Engineer, and to the Thruway Authority's Right-To-Know information officer.

K. Direct employees to be watchful for people in or near the work area where safety hazards may be present.

L. Report fire and other emergency situations to the Engineer immediately.

1.7 STAGING AREA

A. The Contractor shall limit the staging of materials to the work limits indicated, or as directed and defined at the Pre-Construction Meeting.

1.8 WORK ZONE TRAFFIC CONTROL

A. Work Zone Traffic Control (WZTC) shall be complied with throughout the length and duration of the Contract in accordance withthe "Manual on Uniform Traffic Control Devices" and the Contract Documents.

B. **Protection of the Public:** The Contractor shall maintain and protect Authority traffic in accordance with the NYSDOT's Standard Specifications (with all provisions in effect as of May 1, 2016) Section 619, the traffic control sheets and pertinent provisions of the Manual on Uniform Traffic Control Devices. The Contractor's attention is directed to the requirements of Section 107, Legal Relations and Responsibility to Public, of the NYSDOT's Standard Specifications with all provisions in effect as of May 1, 2016.

1.9 RECONSTRUCTION NOTES

A. The Contractor shall examine and verify, in the field, all conditions and dimensions. Dimensions of the existing structures shown on these plans are for general reference only. They have been taken from the original construction or subsequent rehabilitation drawings and are not guaranteed. The Contractor shall take all such field measurements to assure proper fit of the finished work, and the Contractor shall assume full responsibility for their accuracy. If field conditions and dimensions differ from those shown on the plans, the Contractor shall use the field conditions and dimensions and make the appropriate changes to those shown on the plans, as approved by the Engineer. When shop drawings based on field measurements are submitted for approval, the field measurements made shall be indicated on the shop drawings submitted for reference of the reviewer.

B. The Contractor's attention is directed to the fact that, due to the nature of reconstruction projects, the exact extent of reconstruction work cannot always be accurately determined prior to the commencement of work. These Contract Documents have been prepared based on field inspection and other information available at the time. Actual field conditions may require modifications to construction details and work quantities. The Contractor shall perform the work in accordance with field conditions and as approved by the Engineer.

C. The Contractor will be held responsible for all damage to the existing facilities caused by his operations. All damage to the existing facilities which is not part of the intended work shall be repaired by the Contractor to the satisfaction of the Engineer without cost to the Authority.

D. The Contractor shall limit his removal operations so as not to unduly disturb underlying materials that are to remain in place. The Contractor shall perform all work with care so that any materials that are to remain will not be damaged. If the Contractor damages any materials which are to remain in place, or which are to remain the property of the Authority, the damaged material shall be repaired or replaced in a manner satisfactory to the Engineer at the expense of the Contractor.

1.10 COORDINATION

A. Schedule construction operations in the sequence best suited to accomplish the work especially where one part depends on the installation of the other.

1.11 REMOVAL & EXCAVATION NOTES

A. The Contractor shall provide all temporary supports, bracing and other devices required or directed by the Engineer to protect the safety of the adjacent structures, roadway and utilities.

B. The Contractor shall saw cut (straight line cuts) and remove existing asphalt concrete pavement and concrete where required for the installation of new work. Pavement and concrete shall be replaced in kind unless otherwise noted. Re-cut edges damaged by construction operations.

1.12 SPOIL

A. The Contractor's attention is directed to the fact that no spoil area is available for this contract within the Thruway's Right-of-Way. All spoil shall be removed from the Thruway property and shall be managed and disposed of in accordance with Section 107-10 of the NYSDOT Standard Specifications. The Contractor shall comply with all local, state, and federal regulations that apply to the off-site disposal areas. All costs associated with the removal and lawful disposal of spoil materials shall be borne by the Contractor.

1.13 REINFORCEMENT NOTES

A. All steel reinforcing bars used in concrete components shall be galvanized and fabricated in accordance with ASTM A767 and meet the requirements of NYSDOT Spec Subsections 709-11 Galvanized Bar Reinforcement and 709-01 Bar Reinforcement, Grade 60, or 709-14 Bar Reinforcement, Grade 75.

B. Wire fabric reinforcement shall be galvanized and fabricated in accordance with ASTM A123 and ASTM A767 and meet the requirements of NYSDOT Spec Sub sections 709-02 Wire Fabric for Concrete Reinforcement and 719-01 Galvanized Coatings and Repair Methods, Type I. Exceptions to this requirement will be considered when the quantity of reinforcement is small as determined by the Engineer.

C. Reinforcement for concrete pipe shall meet the requirements of NYSDOT Spec Section 706 Concrete, Clay, and Plastic Pipe.

1.14 TRUSS NOTES

A. The Contractor shall submit truss certificate(s) containing the seal and signature of a NYS Professional Engineer or Registered Architect, as provided for Sections 7307 and 7209 of the NYS Education Law and Chapter 23 of the NYS Uniform Fire Prevention and Building Code.

1.15 PIPING

A. Minimum cover over pipes shall be 4'-0", unless noted otherwise.

B. Provide 5'-0" minimum clearance distance between water and sewer lines.

C. **Utility Trenches:** Install continuous red metallic warning tape above piping, conduit, etc. unless noted otherwise. The warning tape is to be installed 6" below finished grade.

D. All vertical and horizontal bends may not be depicted on drawings.

E. Provide all necessary fittings and adapters required to properly connect piping materials.

1.16 ELECTRICAL

A. All electrical work to be performed under this contract shall comply with the provisions of Chapter 27 of the NYS Uniform Fire Prevention and Building Code and its referenced standards, including NFPA 70 (NEC National Electrical Code) and NFPA 70E (Standard for Electrical Safety in the Workplace).

B. All electrical work shall be performed by or under the supervision of a Master Electrician licensed in a New York State municipality.

C. Provide an electrical inspection and a report performed by a third-party inspection agency acceptable to the Authority and, if required, to the local electric utility. The report shall certify that the installation is in accordance with the Contract Documents and applicable codes. The cost associated with the inspection and report shall be included in item 627.0026 - - 25.

D. Per NFPA 70: all switchboards, panelboards, control panels and motor control centers installed under this Contract and that will be subject to service and maintenance while energized above 50 volts, shall be labeled to warn of potential arc flash hazards. Coordinate labeling with the Engineer prior to the time of final inspection.

E. Panels are shown diagrammatically. Final positioning of panels shall be approved by the Engineer.

F. Conduits are shown diagrammatically. Exact runs shall be determined by the Contractor in the field, except where specially dimensioned on the plans. Final positioning of conduit runs shall be approved by the Engineer.

G. All exposed conduit shall be run parallel to the building walls and beams except as otherwise shown on the plans.

H. All exposed conduit shall be supported by approved systems designed for the specific installation.

I. Within an existing building where conduit is required to be run exposed, such conduit is to be run within 12" of the existing ceiling with vertical drops to electrical devices run tight to walls or as approved by the Engineer.

J. Expansion fittings of the approved type shall be furnished and installed where conduits exposed or concealed pass through structural joints.

K. Exact conduit stub-up locations are to be determined by the Contractor based on certified manufacturer's drawings of respective equipment. Conduits shall be installed to agree with equipment furnished.

L. Conduit for power, lighting and communication passing through concrete floors and walls from below grade, shall be installed with approved conduit sealing fittings.

M. Underground electrical conduits that run under roadways and parking areas shall be schedule 80 PVC conduit unless noted otherwise.

N. The Contractor shall furnish and install all electrical equipment required to provide complete and operational systems.

1.17 SHOP DRAWINGS AND SAMPLES

A. Shop drawings include, but are not necessarily limited to, drawings, diagrams, illustrations, schedules, test date, performance charts, cuts, brochures, manufacturer's product data, installation instructions, certifications, material safety data sheets (MSDS), sample product warranties, special warranties, maintenance data, color samples, and material samples, etc. These data will be prepared by the Contractor, subcontractor, manufacturer, supplier or distributor and submitted by the Contractor for approval by the Engineer.

B. Samples are small physical pieces of actual materials submitted by the Contractor for review and approval by the Engineer.

C. The Contractor and the Engineer shall adhere to the submittal and scheduling requirements for shop drawings and samples as set out in the NYS Thruway Authority Addendum dated 05/16.

D. The Contractor shall review shop drawing and sample submittals, to the extent of their ability, for contract compliance before stamping as such and forwarding to the Engineer.

E. By approving and submitting shop drawings and samples, the Contractor represents that he/she has determined and verified all field measurements, field construction criteria, materials, catalog numbers and similar data and that he/she has checked and coordinated each shop drawing and sample with the requirements of the Contract Documents.

F. The Engineer's approval of shop drawings and samples shall not relieve the Contractor of responsibility for any deviation from the requirement of the Contract Documents unless the Contractor has informed the Engineer of the deviation in a separate writing at the time of submission and received written approval of the specific deviations. The Engineer's approval shall not relieve the Contractor from responsibility for errors or omissions in the shop drawings or samples.

G. No portion of the work requiring a shop drawing or sample submission shall be commenced until the appropriate submission has been approved by the Engineer.

H. Any portion of the work requiring shop drawings and samples shall be installed in accordance with the approved shop drawings and samples.

I. **Substitutions:** Defined as changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by the Contractor. Substitutions will not be considered during the bidding phase, but only after the project is awarded. Note, any product identified in the specifications with verbiage **"NO SUBSTITUTION ALLOWED"** means that this specific product is the standard of quality set by the Authority and as such **"OR EQUAL"** does not apply. Note, "I. Substitutions" is in addition to the NYS Thruway Authority Addendum dated 05/16 to the NYSDOT Standard Specifications of May 1, 2016, "Section 106 Control of Material, 106-09 Equivalents".

1.18 INSPECTION FOR CONFORMANCE

A. The Engineer will inspect and test the work at reasonable times at the site, unless the Engineer determines to make an inspection or test at the place of production, manufacturer or shipment. Such inspection or test shall be conclusive as to whether the material and workmanship inspected or

tested conforms to the requirements of the contract. Such inspection or test shall not relieve the Contractor of responsibility for damage to or loss of the material prior to acceptance, or in any way affect the continuing rights of the Engineer to reject the completed work.

B. The Contractor shall furnish promptly without additional charge all facilities, labor and material reasonably needed to perform in a safe and convenient manner such inspection and test as the Engineer requires.

C. The Contractor shall, without charge, promptly correct any work the Engineer finds does not conform to the Contract Documents unless in the Thruway Authority interest the Engineer consents to accept such work with an appropriate adjustment in the Contract price.

D. If the Contractor does not promptly correct rejected work including the work of other Contractors destroyed or damaged by removal, replacement, or correction, the Director of Construction Management may (1) correct such work and charge the cost thereof to the Contractor; or (2) terminate the Contract in accordance with the NYSDOT Standard Specifications of May 1, 2016, Section 100, and the NYS Thruway Authority Addendum dated 05/16.

E. The Contractor shall keep the Engineer informed of the progress of his work and particularly when he intends to cover work not yet inspected or tested. All inspection and tests by the Engineer shall be performed in such manner as not to unreasonably delay the work. The Contractor shall be charged with any additional cost of inspection when the work is not ready at the time specified by the Engineer for inspection.

F. At any time before acceptance of the entire work, should the Engineer wish to examine work already completed by removing, uncovering or testing the same, the Contractor shall, on request, promptly furnish all necessary facilities, labor and materials to conduct such inspection, examination or test. If such work is found to be defective or nonconforming in any material respect, the Contractor shall defray all the expenses of such examination and satisfactory reconstruction. If the work is found to meet the requirements of the Contract Documents, the Engineer shall compensate the Contractor for the additional services involved in such examination and reconstruction and if completion of the work has been delayed hereby, he shall, in addition, grant the Contractor a suitable extension of time.

G. No previous inspection or certificates of payment shall relieve the Contractor from the obligation to perform the work in accordance with the Contract Documents. The final payment shall not relieve the Contractor of the responsibility for failing to comply with the Contract Documents and he shall remedy all defects, paying the cost of any damage to other work resulting therefrom, which shall appear within a period of **one (1) year** from the date of "Acceptance." The "Acceptance Date" shall be determined at the "Joint Inspection" when all exception items have been completed to the satisfaction of the Engineer. See Closeout Procedures below, Part C.

H. Note all special inspections per Section 1704 of the NYS Uniform Fire Prevention and Building Code (19 NYCRR). Notify the Engineer when ready for such inspections.

1.19 CLOSEOUT PROCEDURES

A. **Detailed Inspection:** The Engineer will advise the Contractor of the date and time of the detailed inspection (detailed inspection occurs when the Engineer determines the work to be **substantially complete**).

1. The Contractor will have already performed the following and must provide items as listed at the start of the detailed inspection:

   a. Deliver tools, spare parts, extra material, and similar items to a location designated by the Authority.
   b. Label all panels, disconnects, equipment. Label type shall be approved by the Engineer prior to placing labels on the panels, equipment, etc.
   c. Make final changeover of permanent locks and deliver keys to the Engineer. Advise the Engineer and Authority of changeover in security provisions.
   d. Complete startup testing of systems.
   e. Advise Engineer and Authority of changeover in heat and other utilities.
   f. Assemble two (2) complete sets of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Identify each binder (8 ½ x 11”), on front and spine of each binder, with the printed title “Operation and Maintenance Instructions”, title of project, and subject matter of binder when multiple binders are required. Include operation and maintenance data required in individual specification sections and as follows:

      1) **Operation Data**:

         i. Emergency instructions and procedures
         ii. System, subsystem, and equipment descriptions, including operating standards
         iii. Operating procedures, including startup, shutdown, seasonal, and weekend operations
         iv. Description of controls and sequence of operations
         v. Piping diagrams

      2) **Maintenance Data:**

         i. Manufacturer’s information, including list of parts
         ii. Name, address, and telephone number of installer or supplier
         iii. Maintenance procedures
         iv. Maintenance and service schedules for preventive and routine maintenance
         v. Maintenance record forms
         vi. Sources of spare parts and maintenance materials
         vii. Copies of maintenance service agreements
         viii. Emergency instructions and procedures

   g. **Demonstration and Training**:

      1) Instruction: Instruct Authority personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system. Schedule the instruction sessions through the Engineer, and provide instructors experienced in operation and maintenance procedures. Include instruction for the following:

         i. Review of documentation

ii. Operations
iii. Adjustments
iv. Troubleshooting
v. Maintenance
vi. Repair

2) Provide equipment specific training as required in any applicable specification sections of the Contract Proposal

2. The Contractor shall submit the following either prior too or at the start of the Detailed Inspection:

a. List of items to be completed and corrected (Punch List)
b. Test/adjust/balance report/records

B. **Final Inspection**: The Engineer will advise the Contractor of the date and time of the final inspection. A copy of the final inspection list containing all incomplete or unsatisfactory items and the time allowed to complete the work will be furnished to the Contractor. The Contractor shall complete the following at this time:

1. Complete final cleaning requirements, including touch-up painting.

2. Touch up and otherwise repair and restore marred exposed finishes.

a. **General:** Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and federal and local environmental and anti-pollution regulations.

b. **Cleaning:** Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1) Clean project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
2) Sweep paved areas broom clean.
3) Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
4) Remove tools, construction equipment, machinery, and surplus material from project site.
5) Complete removal of temporary facilities not already removed.
6) Remove debris from limited access spaces, including roofs, plenums, shafts, equipment vaults, manholes, attics, and similar spaces.
7) Vacuum carpet and similar soft surfaces.
8) Clean mirrors and glass in doors and windows.
9) Remove labels that are not permanent.
10) Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored.
i. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

11) Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
12) Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
13) Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grilles.
14) Clean ducts, blowers, and coils.
15) Clean light fixtures, lamps, globes, and reflectors to function with full efficiency Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

3. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Authority property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from project site and dispose of them in accordance with Section 107-10 of the NYSDOT Standard Specifications.

C. **Joint Inspection:** The joint inspection for physical completion will be made by the Engineer accompanied by the Contractor and the representatives from the Authority to verify completion of the exception items listed in the Final Inspection list. The verification of the completeness of all the exception items will enable the "Acceptance" by the Director, Department of Engineering or his/her designee. The purpose of having the "Acceptance Date" is to establish and record a date when all physical work of a contract is completed in accordance with contract requirements and to provide for the date of commencement of any guarantee period and a firm date in the consideration of any Liquidated Damages.

D. **Warranties and Bonds:** When the "Acceptance Date" has been established, the Contractor shall submit specified warranties and bonds.

1. Assemble two (2) complete sets of warranties and bonds. Identify each binder (8 ½ x 11"), on front and spine of each binder, with the printed title "Warranties and Bonds" and title of project. Include warranties and bond data required in individual specification sections.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION (not used)

END OF SECTION 010000

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 PROJECT INFORMATION

A. **Project Identification**: Wash Bay Installation at Existing Vehicle Storage Buildings at the Henrietta and Batavia Maintenance Sites

1. **Project Locations**: New York State Thruway, Buffalo Division
   a. Building M4439 at Henrietta Maintenance Site , Thruway Interchange 46, Milepost (MP) 362.4, Town of Henrietta, Monroe County
      Note: the "Henrietta Maintenance Site" may also be referred to as "West Henrietta Section Maintenance" by Thruway Authority personnel.

   b. Building M4540 at Batavia Maintenance Site, Thruway Interchange 48, MP 390.1, Town of Batavia, Genesee County

2. **Owner**: New York State Thruway Authority (also referred to as "Authority" or "NYSTA" in the Contract documents)

   Contact: Sean Carrington, P.E., Buffalo Division Facilities Engineer
   455 Cayuga Road, Suite 800
   Cheektowaga, NY 14225-1309
   716-635-6224
   sean.carrington@thruway.ny.gov

   Secondary contact: Jonathan McKee, Buffalo Division Building Maintenance Supervisor
   1870 Walden Avenue
   Cheektowaga, NY 14225
   716-891-3535
   jonathan.mckee@thruway.ny.gov

   Code Compliance Specialist: Fredrick Harris
   455 Cayuga Road, Suite 800
   Cheektowaga, NY 14225-1309
   716-635-6276
   fred.harris@thruway.ny.gov

B. **NYSTA Buffalo Division Construction Management**:

Thomas Hurley, P.E., 716-635-6260, thomas.hurley@thruway.ny.gov

C. **NYSTA Buffalo Division Traffic Supervisor**:

Charles Schmidt, 716-635-6231, charles.schmidt@thruway.ny.gov

D. **Construction Inspector** (referred to as "Engineer" or "NYSTA Representative" in the Contract documents): will be either a NYSTA employee or a consultant acting on behalf of the NYSTA. The Engineer has direct supervision of the execution of this Contract and shall be involved during all phases of construction. The Contractor shall inform the Engineer of any communications with a utility provider or any other outside entity involved during construction.

E. **Designer:** The Contract documents were prepared by Watts Architecture & Engineering, D.P.C., 95 Perry Street, Suite 300, Buffalo, New York 14203.

Contact: John Honan, P.E., Senior Associate, 716-206-5112, jhonan@watts-ae.com

F. **Henrietta Maintenance Site**: telephone number 585-334-3886

G. **Batavia Maintenance Site**: telephone number 585-343-7313

H. **Geotechnical Information**:

1. Refer to the geotechnical report and soil boring logs available on the NYSTA website.

2. The Contractor shall conduct any additional subsurface investigation that he/she deems necessary; the cost of this work shall be included in item 627.0001 - - 25.

I. **Drawings of Existing Vehicle Storage Buildings M4439 and M4540**:

1. Refer to the shop drawings available on the NYSTA website.

J. **Type of Contract**: Project will be constructed under a single prime general construction contract.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Refer to Contract Plan Sheet G-100 for a description of the Work.

1.3 ACCESS TO WORK SITES

A. Use of Site: Do not disturb portions of Project sites beyond areas in which the Work is indicated.
1. Driveways, Walkways and Entrances: Keep driveways, parking areas, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

B. Condition of Existing Buildings: Maintain portions of existing buildings affected by construction operations in a weather tight condition throughout construction period. Repair damage caused by construction operations.

C. The Contractor shall only park commercial vehicles near the work sites.

1.4 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy site and existing buildings during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
2. Notify Owner **not less than 72 hours** in advance of activities that will affect Owner's operations, including any necessary power interruptions at the existing Vehicle Storage Buildings.

1.5 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 48-division format and CSI's "MasterFormat" numbering system.
1. Section Identification: The Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 014523 - SPECIAL INSPECTION AND TESTING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Special Inspection and Structural Testing shall be in accordance Chapter 17 of the Building Code of New York State 2010 (BCNYS).

B. The program of Special Inspection and Structural 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.

1.2 RELATED DOCUMENTS

A. Statement of Special Inspections and Tests (attached)

1.3 SCHEDULE OF INSPECTIONS AND TESTS

A. Required inspections and tests are described herein and in the individual specification Sections for the items to be inspected or tested.

B. An Independent Testing Laboratory (ITL) will be retained by the Owner. The Special Inspector, his agents and the ITL shall perform, but not be limited to, the following project testing and inspection services:

(a.) Concrete

(b.) Masonry

(c.) Reinforcing steel

1.4 ITL TESTING AND INSPECTION FREQUENCY

A. Specific items to be tested and the frequency as to which the tests are to be performed are as noted in this Specification Section on the attached "Statement of Special Inspections and Tests."

1.5 PAYMENT

A. The Owner shall engage and pay for the services of the Special Inspector, Agents of the Special Inspector, and Testing Laboratory.

B. The Contractor shall be responsible for the cost of any retesting or reinspection of work which fails to comply with the requirements of the Contract Documents

1.6 CONTRACTOR'S RESPONSIBILITIES

A. Contractor shall cooperate with the Special Inspector, his agents, the ITL and the Engineer to facilitate the execution of required services.

B. Contractor is responsible for coordinating his work with the Engineer and ITL so that no work is installed without the proper tests being performed.

C. Contractor shall secure for the ITL, where required, quantities of samples of materials to be tested.

D. Contractor shall furnish casual labor and facilities for storage of test samples.

E. Contractor shall assist ITL to obtain samples at job site.

F. Contractor shall provide concrete plant mix certifications.

G. Contractor shall provide certified mill reports for project reinforcing and structural steel covering physical and chemical properties.

H. Contractor shall advise ITL, in advance, of sources of material, and instruct supplier to cooperate with ITL to achieve required inspection.

I. Contractor shall notify the ITL a minimum of 24 hours in advance of operations to allow for ITL assignment of personnel and scheduling of test. If ITL visits site and tests cannot take place, Contractor shall reimburse the Owner for total cost.

J. Contractor shall provide mortar and grout mix plant mix designs.

K. Contractor shall notify ITL 24 hours before each concrete pour and identify the proposed quantity of the pour.

L. The Engineer shall keep at the project site the latest set of construction drawings, field sketches, approved shop drawings, and specifications for use by the inspectors and testing technicians.

M. The Special Inspection program shall in no way relieve the Contractor of his obligation to perform work in accordance with the requirements of the Contract Documents or from implementing an effective Quality Control program. All work that is subjected to Special Inspections shall first be reviewed by the Contractor’s quality control personnel.

N. The Contractor shall be solely responsible for construction site safety.

O. Contractor's responsibility related to project testing as required by technical sections hereinafter:

1. The Contractor shall provide advanced notice (7 days) when Special Inspection is required so the Engineer can schedule the Inspection Service.

2. The Contractor shall obtain from governing authorities the proper test procedures that are required for the system tests.

3. All tests shall be made in the presence of the Engineer and the Contractor. The Inspection Service shall provide five (5) copies of test data and results to the Engineer.

4. See technical sections hereinafter for further details of testing requirements.

PART 2 PRODUCTS (Not used)

PART 3 EXECUTION

3.1 TESTING REQUIREMENTS

A. General

1. Testing shall be by the Special Inspector and Testing Laboratory and its agents, unless noted otherwise herein.

2. Owner's providing and use of testing services shall in no way relieve the Contractor of his responsibility to furnish materials and construction in full compliance with drawings and specifications.

B. Concrete

1. The Testing Laboratory services shall include: daily inspection of concrete placement; testing for air content, slump and strength out of the same batch of fresh concrete; laboratory curing of test specimens; test for compressive strength made on cured test specimens; also include furnishing of cylinder molds.

2. Minimum of one compression strength test for each 50 cubic yards and/or each 5,000 square feet of floor slab placed on each class of concrete being used, but not less than one test for each day's work. Each test is comprised of six (6) test cylinder specimens, with additional tests required whenever there is a change in consistency, materials or temperature. These specimens shall be made and cured in accordance with ASTM C31.

3. Take slump test in accordance with ASTM C143. The minimum slump tests required are one slump test at the beginning of each day’s pour and an additional test when test cylinders are made or whenever there is a change in formulation or materials of the mix.

4. Check and note temperature of the concrete.

5. Provide periodic inspection of curing procedures for concrete floor slabs.

6. Observe and approve the addition of water or other additives to the approved mix after the concrete truck leaves the batch plant.

7. Continuous Inspection of bolts to be installed in concrete prior to and during placement

8. Testing Laboratory shall be responsible for proper handling of test cylinders including transfer to testing laboratory. Contractor shall provide adequate approved facilities on project site for proper storing and curing of test cylinders in accordance with ASTM C31 for the first 24 hours after which same shall be transferred.

9. Test specimens in accordance with ASTM C39. Two cylinders shall be tested at 7 days, two at 28 days, and two shall be kept as a spare. In case of questionable or unsatisfactory

results, the remaining cylinders shall be broken at 40 days or as directed by the Engineer.

10. Slump exceeding the specified maximum, when occurring in two consecutive tests made on different portions of the same sample, will be cause for rejection.

11. Provide the following air content tests:

    a. First load delivered for each segment of the construction project, such as caissons, columns, walls, slabs, retaining walls, planters, etc., shall be tested by a representative of testing and inspection laboratory using ASTM air meter equipment and procedures. Slump test and strength test shall be made by testing laboratory representative from the same batch of concrete as used for air test.

    b. Air indicator readings shall be taken from same load to validate use of air indicator readings.

    c. Air indicator tests shall be made on the first load delivered in the morning and afternoon until segment of the project is completed and also when any change in consistency or appearance of the concrete so suggests.

    d. Air indicator tests shall also be made on samples of screeded and floated-in-place concrete as are necessary to give assurance that handling, compacting and finishing methods employed by Contractor do not result in an unwarranted reduction in the air content of concrete. If air content of floated concrete is indicated to be more than one half of one percent less then that indicated by the compaction test on sample taken at the delivery chute, Contractor shall at once take steps to correct, revising his procedures as may be necessary.

    e. Measure air content in accordance with ASTM

12. Additional testing shall be required if 28-day test cylinders show strengths less than that which is required on this project. Cost of' these tests shall be borne by Contractor and may include breaking spare test cylinders, core tests and load tests, also use of mechanical, electrical or electronic testing devices. Any of the foregoing tests shall be done only by specific authorization and direction of Engineer.

13. Additional testing shall also be required if there is evidence of faulty workmanship, frozen concrete, or any violation of project requirements and these tests shall be as directed by the Engineer.

14. Any non-compliance with project requirements will be duly reported. These reports will completely describe mix tested, location of pour, weather and other pertinent data.

15. To facilitate concrete testing services, the Contractor shall:

    a. Secure and deliver to the Engineer, without cost, preliminary representative samples of materials he proposes to use and which are required to be tested.

    b. Submit to the Engineer, the concrete mix design and confirming compression test results proposed for use, and make written request for approval.

c. Furnish such casual labor as is necessary to obtain and handle samples at the project or at other sources of materials.

d. Advise the testing laboratory sufficiently in advance of operations to allow for completion of quality tests and for the assignment of personnel.

e. Provide and maintain for the sole use of testing laboratory, adequate facilities for safe storage and proper curing of concrete test cylinders on project site for the first 24 hours as required by ASTM C31.

f. Furnish copies of mill test reports of all shipments of cement and reinforcing steel to the engineer and the testing laboratory as required.

16. Test results obtained by use of an impact hammer or sonoscope, unless correlated with other test data, shall not be considered conclusive in evaluating strengths of concrete.

C. Reinforcing Steel

1. Periodically inspect the placement, spacing, and size of reinforcing bars before concrete and masonry placement.

3.3 FINAL REPORT OF SPECIAL INSPECTIONS

A. The Final Report of Special Inspections shall be completed by the Special Inspector and /or the Testing Laboratory and be submitted to the Engineer prior to issuance of a Acceptance. The engineer shall provide a copy of the Final Report of Special Inspections to the Division Code Enforcement Officer.

Statement of Special Inspections and Tests

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE (TABLE)	CHECK IF REQUIRED	IDENTIFY SECTION IN SPEC 01410 AND CLARIFYING NOTES
A. Steel Construction				(Table 1704.3)	☐	3.1H (unless noted otherwise)
1. Material verification of high-strength bolts, nuts, and washers.			Applicable ASTM specifications. AISC ASD, Section A3.4	1704.3	☐	
2. Inspection at Fabrication Shop			ASTM Specs	1704.2	☐	
3. Inspection of high strength bolting.				1704.3.3	☐	
4. Material verification of structural steel.			ASTM A6 or A568	1704.3	☐	
5. Material verification of weld filler materials			AISC, ASD, Section A3.6	1704.3	☐	
6. Inspection of structural steel welding.			AWS D1.1, D1.3, D1.4; ACI 318:3.5.2	1704.3, 1704.3.1	☐	
7. Inspection of steel frame joint details.				1704.3, 1704.3.2	☐	
8. Steel joists & girders field erection.				1704.3.2	☐	3.1I
9. Metal roof & floor deck erection.				1704.3, 1704.3.1	☐	3.1J
B. Concrete Construction				(Table 1704.4)	☐	3.1E (unless noted otherwise)
1. Inspection of reinforcing steel, including prestressing tendons, and placement		X	ACI 318: 3.5, 7.1-7.7	1704.4, 1903.1, 1907,	☒	3.1F
2. Inspection of reinforcing steel welding.			AWS D1.4; ACI 318: 3.5.2	1704.4; (Table 1704.3)	☐	3.1F
3. Inspection of bolts to be installed in concrete prior to and during placement.				1704.4, 1912.1	☐	
4. Verify use of required design mix.		X	ACI 318: Ch. 4, 5.2-5.4	1704.4, 1904, 1905.2-1905.4, 1913.2, 1913.3	☒	
5. Sampling fresh concrete:	X		ASTM C 172, C 173,	1704.4,	☒	

slump, air content, temperature, strength test specimens.			C 231, C 31; ACI 318: 5.6, 5.8		1905.6, 1913.10		
6. Inspection of placement for proper application techniques.			ACI, 318: 5.9, 5.10		1704.4, 1905.9, 1905.10, 1913.6, 1913.7, 1913.8	☐	
7. Inspection for maintenance of specified curing temperature and techniques.			ACI, 318: 5.11, 5.13		1704.4, 1905.11-1905.13 1913.9	☐	
8. Inspection of prestressed concrete.			ACI 318: 18.18, 18.16.4		1704.4	☐	
9. Erection of precast concrete members.			ACI 318: Ch. 16		1704.4	☐	3.1G
10. Verification of in-situ concrete strength prior to stressing of tendons and prior to removal of shores and forms from beams and slabs.			ACI 318: 6.2		1704.4, 1906.2	☐	
C. Masonry Construction			ACI 530/ ASCE 5/TMS 402	ACI 530.1/ ASCE 6/TMS 602	(Table 1704.5.1 & 1704.5.3)		3.1D (unless noted otherwise)
1. Verify to ensure compliance:							
a. Proportions of site prepared mortar and grout		X		2.6A	1704.5	☒	
b. Placement of masonry units and construction of mortar joints.		X		3.3B	1704.5	☒	
c. Location and placement of reinforcement, connectors, tendons, anchorages.		X		3.4, 3.6A	1704.5	☒	
d. Prestressing technique and installation.				3.6A, 3.6B	1704.5	☐	3.1F
e. Grade and size of tendons and anchorages.				2.4B	1704.5	☐	3.1F
2. Inspection shall verify:					1704.5	☐	
a. Size and location of structural elements.		X		3.3G	1704.5	☒	
b. Type, size, and location of anchors.		X	1.15.4, 2.1.2		1704.5	☒	
c. Specified size, grade, location and type of reinforcement.		X	1.12	2.4, 3.4	1704.5	☒	

d. Welding of reinforcing bars.			2.1.8.6, 2.1.8.6.2		1704.5, 2108	☐	AWS D1.4, ACI 318:3.5.2
e. Cold/hot weather protection of masonry construction.				1.8	1704.5, 2104.3, 2104.4	☐	
f. Prestessing force measurement and application.				3.6B	1704.5	☐	31.F
3. Inspection prior to grouting a) Grout spaces are clean b) Proportions of grout c) Construction of mortar joints		X X X X	1.12	3.2D, 3.4	1704.5	☒	3.1F
4. Grout placement.	X			3.5	1704.5	☒	3.1F
5. Preparation of grout specimens, mortar specimens, and/or prisms.	X			1.4	1704.5	☒	
6. Compliance with documents and submittals.		X		1.5	1704.5	☒	
D. Wood Construction: Fabrication of wood structural elements and assemblies in shop and field.					1704.6, 1704.2, 1707.3, 2303.1.4 2303.4	☐	
E. Soils					(Table 1704.7)	☐	3.1B Reference approved soils report as required by 1802.2
1. Verify Materials below footings are adequate to achieve design bearing capacity					1704.7	☐	
2. Verify excavations are extended to proper depth and have reached proper material					1704.7	☐	
3. Perform classification and testing of controlled fill materials			ASTM D 1557 ASTM D 698		1704.7	☐	Not required if controlled fill is equal to or less than 12 inches
4. Verify use of proper materials, densities and lift thickness during placement and compaction of controlled fill			ASTM D 1557, ASTM D 698		1704.7	☐	
5. Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly.			ASTM D 2488		1704.7	☐	

F. Pile Foundations:				(Table 1704.8)	☐	3.1C Reference approved soils report as required by 1802.2
1. Verify pile materials, sizes and lengths comply with the requirements.				1704.8	☐	
2. Determine capacities of test piles and conduct additional load tests, as required			ASTM D 1143, ASTM D 4945, ASTM D 3639	1704.8	☐	
3. Observe driving operations and maintain complete and accurate records for each pile				1704.8	☐	
4. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document any pile damage.				1704.8	☐	
5. For steel piles perform additional inspections in accordance with Section 1704.3				1704.8	☐	
6. For concrete piles and concrete-filled piles perform additional inspections in accordance with Section 1704.4				1704.8	☐	
7. For specialty piles perform additional inspections as determined by registered design professional in charge				1704.8	☐	
8. For augered uncased piles and caisson piles perform additional inspections in accordance with Section 1704.9				1704.8	☐	
G. Pier Foundations:				(Table 1704.9)	☐	3.1C Reference approved soils report as required by 1802.2
1. Observe drilling operations and maintain complete and accurate records for each pier				1704.9	☐	

2. Verify placement locations and plumbness, confirm per diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable), and adequate end bearing strata capacity.				1704.9	☐	
3. For concrete piers, perform additional inspections in accordance with section 1704.4				1704.9	☐	
4. For masonry piers, perform additional inspections in accordance with section 1704.5				1704.9	☐	
H. Mastic and Intumescent fire-resistant coatings			AWCI-12B	1704.11	☐	
I. Exterior Insulation and Finish Systems (EIFS)				1704.12	☐	
J. Special Cases				1704.13	☐	
K. Smoke Control				909.18.8.1 1704.14	☐	
L. Special Inspections for Seismic Resistance: Applicable to specific structures, systems, and components.						
1. Structural steel			AISC Seismic	1707.2	☐	
2. Structural wood.				1707.3	☐	
3. Cold-formed steel framing.				1707.4	☐	
4. Pier Foundation				1707.5	☐	
5. Storage racks and access floors.				1707.6	☐	
6. Architectural components.				1707.7	☐	
7. Mechanical and electrical components.				1707.8	☐	
8. Designated Seismic System Verification				1707.9	☐	
9. Seismic isolation system.				1707.10	☐	
M. Structural Testing for Seismic Resistance: Applicable to specific structures, systems, and components.						
1. Testing and verification of masonry materials and assemblies.				1708.1	☐	
2. Testing for seismic resistance.				1708.2	☐	

3. Reinforcing and prestressing steel.			ACI 318	1708.3, 1903.5.2	☐	
4. Structural steel.			AISC Seismic	1708.4	☐	
5. Mechanical and electrical equipment.				1708.5	☐	
6. Seismically isolated structures.				1708.6, 1623.8	☐	
N. Structural Observations: Applicable to specific structures.				1709.1	☐	
O. Test Safe Load				1712.1	☐	
P. In-Situ Load Tests				1713.1	☐	
Q. Preconstruction Load Tests				1714.1	☐	
R. Foundation and Soil Investigations						
1. Questionable soil.				1802.2.1	☐	
2. Expansive soils.				1802.2.2	☐	
3. Groundwater table.				1802.2.3	☐	
4. Pile and pier foundations.				1802.2.4	☐	
5. Rock strata.				1802.2.5	☐	
6. Seismic Design Category C.				1802.2.6	☐	
7. Seismic Design Category D, E, F				1802.2.7	☐	
S. Soil Classification			ASTM D2488	1802.3	☐	
T. Other (List)						

END OF SECTION 014523

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Temporary utilities include, but are not limited to, the following:

1. Sewers and drainage.
2. Water service and distribution.
3. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
4. Heating and cooling facilities.
5. Ventilation.
6. Electric power service.
7. Lighting.
8. Telephone service.

C. Support facilities include, but are not limited to, the following:

1. Dewatering facilities and drains.
2. Waste disposal facilities.
3. Contractor Field office.
4. Storage and fabrication sheds.
5. Construction aids and miscellaneous services and facilities.

D. Security and protection facilities include, but are not limited to, the following:

1. Environmental protection.
2. Stormwater control.
3. Tree and plant protection.
4. Pest control.
5. Site enclosure fence.
6. Security enclosure and lockup.
7. Barricades, warning signs, and lights.
8. Temporary enclosures.
9. Temporary partitions.
10. Fire protection.

1.2 USE CHARGES

A. General: Installation and removal and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to but not limited to, the following:

1. Authority's construction forces.
2. Occupants of Project.
3. Designer/Design Consultant.
4. Testing agencies.
5. Personnel of authorities having jurisdiction.

B. Water Service: Use of water from the Authority's existing water system will be allowed without metering and without payment of use charges.

C. Electric Power Service: Use of electric power (110V to 120V) from the Authority's existing system for the operation of tools and equipment required for the work, as approved by the Engineer, will be allowed without metering and without use charges. Contractor shall provide generator for electric service interruptions for electricity used by all entities engaged in construction activities at Project site.

D. Natural Gas Service: Use of natural gas from the Authority's existing system will be allowed without metering and without payment of use charges, including for the purpose of heating interior building spaces during placement and curing of concrete in cold weather.

E. Sanitary Facilities: Use of Owner's existing restrooms and other sanitary facilities will be allowed at each project site without use charges, as long as the Contractor's personnel do not track in dirt and debris from construction activities.

1.3 SUBMITTALS

A. Temporary Utility Reports: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

B. Implementation and Termination Schedule: Within 15 days of date established for submittal of Contractor's Construction Schedule, submit a schedule indicating implementation and termination of each temporary utility.

1.4 QUALITY ASSURANCE

A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.
1. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

A. Temporary Utilities: At earliest feasible time, when acceptable to the Authority, change over from use of temporary service to use of permanent service.

1. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before the Authority's acceptance, regardless of previously assigned

responsibilities.

B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:

1. Keep temporary services and facilities clean and neat.
2. Relocate temporary services and facilities as required by progress of the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by the Engineer. Provide materials suitable for use intended.

B. Pavement: Use DOT spec Item numbers.

C. Portable Chain-Link Fencing: Minimum 2-inch 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide concrete or galvanized steel bases for supporting posts.

D. Heavy Duty Plastic Security Fencing: Conform to NYSDOT Item 607.41010010 – Temporary Plastic Barrier Fence.

E. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

F. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

G. Lumber and Plywood: Provide new materials as approved by the Engineer."

H. Paint: Comply with requirements in Proposal Specification Section "Painting."

I. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.

J. Water: Potable.

2.2 EQUIPMENT

A. General: Provide equipment suitable for use intended.

B. Field Office for Contractor's Personnel: Prefabricated with lockable entrances, operable windows, and serviceable finishes; heated and air conditioned; on foundations adequate for normal loading.

C. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

D. Authority's Construction Inspector's Field Office: **Not Required** under this Contract. The Contractor shall provide the following for the Project Engineer's use: Computer Equipment and Software, filing cabinet and Digital Camera System.

1. Computer Equipment and Software is as follows:

a. Hardware.
- CPU to operate Windows 7 for Business (32 bit edition) and all other software listed in this specification;
- 24x DVD/CD-RW combo with a supply of CD-R and CD-RW media;
- 250 GB minimum hard drive;
- 4 GB minimum RAM;
- Laptop monitor screen size 14 inch or larger (1280 x 1024 resolution minimum);
- Photo-quality color LaserJet printer capable of printing on 8 ½" x 11" and 8 ½ " x 14" paper. Supply with spare toner cartridge, standard LaserJet and photo paper, diskettes and read/write CD's;
- Locking cabinet(s) which encloses all computer hardware;
- Surge protection device;
- Modem with separate phone line for computer (if high speed internet service is unavailable), (minimum 56K baud rate);
- External 3 button optical scroll mouse.
- Flatbed Scanner -1200x1200dpi (min.), 48 bit color, 11"x17" capable

b. Software. Substitutions for the specified software shall not be permitted unless noted otherwise. All manuals shall be provided.

- Windows 7 for Business (32 bit edition);
- Microsoft Word (2010 version or later);
- Microsoft Excel (2010 version or later);
- Microsoft Photo Editor (latest version);
- Adobe Acrobat Professional (latest version).
- WINZIP 15
- Norton Internet Security (latest version for Windows 7) set up to run in Auto-Protect Mode and Auto Update Mode (monthly), or McAfee Internet Security Suite (latest version);
- Primavera scheduling software capable of meeting all scheduling requirements of the NYS Thruway Authority Addendum to the Standard Specifications §108-01 *Start and Progress of Work* and compatible with the operating system supplied under this specification.

  Note: Microsoft Office 2010 Standard Edition, or later version, may be used in lieu of Word 2010 and Excel 2010.

2. Digital Camera. The digital camera system shall meet the requirements below. All necessary hardware, cables, operating manuals, and other pertinent media required for the operation of the

camera unit itself, including connecting the camera to the computer system. The camera must be able to download the images to a computer without any proprietary software having to be installed on a computer. The equipment shall be no more than one (1) year old. To verify the age of the equipment, the Contractor shall provide the Engineer with a dated copy of the receipt(s) for the purchase of the equipment. Once equipment has been provided, it does not require replacement every year.

- Minimum 6.0 megapixel resolution with 3x optical zoom and autofocus operation
- 1.5 inch LCD screen and optical viewfinder
- Built-in intelligent flash (auto/on/off)
- Time/date stamp on each picture
- A total of two (2) rechargeable sets of batteries (Lithium-Ion or NiMH) and high-capacity (approximately 1 hour) charging unit
- Two (2) 512 MB memory cards – commercially available removable recording media
- Soft storage/carry case with shoulder strap
- Motion Video: 640 x 480 resolution capability at 30 frames per second (MPEG Video)

3. Fire Resistant Cabinet. One (1) 4-drawer, fire resistant, legal size filing cabinet with locks and two (2) keys each, meeting the requirements of ANSI/ UL Standard 72 for Insulated Filing Devices, Class 350-1 hour.

E. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.

F. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

G. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.

H. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each 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.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Water Service: Use of the Authority's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to the Authority. At Substantial Completion, restore these facilities to condition existing before initial use.

1. Provide rubber hoses as necessary to serve Project site.

C. Sanitary Facilities: Use of the Authority's existing sanitary facilities will be permitted, as long as the Contractor's personnel do not track in dirt and debris from construction activities.

D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed.

1. Maintain a minimum temperature of 50 deg F in permanently enclosed portions of building for normal construction activities, and 65 deg F for finishing activities and areas where finished Work has been installed.

E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will nothave a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

F. Electric Power Service: Use of the Authority's existing electric power service (110 to 120 V) will be permitted, as long as equipment is maintained in a condition acceptable to the Authority.

G. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.

1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
2. Provide warning signs at power outlets other than 110 to 120 V.
3. Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or other traffic areas.
4. Provide 4-gang outlets, spaced so 100-foot extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

I. Telephone Service: Provide temporary telephone service throughout construction period for common-use facilities used by all personnel engaged in construction activities.

1. At each telephone, post a list of important telephone numbers.

   a. Police and fire departments
   b. Ambulance service
   c. Contractor's home office
   d. Designer/Design Consultant's office
   e. Engineer's office
   f. Authority's office
   g. Principal subcontractors' field and home offices

2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Locate field offices, storage sheds, and other temporary construction facilities within construction area or within 30 feet of building lines. Provide incombustible construction for offices, shops, and sheds. Comply with NFPA 241.
2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Authority.

B. Paved Areas: Use Owner's existing parking areas for construction personnel. Repair paved areas disturbed by construction activities to achieve conditions adequate to support loads and withstand exposure to traffic during construction. Restore pavement as required by contract documents.

C. Dewatering Facilities and Drains: Comply with requirements in applicable Division 2 Sections for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, use same facilities. Maintain Project site, excavations, and construction free of water.

D. Temporary Signs: Prepare temporary signs in sizes indicated. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.

E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with Section "General Requirements" for progress cleaning requirements.

1. Provide separate containers, clearly labeled, for each type of waste material to be deposited.

F. Janitorial Services: Provide janitorial services on a daily basis for temporary offices, first-aid stations, toilets, wash facilities, lunchrooms, and similar areas.

G. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility services. Sheds may be open shelters or fully enclosed spaces within building or elsewhere on-site.

A. Lifts and Hoists: Provide facilities for hoisting materials and personnel. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site.

C. Stormwater Control: Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

E. Site Enclosure Fence: The Contractor is required to maintain a secure chain-link fencing system around the perimeter of the wastewater treatment plants for the duration of construction contract. The Contractor is also required to install portable chain-link enclosure fence system with lockable entrance gates for all other work areas including, but not limited to, the proposed construction staging area and all construction work areas outside of the wastewater treatment plants perimeter chain link fence system before construction operations begin, as directed and approved by the Engineer. Install portable chain-link enclosure fence in a manner that will prevent people, dogs, and other animals from easily entering site.

1. Set portable chain-link fence posts in concrete bases or galvanized steel bases.

2. Provide gates in sizes and at locations necessary to accommodate delivery vehicles and other construction operations.

3. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Authority with one set of keys.

F. Heavy Duty Plastic Security Fencing: The Contractor is required to install heavy duty plastic security fencing around the perimeter open excavations that are not backfilled at the end of the workday that are within the chain-link fencing system around the perimeter of the wastewater treatment plants and within work areas that are secured with portable chain-link enclosure fence system.

G. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

H. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform

personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.

I. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
2. Vertical Openings: Close openings with plywood or similar materials.
3. Horizontal Openings: Close openings in floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
4. Install tarpaulins securely using fire-retardant-treated wood framing and other materials.

K. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.

L. Temporary Fire Protection: Comply with NFPA 241.

1. Provide fire extinguishers.
   a. Class ABC dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for exposures.
   b. Locate fire extinguishers where convenient and effective for their intended purpose.
2. No storing of combustible materials allowed within the building.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting.
4. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
2. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Remove each temporary facility when need for its service has ended, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may

have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns.
3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1 Section "General Notes."

END OF SECTION 015000

ITEM 627.0002 - - 25 – EXISTING CONDITIONS

TAB 16-34A, D214509
Vehicle Wash Bay Installation at the Henrietta
and Batavia Maintenance Sites, MP 362.4 and 390.1

1. DESCRIPTION:

1.01 Furnish all labor, equipment and services necessary to remove and demolish existing materials as indicated on the Contract Plans.

2. METHOD OF MEASUREMENT:

2.01 This item shall be measured for payment on a lump sum basis for the work completed in accordance with the Contract Documents and as directed by the Engineer.

3. BASIS OF PAYMENT:

3.01 Payment for this item shall be made at the lump sum bid price bid. The lump sum price bid shall include cost of furnishing all labor, equipment and appliances necessary to complete the work as indicated on the Contract Plans.

3.02 Detailed Estimate:

A. Before the first certificate of payment is issued for the work under this item, submit a detailed estimate of quantities and prices for all labor and other items included under this item, which shall aggregate the contract lump sum price bid for this item.

B. The detailed estimate shall be supported by such evidence, including certified copies of subcontracts, as the Engineer may require.

C. The detailed estimate must be approved by the Engineer who may revise it as, in his/her reasonable judgment, is necessary to make the various item conform to their true values. The value of each certificate of payment will be based on the approved detailed estimate.

3.03 Monthly payments will be made for this item in proportion to the total amount of work completed.

1. SPECIFICATION SUMMARY

1.01 This item includes the following specification:

A. Section 024119 – SELECTIVE DEMOLITION

SECTION 024119 - SELECTIVE DEMOLITION

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. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 INFORMATIONAL SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

B. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.

1.6 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.7 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Engineer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
1. If suspected hazardous materials are encountered, do not disturb; immediately notify Engineer and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

D. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.

1. 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 operations.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

2. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.3 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

    1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
    2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
    3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

    1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least 6 hours after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Engineer, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

ITEM 627.0003 - - 25 – CONCRETE

TAB 16-34A, D214509
Vehicle Wash Bay Installation at the Henrietta
and Batavia Maintenance Sites, MP 362.4 and 390.1

1. DESCRIPTION:

1.01 Furnish all labor, materials, equipment and services necessary to complete the work as indicated on the Contract Plans and the attached Specification Summary.

1.02 All work shall conform to the requirements specified in Part 1 – General, of the Sections listed.

2. MATERIALS:

2.01 The materials shall be as specified in Part 2 – Products, of the Sections listed.

3. CONSTRUCTION DETAILS:

3.01 The construction details shall be as specified in Part 3 – Execution, of the Sections listed.

4. METHOD OF MEASUREMENT:

4.01 This item shall be measured for payment on a lump sum basis for the work completed in accordance with the Contract Documents and as directed by the Engineer.

5. BASIS OF PAYMENT:

5.01 Payment for this item shall be made at the lump sum bid price bid. The lump sum price bid shall include cost of furnishing all labor, material, equipment and appliances necessary to complete the work as indicated on the Contract Plans and as specified herein in the Sections listed.

5.02 Detailed Estimate:

A. Before the first certificate of payment is issued for the work under this item, submit a detailed estimate of quantities and prices for all materials, labor, and other items included under this item, which shall aggregate the contract lump sum price bid for this item. Prepare the detailed estimate in the same sequence as the Sections listed.

B. The detailed estimate shall be supported by such evidence, including certified copies of subcontracts, as the Engineer may require.

C. The detailed estimate must be approved by the Engineer who may revise it as, in his/her reasonable judgment, is necessary to make the various item conform to their true values. The value of each certificate of payment will be based on the approved detailed estimate.

5.03 Monthly payments will be made for this item in proportion to the total amount of work completed.

1. SPECIFICATION SUMMARY

1.01 This item includes the following specification:

A. Section 033000 – CAST-IN-PLACE CONCRETE

SECTION 033000 - CAST-IN-PLACE CONCRETE

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 cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:
   1. Section 079100 “Pre-formed Joint Seals” at joint between interior and exterior slab
   2. Section 072100 "Thermal Insulation” for foam insulation under concrete slab.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

   1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

      a. Contractor's superintendent.
      b. Independent testing agency responsible for concrete design mixtures.
      c. Ready-mix concrete manufacturer.
      d. Concrete Subcontractor.

   2. Review special inspection and testing and inspecting agency procedures for field quality control, vapor-retarder installation, steel reinforcement installation, methods for achieving specified floor and slab flatness and levelness and concrete protection.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Samples: For vapor retarder.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Steel reinforcement and accessories.
4. Curing compounds.
5. Vapor retarders.
6. Joint Filler
7. Rigid Insulation
8. Penetrating sealer
9. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

E. Field quality-control reports.

F. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment. Manufacturer shall be certified for producing concrete for NYS Department of Transportation (NYSDOT) in accordance with Standard Specificaitons.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M.

1.8 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle galvanized steel reinforcement to prevent bending and damage. Avoid damaging galvanized coatings on steel reinforcement.

1.10 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. NYSDOT Publications: Comply with the NYSDOT Standard Specifications for Class HP concrete

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

   a. High-density overlay, Class 1 or better.
   b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
   c. Structural 1, B-B or better; mill oiled and edge sealed.
   d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

3. Overlaid Finnish birch plywood.

B. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

C. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.

2.3 STEEL REINFORCEMENT

A. Galvanized Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars, ASTM A 767/A 767M, Class II zinc coated after fabrication and bending. Bars shall conform to NYSDOT specification 709-11.

B. Plain-Steel Wire: ASTM A 1064/A 1064M, galvanized.

C. Deformed-Steel Wire: ASTM A 1064/A 1064M.

D. Galvanized-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from galvanized-steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), galvanized plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
1. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.5 CONCRETE MATERIALS

A. Concrete shall conform to NYSDOT specification section 555.0105 Concrete For Structures, Class HP.

B. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

C. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I Type II Type I/II, gray.
2. Fly Ash: ASTM C 618, Class F.
3. Slag Cement: ASTM C 989/C 989M, Grade 100.

4. Blended Hydraulic Cement: ASTM C 595/C 595M, Type IP, portland-pozzolan cement.

D. Normal-Weight Aggregates: ASTM C 33/C 33M, from the NYSDOT Approved List of Sources of Fine and Coarse Aggregates

1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm) nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

E. Air-Entraining Admixture: ASTM C 260/C 260M.

F. Chemical Admixtures: Use only admixtures meeting NYSDOT specification 711-08 that appear on the NYSDOT Approved List. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

G. Water: ASTM C 94/C 94M and potable.

2.6 Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm).

1. Sike Greenstreak “Swellstop” Hydropilic waterstop or equal

2.7 VAPOR RETARDERS

A. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils (0.25 mm) thick.

2.8 LIQUID FLOOR TREATMENTS

A. Penetrating Type Protective Sealer that complies with NYSDOT specification 717-03 and is on NYSDOT Approved Materials list.

2.9 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

B. Water: Potable.

2.10 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1752, rubber joint expansion joint material. Bonding agent ASTM C-1059, Type II, non-dispersible, acrylic emulsion or styrene butadiene.

B. Non Sag Urethane Sealant: Comply with ASTM C-920, multi-component (M), non-sag (NS), Class 25, Exposed to Traffic (T) , and uses related to substrates M, G, and A and as related to joint substrates indicated O.

2.11 CONCRETE MIXTURES, GENERAL

A. Provide concrete mixture complying with NYSDOT Standard Specifications for Class HP concrete

B. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

C. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

E. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Slabs-on-Grade: Normal-weight concrete.

1. Concrete shall conform to NYSDOT Specification for Class HP concrete.
2. Maximum W/C Ratio: 0.40.
3. Minimum Cementitious Materials Content: 683 lb/cu. yd. (405 kg/cu. m).
4. Slump Limit: 5 inches (125 mm), plus or minus 1 inch (25 mm).
5. Air Content: 6.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size for exterior slabs..
6. Air Content: Do not allow air content of trowel-finished interior floors to exceed 3 percent.

2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M).

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class B, 1/4 inch (6.4 mm) for smooth-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Form openings, chases, offsets, sinkages, keyways, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.

3.3 VAPOR-RETARDER INSTALLATION

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Zinc-Coated Reinforcement: Repair cut and damaged zinc coatings with zinc repair material according to ASTM A 780/A 780M. Use galvanized-steel wire ties to fasten zinc-coated steel reinforcement.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least 1-1/2" of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: Install joint-filler strips at slab junctions with adjoining slabs as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.7 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to the interior slab surface that is to receive trowel finish and to the exterior slab that is to receive a broom finish.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to interior slab surfaces.

2. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch (6.4 mm).

D. Broom Finish: Apply a broom finish to exterior concrete slabs.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

3.8 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 (ACI 301M) for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure slab surface.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.

3.9 LIQUID FLOOR TREATMENT APPLICATION

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than 28 days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.10 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 1-1/2”(38 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.11 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place

patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

D. Perform structural repairs of concrete, subject to Engineer's approval, using epoxy adhesive and patching mortar.

E. Repair materials and installation not specified above may be used, subject to Engineer's approval.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

B. Inspections:

1. Steel reinforcement placement.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete;one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567/C 567M, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
6. Compression Test Specimens: ASTM C 31/C 31M.

   a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
   b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
10. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Engineer.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 24 hours of finishing.

3.13 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 033000

ITEM 627.0004 - - 25 – MASONRY

TAB 16-34A, D214509
Vehicle Wash Bay Installation at the Henrietta
and Batavia Maintenance Sites, MP 362.4 and 390.1

1. DESCRIPTION:

1.01 Furnish all labor, materials, equipment and services necessary to complete the work as indicated on the Contract Plans and the attached Specification Summary.

1.02 All work shall conform to the requirements specified in Part 1 – General, of the Sections listed.

2. MATERIALS:

2.01 The materials shall be as specified in Part 2 – Products, of the Sections listed.

3. CONSTRUCTION DETAILS:

3.01 The construction details shall be as specified in Part 3 – Execution, of the Sections listed.

4. METHOD OF MEASUREMENT:

4.01 This item shall be measured for payment on a lump sum basis for the work completed in accordance with the Contract Documents and as directed by the Engineer.

5. BASIS OF PAYMENT:

5.01 Payment for this item shall be made at the lump sum bid price bid. The lump sum price bid shall include cost of furnishing all labor, material, equipment and appliances necessary to complete the work as indicated on the Contract Plans and as specified herein in the Sections listed.

5.02 Detailed Estimate:

A. Before the first certificate of payment is issued for the work under this item, submit a detailed estimate of quantities and prices for all materials, labor, and other items included under this item, which shall aggregate the contract lump sum price bid for this item. Prepare the detailed estimate in the same sequence as the Sections listed.

B. The detailed estimate shall be supported by such evidence, including certified copies of subcontracts, as the Engineer may require.

C. The detailed estimate must be approved by the Engineer who may revise it as, in his/her reasonable judgment, is necessary to make the various item conform to their true values. The value of each certificate of payment will be based on the approved detailed estimate.

5.03 Monthly payments will be made for this item in proportion to the total amount of work completed.

1. SPECIFICATION SUMMARY

1.01 This item includes the following specifications:

A. Section 042000 – UNIT MASONRY

SECTION 042000 - UNIT MASONRY

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. Concrete masonry units.
2. Mortar and grout.
3. Steel reinforcing bars.
4. Masonry-joint reinforcement.
5. Ties and anchors.

B. Products Installed but not Furnished under This Section:
1. Steel lintels in unit masonry.

C. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete"
2. Section 051200 "Structural Steel Framing" for installing galvanized steel lintels.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Galvanized Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry galvanized reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.

1.5 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Engineer and approved in writing.

B. Qualification Data: For testing agency.

C. Material Certificates: For each type and size of the following:

1. Masonry units.

a. Include data on material properties.
b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
2. Cementitious materials. Include name of manufacturer, brand name, and type.
3. Mortar admixtures.
4. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
5. Grout mixes. Include description of type and proportions of ingredients.
6. Reinforcing bars.
7. Joint reinforcement.
8. Anchors, ties, and metal accessories.

D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.

2.3 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

2.4 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for corners, jambs, sashes, headers, bonding, and other special conditions.

B. CMUs: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi (14.8 MPa).
2. Density Classification: Normal weight.
3. Size (Width): Manufactured to dimensions 3/8 inch (10 mm) less than nominal dimensions.

2.5 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C 91/C 91M.

1. Holcim (US), Inc

2. Lafarge North America, Inc.

3. Or equal

E. Mortar Cement: ASTM C 1329/C 1329M.

1. Lafarge North America, Inc. or equal

F. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.

G. Aggregate for Grout: ASTM C 404.

H. Water: Potable.

2.6 REINFORCEMENT

A. Galvanized-Steel Reinforcing Bars: Shall meet the requirements of NYSDOT Specification 709-11.

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

1. Dur-O Wall

2. Heckmann Building Products

3. Homann & Barnard, Inc.

4. Or Equal

C. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.

1. Interior Walls: Hot-dip galvanized carbon steel.
2. Wire Size for Side Rods: 0.148-inch (3.77-mm) diameter.
3. Wire Size for Cross Rods: 0.148-inch (3.77-mm) diameter.
4. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches (407 mm) o.c.
5. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner units.

D. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder or truss type with single pair of side rods.

2.7 ANCHORS

A. General: Anchors shall extend at least 4 inches into masonry.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
1. Stainless-Steel anchor bolts: ASTM A 276 or ASTM A 666, Type 304.

2.8 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. For reinforced masonry, use portland cement-lime masonry cement or mortar cement mortar.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
   1. For reinforced masonry, use Type S.

D. Grout for Unit Masonry: Comply with ASTM C 476.

   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
   2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 3000 psi.
   3. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143/C 143M.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

B. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. Verify that reinforcing dowels are properly placed.
   2. Verify that substrates are free of substances that impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm) except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).

4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

G. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

A. Lay CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on slab.
4. Fully bed entire units, including areas under cells, at starting course on slabs where cells are not grouted.
5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).

1. Space reinforcement not more than 16 inches (406 mm) o.c.
2. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.

B. Provide continuity at corners by using prefabricated L-shaped units.

3.7 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:

1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

3.8 LINTELS

A. Install steel lintels where indicated.

B. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.9 REINFORCED UNIT MASONRY INSTALLATION

A. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

B. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

2. Limit height of vertical grout pours to not more than 60 inches (1520 mm).

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

F. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

G. Prism Test: For each type of construction provided, according to ASTM C 1314 at 7 days and at 28 days.

3.11 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Engineer's approval of sample cleaning before proceeding with cleaning of masonry.
3. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.12 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

ITEM 627.0005 - - 25 – METALS

TAB 16-34A, D214509
Vehicle Wash Bay Installation at the Henrietta
and Batavia Maintenance Sites, MP 362.4 and 390.1

1. DESCRIPTION:

1.01 Furnish all labor, materials, equipment and services necessary to complete the work as indicated on the Contract Plans and the attached Specification Summary.

1.02 All work shall conform to the requirements specified in Part 1 – General, of the Sections listed.

2. MATERIALS:

2.01 The materials shall be as specified in Part 2 – Products, of the Sections listed.

3. CONSTRUCTION DETAILS:

3.01 The construction details shall be as specified in Part 3 – Execution, of the Sections listed.

4. METHOD OF MEASUREMENT:

4.01 This item shall be measured for payment on a lump sum basis for the work completed in accordance with the Contract Documents and as directed by the Engineer.

5. BASIS OF PAYMENT:

5.01 Payment for this item shall be made at the lump sum bid price bid. The lump sum price bid shall include cost of furnishing all labor, material, equipment and appliances necessary to complete the work as indicated on the Contract Plans and as specified herein in the Sections listed.

5.02 Detailed Estimate:

A. Before the first certificate of payment is issued for the work under this item, submit a detailed estimate of quantities and prices for all materials, labor, and other items included under this item, which shall aggregate the contract lump sum price bid for this item. Prepare the detailed estimate in the same sequence as the Sections listed.

B. The detailed estimate shall be supported by such evidence, including certified copies of subcontracts, as the Engineer may require.

C. The detailed estimate must be approved by the Engineer who may revise it as, in his/her reasonable judgment, is necessary to make the various item conform to their true values. The value of each certificate of payment will be based on the approved detailed estimate.

5.03 Monthly payments will be made for this item in proportion to the total amount of work completed.

1. SPECIFICATION SUMMARY

1.01 This item includes the following specifications:

A. Section 051200 – STRUCTURAL STEEL FRAMING

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel lintels.

B. Related Requirements:

1. Section 042000 "Unit Masonry"

1.2 DEFINITIONS

A. Structural Steel: Ele ments of the structural frame indicated on D rawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel lintels.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Mill test reports for structural steel, including chemical and physical properties.

C. Source quality-control reports.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. Angles: ASTM A 36/A 36M.

2.2 COATING

A. Hot Dip Galvanizing: Comply with ASTM A-123 Standard Specification for Zinc (Hot Dipped Galvanized) Coating on Iron and Steel Products.

2.3 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify elevations of masonry-bearing for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

END OF SECTION 051200

ITEM 627.0006 - - 25 – WOOD, PLASTICS AND COMPOSITES TAB 16-34A, D214509

Vehicle Wash Bay Installation at the Henrietta
and Batavia Maintenance Sites, MP 362.4 and 390.1

1. DESCRIPTION:

1.01 Furnish all labor, materials, equipment and services necessary to complete the work as indicated on the Contract Plans and the attached Specification Summary.

1.02 All work shall conform to the requirements specified in Part 1 – General, of the Sections listed.

2. MATERIALS:

2.01 The materials shall be as specified in Part 2 – Products, of the Sections listed.

3. CONSTRUCTION DETAILS:

3.01 The construction details shall be as specified in Part 3 – Execution, of the Sections listed.

4. METHOD OF MEASUREMENT:

4.01 This item shall be measured for payment on a lump sum basis for the work completed in accordance with the Contract Documents and as directed by the Engineer.

5. BASIS OF PAYMENT:

5.01 Payment for this item shall be made at the lump sum bid price bid. The lump sum price bid shall include cost of furnishing all labor, material, equipment and appliances necessary to complete the work as indicated on the Contract Plans and as specified herein in the Sections listed.

5.02 Detailed Estimate:

A. Before the first certificate of payment is issued for the work under this item, submit a detailed estimate of quantities and prices for all materials, labor, and other items included under this item, which shall aggregate the contract lump sum price bid for this item. Prepare the detailed estimate in the same sequence as the Sections listed.

B. The detailed estimate shall be supported by such evidence, including certified copies of subcontracts, as the Engineer may require.

C. The detailed estimate must be approved by the Engineer who may revise it as, in his/her reasonable judgment, is necessary to make the various item conform to their true values. The value of each certificate of payment will be based on the approved detailed estimate.

5.03 Monthly payments will be made for this item in proportion to the total amount of work completed.

1. SPECIFICATION SUMMARY

1.01 This item includes the following specifications:

A. Section 061000 – ROUGH CARPENTRY
B. Section 061600 – SHEATHING
C. Section 067414 – FIBERGLASS REINFORCED GRATINGS, SUPPORTS, STAIRS, AND HANDRAILS

SECTION 061000 - ROUGH CARPENTRY

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. Framing with dimension lumber.

1.3 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal (38 mm actual) size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) size or greater but less than 5 inches nominal (114 mm actual) size in least dimension.

C. Exposed Framing: Framing not concealed by other construction.

D. OSB: Oriented strand board.

E. Timber: Lumber of 5 inches nominal (114 mm actual) size or greater in least dimension.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

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. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 INFORMATIONAL SUBMITTALS

A. 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.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 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: 19 percent for 2-inch nominal (38-mm actual) thickness or less; unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC3b for exterior construction not in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Retain subparagraph below for exposed framing if considered necessary.

2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

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 all rough carpentry unless otherwise indicated.

2.3 DIMENSION LUMBER FRAMING

A. Rafters: No. 2 grade.

1. Species:

a. Hem-fir (north); NLGA.
b. Southern pine; SPIB.
c. Douglas fir-larch; WCLIB or WWPA.
d. Southern pine or mixed southern pine; SPIB.
e. Spruce-pine-fir; NLGA.
f. Douglas fir-south; WWPA.
g. Hem-fir; WCLIB or WWPA.
h. Douglas fir-larch (north); NLGA.
i. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

B. Any species of machine stress-rated dimension lumber with a grade of not less than 2400f-2.0E.

2.4 FASTENERS

A. General: Fasteners shall be of size and type indicated 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.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

2.5 METAL FRAMING ANCHORS

A. Allowable design loads, as published by manufacturer, shall meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data

or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

C. Joist Hangers: U-shaped joist hangers with 2-inch- (50-mm-) long seat and 1-1/4-inch-

(32-mm-) wide nailing flanges at least 85 percent of joist depth.

1. Thickness: 0.050 inch (1.3 mm).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction.

C. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

D. Do not splice structural members between supports unless otherwise indicated.

E. Provide blocking and framing as indicated and as required to support facing materials and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.

F. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

H. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
2. ICC-ES evaluation report for fastener.

J. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 RAFTER FRAMING INSTALLATION

A. Ceiling Joists: Install with crown edge up and complying with requirements specified above. Face nail to ends of parallel rafters.

B. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers.

3.3 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. 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 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Roof sheathing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

   1. Wood-preservative-treated plywood.
   2. Fire-retardant-treated plywood.
   3. Foam-plastic sheathing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested according t o A STM E 119; testing b y a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

   1. Fire-Resistance Ratings: I ndicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 WOOD PANEL PRODUCTS

A. Emissions: Products shall meet the testing and prod uct requirements of the California Department of Public Health' s "Standard Method for the Testi ng and Evaluation of Volat ile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.3 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treat ment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with gro und, Use Category UC3b for exterior con struction not in contact with ground, and Use Category UC4a for items in contact with ground.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat all plywood unless otherwise indicated.

2.4 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.

1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201/D 3201M at 92 percent relative humidity. Use where exterior type is not indicated.
3. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305. Span ratings after treatment shall be not less than span ratings specified.

C. Kiln-dry material after treatment to a maximum moisture content of 15 percent.

D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

E. Application: Treat all plywood unless otherwise indicated.

2.5 ROOF SHEATHING

A. Plywood Sheathing: DOC PS 1, Exterior, Structural I sheathing.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof sheathing, provide fasteners of Type 304 stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

D. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Sheathing:
   a. Space panels 1/8 inch (3 mm) apart at edges and ends.

END OF SECTION 061600

SECTION 067414 - FIBERGLASS REINFORCED GRATINGS, SUPPORTS, STAIRS, AND HANDRAILS

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 glass-fiber-reinforced-plastic gratings, supports, stairs, and handrails.

1.3 COORDINATION

A. Coordinate installation of anchorages for gratings, grating frames, stairs, support, and handrails. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

A. Product Data: For glass-fiber-reinforced-plastic gratings, grating frames, stairs, support, and handrails.

B. Shop Drawings: Include plans, sections, details, and attachments to other work.

C. Delegated-Design Submittal: For gratings, stairs, railings, and supports including analysis data signed and sealed by the qualified professional engineer responsible for their preparation. Two sets of sealed, signed shop drawings will be required for each site.

1.5 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Ultra Fiberglass Systems, 9732 West Carmen Avenue, Milwaukee, WI 53225 (414-461-5051) or equal.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified NYS professional engineer to design gratings, stairs, supports, and handrails.

B. Structural Performance: Gratings and supports shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Stairs and Elevated Platform: Uniform load of 125 lbf/sq. ft. (6.00 kN/sq. m) or concentrated load of 2000 lbf (8.90 kN), whichever produces the greater stress.

2. Hand-railing assembly shall meet OSHA standards for a height of 42” from the top of the walkway to the top of the guardrail, and loading for guardrail and hand rail shall be 200 lbs concentrated load in any direction on the top rail. System shall include 4” toe boards (kick plates).

3. Limit deflection to L/360 or 1/4 inch (6.4 mm), whichever is less.

C. Seismic Performance: Gratings and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Component Importance Factor: 1.5.

2.3 GLASS-FIBER-REINFORCED-PLASTIC GRATINGS

A. Pultruded Glass-Fiber-Reinforced Gratings: Bar gratings assembled from components made by simultaneously pulling glass fibers and extruding thermosetting plastic resin through a heated die under pressure to produce a product without voids and with a high glass-fiber content.

1. Configuration: I6015; 1-1/2-inch (38-mm) I-bars spaced 1-1/2 inches (38 mm) o.c. (60 percent open) as required to comply with structural performance requirements.
2. Resin Type: Polyester.

a. Flame-Spread Index: 25 or less when tested according to ASTM E 84.

3. Color: Yellow.
4. Traffic Surface: Applied abrasive finish.

2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners. Select fasteners for type, grade, and class required.

B. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts, and, where indicated, flat washers; ASTM F 593 (ASTM F 738M) for bolts and ASTM F 594 (ASTM F 836M) for nuts, Alloy Group 1 (A1).

C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
   1. Material Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.5 FABRICATION

A. Shop Assembly: Shop fabricate grating sections to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form gratings from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.

D. Fit exposed connections accurately together to form hairline joints.

E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.

F. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.

2.6 STAIR AND WALKWAY GRATING FRAMES, SUPPORTS, AND HANDRAILS

A. Frames and Supports for Glass-Fiber-Reinforced-Plastic Gratings, Stairs, and Railings: Fabricate from glass-fiber-reinforced-plastic shapes of sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.

   1. Unless otherwise indicated, use shapes made from same resin as gratings.
   2. Equip units indicated to be cast into concrete or built into masonry with integral anchors.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.

D. Fit exposed connections accurately together to form hairline joints.

3.2 INSTALLING GLASS-FIBER-REINFORCED-PLASTIC GRATINGS, STAIRS, AND HANDRAILS

A. Comply with manufacturer's written instructions for installing gratings. Use manufacturer's standard stainless-steel anchor clips and hold-down devices for bolted connections.

END OF SECTION 067414

ITEM 627.0007 - - 25 – THERMAL AND MOISTURE PROTECTION TAB 16-34A, D214509

Vehicle Wash Bay Installation at the Henrietta
and Batavia Maintenance Sites, MP 362.4 and 390.1

1. DESCRIPTION:

1.01 Furnish all labor, materials, equipment and services necessary to complete the work as indicated on the Contract Plans and the attached Specification Summary.

1.02 All work shall conform to the requirements specified in Part 1 – General, of the Sections listed.

2. MATERIALS:

2.01 The materials shall be as specified in Part 2 – Products, of the Sections listed.

3. CONSTRUCTION DETAILS:

3.01 The construction details shall be as specified in Part 3 – Execution, of the Sections listed.

4. METHOD OF MEASUREMENT:

4.01 This item shall be measured for payment on a lump sum basis for the work completed in accordance with the Contract Documents and as directed by the Engineer.

5. BASIS OF PAYMENT:

5.01 Payment for this item shall be made at the lump sum bid price bid. The lump sum price bid shall include cost of furnishing all labor, material, equipment and appliances necessary to complete the work as indicated on the Contract Plans and as specified herein in the Sections listed.

5.02 Detailed Estimate:

A. Before the first certificate of payment is issued for the work under this item, submit a detailed estimate of quantities and prices for all materials, labor, and other items included under this item, which shall aggregate the contract lump sum price bid for this item. Prepare the detailed estimate in the same sequence as the Sections listed.

B. The detailed estimate shall be supported by such evidence, including certified copies of subcontracts, as the Engineer may require.

C. The detailed estimate must be approved by the Engineer who may revise it as, in his/her reasonable judgment, is necessary to make the various item conform to their true values. The value of each certificate of payment will be based on the approved detailed estimate.

5.03 Monthly payments will be made for this item in proportion to the total amount of work completed.

1. SPECIFICATION SUMMARY

1.01 This item includes the following specifications:

A. Section 072100 – THERMAL INSULATION
B. Section 074113.13 – FORMED METAL ROOF PANELS
C. Section 076200 – SHEET METAL FLASHING AND TRIM
D. Section 078413 – PENETRATION FIRESTOPPING
E. Section 078443 – JOINT FIRESTOPPING
F. Section 079100 – PREFORMED JOINT SEALS
G. Section 079200 – JOINT SEALANTS

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

B. Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD

A. Extruded polystyrene boards in this article are also called "XPS boards." Roman numeral designators in ASTM C 578 are assigned in a fixed random sequence, and their numeric order does not reflect increasing strength or other characteristics.

B. Extruded Polystyrene Board, Type IV: ASTM C 578, Type IV, 25-psi (173-kPa) minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.

1. Basis of Design Product: The Dow Chemical Company, Styrofoam Brand Square Edge Insulation or approved equal.
   a. 2” Thickness, R-10, in locations shown on drawings.
   b. 3” Thickness, R-15, in locations shown on drawings.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF SLAB INSULATION

A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of 24 inches (610 mm) below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. If not otherwise indicated, extend insulation a minimum of 24 inches (610 mm) in from exterior walls.

3.4 INSTALLATION OF FOUNDATION WALL INSULATION

A. Butt panels together for tight fit.

3.5 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 074113.13 - FORMED METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exposed-fastener, lap-seam, metal roof panels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim, and anchorage systems.

C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Metal Panels: 12 inches (305 mm) long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

1.8 COORDINATION

A. Coordinate sizes and locations of roof penetrations with actual equipment provided.

B. Coordinate metal panel installation with flashing, trim, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

1. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E 1680 or ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: 1.57 lbf/sq. ft. (75 Pa).

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 or ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 2.86 lbf/sq. ft. (137 Pa).

D. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

E. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 30.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.

2.2 EXPOSED-FASTENER, LAP-SEAM, METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.

B. Corrugated-Profile, Exposed-Fastener Metal Roof Panels: Formed with alternating curved ribs spaced at 2.67 inches (68 mm) o.c. across width of panel.

1. Basis of Design: Atas International, Inc. – Belvedere Corrugated Panel BWC-374 or approved equal.
2. Aluminum Sheet: Coil-coated sheet, ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

a. Thickness: 0.050 inch.
b. Surface: Embossed finish.
c. Exterior Finish: Two-coat fluoropolymer.
d. Color: As selected by Engineer from manufacturer's full range.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils (0.76 mm) thick, specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 220 deg F (111 deg C); ASTM D 1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.

B. Felt Underlayment: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felts.

C. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 MISCELLANEOUS MATERIALS

A. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

B. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.

C. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

D. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.5 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

    a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated on Drawings, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

B. Slip Sheet: Apply slip sheet over underlayment before installing metal roof panels.

C. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.4 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air or water-resistive barriers and flashings that are concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.

5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Aluminum Panels: Use stainless-steel fasteners.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
2. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
3. Flash and seal panels with weather closures at perimeter of all openings.
4. Watertight Installation:

a. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
c. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.

E. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended in writing by metal panel manufacturer.

F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

G. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal panel installation, including accessories. Report results in writing.

B. Remove and replace applications where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113.13

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Formed roof sheet metal fabrications.
   2. Formed wall sheet metal fabrications.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For sheet metal flashing and trim.

   1. Include plans, elevations, sections, and attachment details.
   2. Distinguish between shop- and field-assembled work.
   3. Include identification of finish for each item.
   4. Include pattern of seams and details of termination points, expansion joints and expansion-joint covers, direction of expansion, roof-penetration flashing, and connections to adjoining work.

C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

C. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1. For copings and roof edge flashings that are SPRI ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.

1.6 WARRANTY

A. 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. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies 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. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

2.2 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 B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.

1. Exposed Coil-Coated Finish:

a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent 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. Color: As selected by Engineer from manufacturer's full range.

2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

B. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F (111 deg C); and complying with physical requirements of ASTM D 226/D 226M for Type I and Type II felts.

C. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Aluminum Sheet: Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

F. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Obtain field measurements for accurate fit before shop fabrication.
2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

F. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

2.6 ROOF SHEET METAL FABRICATIONS

A. Roof Edge Flashing: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long sections. Furnish with 6-inch- (150-mm-) wide, joint cover plates. Shop fabricate interior and exterior corners.

1. Fabricate from the Following Materials:
   a. Aluminum: 0.050 inch (1.27 mm) thick.

B. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Aluminum: 0.040 inch (1.02 mm) thick.

C. Roof-Penetration Flashing: Fabricate from the following materials:
1. Stainless Steel: 0.019 inch (0.48 mm) thick.

2.7 WALL SHEET METAL FABRICATIONS

A. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, according to manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.

C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller. Cover underlayment within 14 days.

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, 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, levels, and slopes. 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. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
   4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
   5. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.3 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.

D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.4 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

3.5 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.

END OF SECTION 076200

SECTION 078413 - PENETRATION FIRESTOPPING

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. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.

1) UL in its "Fire Resistance Directory."
2) Intertek Group in its "Directory of Listed Building Products."
3) FM Global in its "Building Materials Approval Guide."

2.2 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

1. Hilti Inc., or approved equal.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
2. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.

D. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.

E. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

1. Permanent forming/damming/backing materials.
2. Substrate primers.
3. Collars.
4. Steel sleeves.

2.3 FILL MATERIALS

A. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

B. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

C. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.

D. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

E. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

F. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

G. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

H. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.4 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.

B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

C. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.

3.5 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.

B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

3.7 PENETRATION FIRESTOPPING SYSTEM SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Where Intertek Group-listed systems are indicated, they refer to design numbers in Intertek Group's "Directory of Listed Building Products" under "Firestop Systems."

C. Where FM Global-approved systems are indicated, they refer to design numbers listed in FM Global's "Building Materials Approval Guide" under "Wall and Floor Penetration Fire Stops."

D. Penetration Firestopping Systems for Metallic Pipes, Conduit, or Tubing:

1. UL-Classified Systems: W-J-1166 and F-C-1038.
2. F-Rating: 1 hour.
3. T-Rating: ¼ hour.
4. W-Rating: No leakage of water at completion of water leakage testing.
5. Type of Fill Materials: As required to achieve rating, caulk or sealant.

E. Penetration Firestopping Systems for Insulated Pipes:

1. UL-Classified Systems: W-J-5013 and F-C-5007.
2. F-Rating: 1 hour.
3. T-Rating: 1 hour.
4. W-Rating: No leakage of water at completion of water leakage testing.
5. Type of Fill Materials: As required to achieve rating, caulk or sealant.

END OF SECTION 078413

SECTION 078443 - JOINT FIRESTOPPING

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. Joints in or between fire-resistance-rated constructions.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Joint firestopping systems shall bear classification marking of a qualified testing agency.

1) UL in its "Fire Resistance Directory."

2.2 JOINT FIRESTOPPING SYSTEMS

A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Fire Protection Products.
b. Hilti, Inc.
c. Tremco, Inc.

2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.

C. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

D. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Before installing fire-resistive joint systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.

2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2393.

B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.

C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

3.7 JOINT FIRESTOPPING SYSTEM SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHBN.

B. Head-of-Wall, Fire-Resistive Joint Firestopping Systems:

1. UL-Classified Systems: HW-D- 0000-0999.
2. Assembly Rating: 1 hour.

END OF SECTION 078443

SECTION 079100 - PREFORMED JOINT SEALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes preformed, foam joint seals.

1.2 ACTION SUBMITTALS

A. Product Data: For each preformed joint seal product.

B. Samples for Verification: For each type and color of preformed joint seal required.

C. Preformed joint seal schedule.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Sample warranties.

1.4 WARRANTY

A. Special Warranty: Installer agrees to repair or replace preformed joint seals 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.

PART 2 - PRODUCTS

2.1 PREFORMED, FOAM JOINT SEALS

A. Preformed, Foam Joint Seals : Manufacturer's standard joint seal manufactured from urethane or EVA (ethylene vinyl acetate) foam with minimum density of 10 lb/cu. ft. (160 kg/cu. m) and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths based on design criteria indicated, with factory- or field-applied adhesive for bonding to substrates.

1. Watson Bowman Acme Corporation: Wabo XPE joint seal or equal
2. Design Criteria:

a. Nominal Joint Width: 2”
b. Movement Capability: -25 percent/+25 percent.

3. Joint Seal Color: As indicated by manufacturer's designations.

2.2 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by preformed-joint-seal manufacturer for joint substrates indicated.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to preformed joint seal manufacturer, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces, and formulated to promote best adhesion to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with preformed joint seals and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing preformed joint seals to comply with preformed joint seal manufacturer's written instructions and the following requirements:

1. Remove laitance and form-release agents from concrete.
2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.

B. Joint Priming: Prime joint substrates where recommended by preformed joint seal manufacturer or as indicated by tests or prior experience.

C. Masking Tape: Use masking tape where required to prevent contact of adhesive or primer with adjoining surfaces.

3.2 INSTALLATION

A. General: Comply with preformed joint seal manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Installation of Preformed, Foam Joint Seals:

1. Install each length of seal immediately after removing protective wrapping.
2. Firmly secure compressed joint seals to joint gap side to obtain full bond using exposed pressure-sensitive adhesive or field-applied adhesive as recommended by manufacturer.

3. Do not pull or stretch material. Produce seal continuity at splices, ends, turns, and intersections of joints.
4. For applications at low ambient temperatures, heat foam joint seal material in compliance with manufacturer's written instructions.

END OF SECTION 079100

SECTION 079200 - JOINT SEALANTS

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.
2. Mildew-resistant joint sealants.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

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.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.

C. Preconstruction Laboratory Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation are needed for adhesion.

D. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

E. Field-Adhesion-Test Reports: For each sealant application tested.

F. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

B. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with glazing and gasket materials.
3. Stain Testing: Use ASTM C 1248 to determine stain potential of sealant when in contact with masonry substrates.
4. Submit manufacturer's recommended number of pieces of each type of material, including joint substrates, joint-sealant backings, and miscellaneous materials.
5. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
6. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.

7. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with joint substrates and other materials matching those submitted.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by Engineer.
2. Conduct field tests for each kind of sealant and joint substrate.
3. Notify Engineer seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.

a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

1) 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.

5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.8 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.9 WARRANTY

A. Special Installer's Warranty: 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 agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five 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 stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, 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. Colors of Exposed Joint Sealants: As selected by Engineer from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Dow Corning.
2. Tremco Incorporated.
3. Soudal USA.

2.3 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Dow Corning.

2. Tremco Incorporated.
3. Soudal USA.

2.4 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.5 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

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.

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. 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.

3.4 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.

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 complies with 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 material, 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.

B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

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, remove, and repair 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 nontraffic surfaces.

1. Joint Locations:
   a. Joints between metal panels.
   b. Perimeter joints between materials listed above and frames of louvers.

2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
3. Joint-Sealant Color: As selected by Engineer from manufacturer's full range of colors.

B. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:
   a. Joints as indicated on Drawings.

2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Engineer from manufacturer's full range of colors.

END OF SECTION 079200

ITEM 627.0008 - - 25 – OPENINGS

TAB 16-34A, D214509
Vehicle Wash Bay Installation at the Henrietta
and Batavia Maintenance Sites, MP 362.4 and 390.1

1. DESCRIPTION:

1.01 Furnish all labor, materials, equipment and services necessary to complete the work as indicated on the Contract Plans and the attached Specification Summary.

1.02 All work shall conform to the requirements specified in Part 1 – General, of the Sections listed.

2. MATERIALS:

2.01 The materials shall be as specified in Part 2 – Products, of the Sections listed.

3. CONSTRUCTION DETAILS:

3.01 The construction details shall be as specified in Part 3 – Execution, of the Sections listed.

4. METHOD OF MEASUREMENT:

4.01 This item shall be measured for payment on a lump sum basis for the work completed in accordance with the Contract Documents and as directed by the Engineer.

5. BASIS OF PAYMENT:

5.01 Payment for this item shall be made at the lump sum bid price bid. The lump sum price bid shall include cost of furnishing all labor, material, equipment and appliances necessary to complete the work as indicated on the Contract Plans and as specified herein in the Sections listed.

5.02 Detailed Estimate:

A. Before the first certificate of payment is issued for the work under this item, submit a detailed estimate of quantities and prices for all materials, labor, and other items included under this item, which shall aggregate the contract lump sum price bid for this item. Prepare the detailed estimate in the same sequence as the Sections listed.

B. The detailed estimate shall be supported by such evidence, including certified copies of subcontracts, as the Engineer may require.

C. The detailed estimate must be approved by the Engineer who may revise it as, in his/her reasonable judgment, is necessary to make the various item conform to their true values. The value of each certificate of payment will be based on the approved detailed estimate.

5.03 Monthly payments will be made for this item in proportion to the total amount of work completed.

1. SPECIFICATION SUMMARY

1.01 This item includes the following specifications:

A. Section 084000 – FIBERGLASS REINFORCED POLYESTER ENTRANCES
B. Section 087100 – DOOR HARDWARE
C. Section 088813 – FIRE-RESISTANT GLAZING
D. Section 089119 – FIXED LOUVERS

SECTION 084000 - FIBERGLASS REINFORCED POLYESTER ENTRANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Related Requirements:
   1. Section 088813 “Fire-Resistant Glazing” for vision lite glazing

1.2 SUMMARY

A. This Section includes the following:
   1. Fiberglass reinforced polyester (FRP) fire-rated flush doors with FRP fire-rated frames

1.3 REFERENCES

A. NFPA 252 - Fire Tests of Door Assemblies

B. UBC Standard 7-2 - Fire Tests of Door Assemblies

C. UL 10C - Positive Pressure Fire Tests of Door Assemblies

D. Surface Burning Characteristics, of FRP Doors , ASTM E 84.
   1. Flame Spread: Maximum of 200, Class C.
   2. Smoke Developed: Maximum of 450, Class C.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.

B. 90-Minute Full-Scale Vertical Fire Test of Doors, Positive Pressure: Complied with acceptance criteria for 90-minute rating.
   1. UBC Standard 7-2
   2. NFPA 252
   3. UL 10C

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's product data, including description of materials, components, fabrication, finishes, and installation

B. Shop Drawings: Submit manufacturer's shop drawings, including elevations, sections, and details,

indicating dimensions, tolerances, materials, fabrication, doors, panels, framing, and finish

C. Samples:
   1. Door: Submit manufacturer's sample of door showing face sheets, core, framing, and finish
   2. Color: Submit manufacturer's samples of standard colors of doors and frames

D. Test Reports: Submit certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements

E. Maintenance Manual: Submit manufacturer's maintenance and cleaning instructions for doors, including maintenance and operating instructions for hardware

F. Warranty: Submit manufacturer's standard warranty

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying opening door mark and manufacturer

B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions

C. Handling: Protect materials and finish from damage during handling and installation

1.7 WARRANTY

A. Warrant doors, frames, and factory hardware against failure in materials and workmanship, including excessive deflection, faulty operation, defects in hardware installation, and deterioration of finish or construction in excess of normal weathering.

B. Warranty Period: Ten years starting on date of shipment. In addition, a limited lifetime (while the door is in its specified application in its original installation) warranty covering: failure due to corrosion on FRP components.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Product: Special-Lite, Inc.

2.2 FRP FLUSH DOORS

A. Model: FR Series Fire-Rated Flush Doors. FR-90P

B. Door Opening Size: As indicated on the drawings

C. Construction:
   1. Door Thickness: 1-3/4 inches.
   2. Construction: Doors shall be FRP with mineral core.
   3. Reinforcement: High density mineral.

4. Stile Edge: FRP.
5. Top Rail: 6” High density mineral
6. Bottom Rail: High density mineral.

D. Face Sheet:
1. Material: FRP Pebbled
2. Exterior Face Sheets: Class C rated, 0.120-inch thickness
3. Interior Face Sheets: Class C rated, 0.90-inch thickness
4. Color: Selected from Manufacturer's full range of colors

E. Core:
1. Material: Mineral
2. Density: Minimum of 16.5 pounds per cubic foot

F. Cutouts:
1. Manufacture doors with cutouts for required vision lites
2. Factory install vision lites

G. Hardware:
1. Pre-machine doors in accordance with templates from specified hardware manufacturers and hardware schedule.

2.3 MATERIALS

A. Components: Door and frame components from same manufacturer.

B. Fasteners:
1. Material: Aluminum, 18-8 stainless steel, or other noncorrosive metal.
2. Compatibility: Compatible with items to be fastened.

2.4 FABRICATION

A. Sizes and Profiles: Required sizes for door and frame units, and profile requirements shall be as indicated on the Drawings.

B. Coordination of Fabrication: Field measure before fabrication and show recorded measurements on shop drawings.

C. Assembly:
1. Complete cutting, fitting, forming, drilling, of doors and frames before assembly.

D. Fit:
1. Maintain continuity of line and accurate relation of planes and angles.
2. Secure attachments and support at mechanical joints with hairline fit at contacting members.

2.5 FRP FRAMING SYSTEMS

A. Framing:
1. Size and Type: As indicated on the Drawings.

2. Materials: ¼" thick solid pultruded FRP profiles having no corrosive components or reinforcement.
3. Width: 2" face.
4. Depth: 5 ¾"
5. Assembly: One piece chemically welded at factory.
6. Door Stop: 5/8" x 2 ¼".
7. Corner Construction: Mitered with 4" x 4" x 3/8" pultruded FRP angle reinforcement with interlocking pultruded FRP brackets.
8. Reinforcing: High density mineral.
9. Anchors: Furnished with type as specified on drawings.
10. Fasteners for reinforcing: 18-8 Stainless Steel.

2.6 HARDWARE

A. Hardware shall be fire rated.

B. Pre-machine doors in accordance with templates from specified hardware manufacturers and hardware schedule.

C. Hardware Schedule: As specified in Section 08710.

D. Finish: As specified in Section 08710.

2.7 VISION LITES

A. Vision Lite Kit: Stainless steel.

B. Size: 10 inches by 10 inches

C. Glazing: Refer to section 088813.

2.8 FINISH

A. Finish for Frames: Through Color
1. Painted Finish: Two-part aliphatic polyurethane, low VOC, Industrial Coating
2. Thickness: 5 mils
3. Sheen: Gloss
4. Impact Resistance per ASTM D 2794: 140 in lbs

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive doors. Notify Engineer of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Ensure openings to receive frames are plumb, level, square, and in tolerance.

3.3 INSTALLATION

A. Install doors in accordance with manufacturer's instructions.
   1. Install doors plumb, level, square, true to line, and without warp or rack.
   2. Anchor frames securely in place.
   3. Set thresholds in bed of mastic and backseal.

B. Install exterior doors to be weathertight in closed position.

C. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Engineer.

D. Remove and replace damaged components that cannot be successfully repaired as determined by Engineer.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance and guidance for installation of doors.

3.5 ADJUSTING

A. Adjust doors, hinges, and locksets for smooth operation without binding.

3.6 CLEANING

A. Clean doors promptly after installation in accordance with manufacturer's instructions.

B. Do not use harsh cleaning materials or methods that would damage finish.

3.7 PROTECTION

A. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of substantial completion.

END OF SECTION 084000

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Mechanical door hardware for swinging doors.

2. Cylinders for door hardware specified in other Sections.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product in each finish specified.

C. Door hardware schedule.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Engineer, and Owner about door hardware and keying.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:
   a. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

2.2 SCHEDULED DOOR HARDWARE

A. Provide products for each door that comply with requirements indicated in Part 2 and door hardware schedule.

1. Door hardware is scheduled on Drawings.

2.3 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on doors and frames.
1. 3 each RCBB1199 4.5*4.5 US32D NRP (Hager)

2.4 MECHANICAL LOCKS AND LATCHES

A. Lockset: BHMA A156
1. Best Access Systems lockset, 9K Series, 7 pin housing, classroom function, 14L Lever and Rose, strike package S3, Finish 630 Lock cylinders and keying; Cylinder shall be removable core tumbler type.

2.5 AUTOMATIC FLUSH BOLTS

A. Automatic Flush Bolts: BHMA A156.16; minimum 3/4-inch (19-mm) throw; designed for mortising into door edge. Include wear plates.
1. Hager Companies – Automatic Flush Bolts 291D.

2.6 COORDINATOR AND FILLER

A. Coordinator and Filler: BHMA A156.3;
1. Hager Companies – 297D – Coordinating Device
2. Hager Companies – 297M – Mounting Bracket

2.7 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
   1. Sargent – 281 Series – Grade 1 Heavy Duty Surface Door Closer (US26D).

2.8 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
   1. Hager Companies – Smoke Seal 736S.

2.9 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.
   1. Hager Companies – 4” Saddle Threshold 403S, Stainless Steel with Stainless Steel Screws.

2.10 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

   1. Standard Steel Doors and Frames: ANSI/SDI A250.8.

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

E. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

1. Do not notch perimeter gasketing to install other surface-applied hardware.

F. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

G. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.2 ADJUSTING

A. Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

END OF SECTION 087100

SECTION 088813 - FIRE-RESISTANT GLAZING

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. Fire-protection-rated glazing.

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.4 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of glass product; 12 inches (300 mm) square.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installers and glass testing agency.

B. Product Certificates: For each type of glass and glazing product, from manufacturer.

C. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install fire-resistant glazing until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature conditions at occupancy levels during the remainder of the construction period.

1.10 WARRANTY

A. Manufacturer's Special Warranty on Ceramic Glass: Manufacturer agrees to replace ceramic glass units that deteriorate within specified warranty period. Deterioration of ceramic glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning ceramic glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.

B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; deterioration of glazing materials; or other defects in construction.

2.3 GLASS PRODUCTS, GENERAL

A. Safety Glazing Labeling: Permanently mark glazing with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction or the manufacturer. Label shall indicate manufacturer's name, type of glass, glass thickness, and safety glazing standard with which glass complies.

2.4 FIRE-PROTECTION-RATED GLAZING

A. Fire-Protection-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on positive-pressure testing according to NFPA 257 or UL 9, including the hose-stream test, and shall comply with NFPA 80.

B. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether or not glazing has passed the hose-stream test; whether or not glazing meets 450 deg F (250 deg C) temperature-rise limitation; and the fire-resistance rating in minutes.

C. Fire-Protection-Rated Ceramic Glass: 8-mm thickness, fire-protection-rated tempered glass; and complying with 16 CFR 1201, Category I and II.

1. Basis of Design: Technical Glass Products (TGP) – FireLite Plus 5/16” (8mm) thick

2.5 GLAZING ACCESSORIES

A. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.

B. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.

1. Colors of Exposed Glazing Sealants: As selected by Engineer from manufacturer's full range.

C. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

D. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

C. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.7 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with manufacturing and installation tolerances, including those for size, squareness, and offsets at corners, and for compliance with minimum required face and edge clearances.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate fire side and protected side. Label or mark units as needed so that fire side and protected side are readily identifiable. Do not use materials that leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Use methods approved by testing agencies that listed and labeled fire-resistant glazing products.

B. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publications.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites with proper orientation so that coatings face fire side or protected side as specified.

I. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

J. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop, so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

D. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial washaway from glass.

3.7 CLEANING AND PROTECTION

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 FIRE-PROTECTION-RATED GLAZING SCHEDULE

A. Glass Type: 90-minute fire-protection-rated glazing; ceramic glazing.

END OF SECTION 088813

SECTION 089119 - FIXED LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fixed, extruded-aluminum louvers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

C. Samples: For each type of metal finish required.

D. Delegated-Design Submittal: For louvers indicated to comply with structural performance requirements, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on tests performed according to AMCA 500-L.

B. Windborne-debris-impact-resistance test reports.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural performance requirements and design criteria indicated.

B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.

1. Wind Loads: Determine loads based on pressures as indicated on Drawings.

2. Wind Loads: Determine loads based on a uniform pressure of 25 lbf/sq. ft., acting inward or outward.

C. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

2.2 FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Horizontal, Drainable-Blade Louver:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Greenheck Fan Corporation.
   b. Pottorff.
   c. Ruskin Company.

2. Louver Depth: 6 inches.
3. Frame and Blade Nominal Thickness: Not less than 0.080 inch.
4. Mullion Type: Exposed.
5. Louver Performance Ratings:

   a. Free Area: Not less than 50%.
   b. Point of Beginning Water Penetration: Not less than 900 fpm.
   c. Air Performance: Not more than 0.10-inch wg static pressure drop at 750-fpm free-area exhaust and intake velocity.

6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.3 LOUVER SCREENS

A. General: Provide screen at each exterior louver.

1. Screen Location for Fixed Louvers: Interior face.
2. Screening Type: Bird screening.

B. Louver Screen Frames: Same type and form of metal as indicated for louver to which screens are attached.

C. Louver Screening for Aluminum Louvers:

1. Bird Screening: Aluminum, 1/2-inch-square mesh, 0.063-inch wire.

2.4 MATERIALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.

B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.

C. Fasteners: Use types and sizes to suit unit installation conditions.

1. Use tamper-resistant screws for exposed fasteners unless otherwise indicated.
2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
3. For fastening galvanized steel, use hot-dip-galvanized steel or 300 series stainless-steel fasteners.
4. For fastening stainless steel, use 300 series stainless-steel fasteners.
5. For color-finished louvers, use fasteners with heads that match color of louvers.

2.5 FABRICATION

A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

2.6 ALUMINUM FINISHES

A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 and containing not less than 50 percent 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.

1. Color and Gloss: As selected by Engineer from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

D. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

3.2 ADJUSTING

A. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Engineer, remove damaged units and replace with new units.

END OF SECTION 089119

1. DESCRIPTION:

1.01 Furnish all labor, materials, equipment and services necessary to complete the work as indicated on the Contract Plans and the attached Specification Summary.

1.02 All work shall conform to the requirements specified in Part 1 – General, of the Sections listed.

2. MATERIALS:

2.01 The materials shall be as specified in Part 2 – Products, of the Sections listed.

3. CONSTRUCTION DETAILS:

3.01 The construction details shall be as specified in Part 3 – Execution, of the Sections listed.

4. METHOD OF MEASUREMENT:

4.01 This item shall be measured for payment on a lump sum basis for the work completed in accordance with the Contract Documents and as directed by the Engineer.

5. BASIS OF PAYMENT:

5.01 Payment for this item shall be made at the lump sum bid price bid. The lump sum price bid shall include cost of furnishing all labor, material, equipment and appliances necessary to complete the work as indicated on the Contract Plans and as specified herein in the Sections listed.

5.02 Detailed Estimate:

A. Before the first certificate of payment is issued for the work under this item, submit a detailed estimate of quantities and prices for all materials, labor, and other items included under this item, which shall aggregate the contract lump sum price bid for this item. Prepare the detailed estimate in the same sequence as the Sections listed.

B. The detailed estimate shall be supported by such evidence, including certified copies of subcontracts, as the Engineer may require.

C. The detailed estimate must be approved by the Engineer who may revise it as, in his/her reasonable judgment, is necessary to make the various item conform to their true values. The value of each certificate of payment will be based on the approved detailed estimate.

5.03 Monthly payments will be made for this item in proportion to the total amount of work completed.

1. SPECIFICATION SUMMARY

1.01 This item includes the following specifications:

A. Section 092900 – GYPSUM BOARD
B. Section 099600 – HIGH-PERFORMANCE COATINGS

SECTION 092900 - GYPSUM BOARD

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. Exterior gypsum board.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For the following products:

   1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.
   2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

C. Samples for Initial Selection: For each type of trim accessory and textured finish indicated.

D. Samples for Verification: For the following products:

   1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.
   2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.

1. Provide “GlasRoc Sheathing Type X” as manufactured by CertainTeed or approved equal.
2. Core: 5/8 inch, Type X.

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:
1. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.

C. Joint Compound for Exterior Applications:
1. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

C. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

D. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
2. Fit gypsum panels around ducts, pipes, and conduits.

E. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

F. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

G. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

3.3 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

A. Apply panels perpendicular to supports, with end joints staggered and located over supports.

1. Install with 1/4-inch (6.4-mm) open space where panels abut other construction or structural penetrations.
2. Fasten with corrosion-resistant screws.

3.4 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
1. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions.

3.5 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 099600 - HIGH-PERFORMANCE COATINGS

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 surface preparation and the application of high-performance coating systems.

1. Interior Substrates:
   a. Concrete masonry units (CMUs).
   b. Gypsum Wall Board
   c. Galvanized steel lintels

1.3 DEFINITIONS

A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

C. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product indicated.

C. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Coatings: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 HIGH-PERFORMANCE COATINGS, GENERAL

A. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
3. Products shall be of same manufacturer for each coat in a coating system.

B. Colors: As selected by Engineer from manufacturer's full range.

2.2 SOURCE QUALITY CONTROL

A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (CMUs): 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

D. Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or alkalinity of mortar joints exceeds that permitted in manufacturer's written instructions.

1. Clean surfaces with pressurized water. Use pressure range of 100 to 600 psi (690 to 4140 kPa) at 6 to 12 inches (150 to 300 mm).

E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for coating and substrate indicated.
2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.

1. Contractor shall touch up and restore coated surfaces damaged by testing.
2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Engineer, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. CMU Substrates:

1. Epoxy System:

a. Block Filler: Block filler, epoxy.

1) Devoe High Performance Coatings, Tru-Glaze-WB 4015 Filler.

b. Intermediate Coat: Epoxy, matching topcoat.
c. Topcoat: Epoxy, gloss.

1) Devoe High Performance Coatings, Tru-Glaze-WB 4408 Epoxy.

B. Gypsum Wall Board Substrates:

1. Epoxy System:

a. GWB Primer:

1) Devoe High Performance Coatings, Prep & Prime Gripper 3210 Primer.

b. Intermediate Coat: Epoxy, matching topcoat.
c. Topcoat: Epoxy, gloss.

1) Devoe High Performance Coatings, Tru-Glaze-WB 4408 Epoxy.

C. Galvanized Steel Substrates:

1. Epoxy System:

a. Steel Primer:

1) Devoe High Performance Coatings, Tru-Glaze-WB 4030 water borne epoxy primer.

b. Intermediate Coat: Epoxy, matching topcoat.
c. Topcoat: Epoxy, gloss.

1) Devoe High Performance Coatings, Tru-Glaze-WB 4408 Epoxy.

END OF SECTION 099600

ITEM 627.0022 - - 25 – PLUMBING

TAB 16-34A, D214509
Vehicle Wash Bay Installation at the Henrietta
and Batavia Maintenance Sites, MP 362.4 and 390.1

1. DESCRIPTION:

1.01 Furnish all labor, materials, equipment and services necessary to complete the work as indicated on the Contract Plans and the attached Specification Summary.

1.02 All work shall conform to the requirements specified in Part 1 – General, of the Sections listed.

2. MATERIALS:

2.01 The materials shall be as specified in Part 2 – Products, of the Sections listed.

3. CONSTRUCTION DETAILS:

3.01 The construction details shall be as specified in Part 3 – Execution, of the Sections listed.

4. METHOD OF MEASUREMENT:

4.01 This item shall be measured for payment on a lump sum basis for the work completed in accordance with the Contract Documents and as directed by the Engineer.

5. BASIS OF PAYMENT:

5.01 Payment for this item shall be made at the lump sum bid price bid. The lump sum price bid shall include cost of furnishing all labor, material, equipment and appliances necessary to complete the work as indicated on the Contract Plans and as specified herein in the Sections listed.

5.02 Detailed Estimate:

A. Before the first certificate of payment is issued for the work under this item, submit a detailed estimate of quantities and prices for all materials, labor, and other items included under this item, which shall aggregate the contract lump sum price bid for this item. Prepare the detailed estimate in the same sequence as the Sections listed.

B. The detailed estimate shall be supported by such evidence, including certified copies of subcontracts, as the Engineer may require.

C. The detailed estimate must be approved by the Engineer who may revise it as, in his/her reasonable judgment, is necessary to make the various item conform to their true values. The value of each certificate of payment will be based on the approved detailed estimate.

5.03 Monthly payments will be made for this item in proportion to the total amount of work completed.

1. SPECIFICATION SUMMARY

1.01 This item includes the following specifications:

A. Section 220500 – COMMON WORK RESULTS FOR PLUMBING
B. Section 220519 – METERS AND GAUGES FOR PLUMBING PIPING
C. Section 220523 – GENERAL DUTY VALVES FOR PLUMBING PIPING
D. Section 220529 – HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
E. Section 220553 – IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
F. Section 220700 – PLUMBING INSULATION
G. Section 221116 – DOMESTIC WATER PIPING
H. Section 221119 – DOMESTIC WATER PIPING SPECIALTIES
I. Section 221124 – FACILITY NATURAL GAS PIPING
J. Section 221316 – SANITARY WASTE AND VENT PIPING
K. Section 221319 – SANITARY WASTE PIPING SPECIALTIES
L. Section 227200 – OIL WATER SEPARATOR SYSTEM
M. Section 227300 – PRESSURE WASHER SYSTEM

SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Dielectric fittings.
3. Mechanical sleeve seals.
4. Sleeves.
5. Escutcheons.
6. Grout.
7. Plumbing demolition.
8. Equipment installation requirements common to equipment sections.
9. Supports and anchorages.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than plumbing and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, and spaces above ceilings, and unexcavated spaces.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and plumbing equipment rooms.

C. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

1.3 SUBMITTALS

A. Welding certificates.

1.4 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

D. Provide all building plumbing systems in compliance with the Plumbing Code of New York State.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

D. Welding Filler Metals: Comply with AWS D10.12.

E. Solvent Cements for Joining Plastic Piping:

1. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.3 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

D. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

E. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

2.4 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

B. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

C. Pressure Plates: Plastic. Include two for each sealing element.

D. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.5 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Under deck Clamp: Clamping ring with set screws.

2.6 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. Two-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. Two-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Polished chrome-plated.

2.7 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PLUMBING DEMOLITION

A. Disconnect, demolish, and selective removal of plumbing systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining domestic water and sanitary piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same piping material at main. All abandoned and unused branch piping shall be removed unless cost or structural concerns prohibit removal. Sanitary sewer branches abandoned in place or left for future reconnection shall have a cleanout installed at the dead end of a section to facilitate cleaning.
3. Equipment or Fixtures to Be Removed: Disconnect and cap services and remove equipment, fixtures and branch piping to fixtures.
4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.

B. If pipe, insulation or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Provide piping according to the following requirements and Division 22 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and other design considerations. Provide piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Provide piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Provide piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to buildi ng walls. Di agonal runs are prohibited unless specifically indicated otherwise.

E. Provide piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Provide piping to permit valve servicing or replacement.

G. Provide piping at indicated slopes.

H. Provide piping free of sags and bends.

I. Provide fittings for changes in direction and branch connections.

J. Provide piping to allow application of insulation.

K. Select sy stem co mponents with pressure rating equal to or g reater than sy stem operating pressure.

L. Provide escutcheons for penetrations of walls, ceilings, and floors.

M. Provide sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

N. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pi pe penetrations with fire stop materials. Refer to Division 07 Section "Firestopping" for materials.

O. Verify final equipment and fixture locations prior to roughing-in piping.

P. Refer to equipment specifications in other S ections of these Specifications for roughin g-in requirements.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the follo wing requirem ents and Divisi on 22 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scal e, slag, dirt, and debris from the in side and outside of pipe and fittings bef ore assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Constr uct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," usi ng lead-free solder alloy complying with ASTM B 32.

E. Threaded Joints: Thread pipe with tapered pipe threads accor ding to ASME B1.20.1. Cut threads full a nd clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

F. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Provide unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Provide equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Provide equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Provide plumbing equipment and fixtures to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations.

D. Provide equipment and fixtures to allow right of way for piping installed at required slope.

3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Structural Steel" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.7 GROUTING

A. Clean surfaces that will come into contact with grout.

B. Provide forms as required for placement of grout.

C. Avoid air entrapment during placement of grout.

D. Place grout around anchors.

E. Cure placed grout.

END OF SECTION 220500

SECTION 220519 - METERS AND GAUGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Dial-type pressure gauges.
2. Gauge attachments.
3. Thermometers

1.2 SUBMITTALS

A. Product Data: For each type of product indicated and for the final O & M manuals.

B. Product certificates.

C. Operation and maintenance data.

PART 2 – PRODUCTS

2.1 PRESSURE GAUGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gauges:

1. Basis-of-Design Product: Subject to compliance with requirements, provide a Winters Instrument Model P1S238 or comparable product by one of the following:

   a. AMETEK, Inc.; U.S. Gauge.
   b. Ashcroft Inc.
   c. Trerice, H. O. Co.
   d. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
   e. Weiss Instruments, Inc.
   f. WIKA Instrument Corporation – USA.
   g. Winters Instruments – U.S.

2. Standard: ASME B40.100.
3. Case: Liquid-filled type; cast aluminum or drawn steel; 3-1/2-inch nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Non-reflective aluminum with permanently etched scale markings graduated in psi.
8. Pointer: Dark-colored metal.

9. Window: Glass.
10. Ring: Stainless steel.
11. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range of 0-300 psig.
12. Plumbing Water Service: Winters Model P1S238, (0 – 160 psi).
13. Fire Protection Water Service: Winters Model P1S240, (0 – 300 psi).

2.2 GAUGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and piston –type surge-dampening device. Include extension for use on insulated piping.

B. Valves: Brass ball, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads.

2.3 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:
   1. Basis-of-Design Pro duct: Subject to compliance with requirements, provi de Winters Instruments – U.S.A. Model TSW-173 or comparable product by one of the following:

      a. Flo Fab Inc.
      b. Miljoco Corporation.
      c. Palmer Wahl Instrumentation Group.
      d. Tel-Tru Manufacturing Company.
      e. Trerice, H. O. Co.
      f. Weiss Instruments, Inc.
      g. Winters Instruments – U.S.

   2. Standard: ASME B40.200.
   3. Case: Cast aluminum; 8-inch nominal size unless otherwise indicated.
   4. Case Form: Straight unless otherwise indicated.
   5. Tube: Glass with magnifying lens and red organic liquid.
   6. Tube Background: Nonr eflective alu minum with per manently etched scal e markings graduated in degrees F. and degrees C.
   7. Window: #N – 16 Glass.
   8. Stem: Aluminum and of length to suit installation.

      a. Design for Thermowell Installation: Bare stem.

   9. Connector: 1-1/4 inches, with ASME B1.1 screw threads.
   10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.4 THERMOW ELLS

A. Thermowells:

   1. Standard: ASME B40.200.

2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
3. Material for Use with Copper Tubing: CNR.
4. Material for Use with Steel Piping: CRES.
5. Type: Stepped shank unless straight or tapered shank is indicated.
6. External Threads: NPS ½, NPS ¾, or NPS 1, ASME B1.20.1 pipe threads.
7. Internal Threads: ½, ¾, or 1 inch, with ASME B1.1 screw threads.
8. Bore: Diameter required matching thermometer bulb or stem.
9. Insertion Length: Length required matching thermometer bulb or stem.
10. Lagging Extension: Include on thermowells for insulated piping and tubing.
11. Bushings: For converting size of ther mowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.5 TEST PLUGS

A. Basis-of-Design Product: Subject to com pliance with requirem ents, provide Winte rs Instruments – U.S. or comparable product by one of the following:

1. Flow Design, Inc.
2. Miljoco Corporation.
3. National Meter, Inc.
4. Peterson Equipment Co., Inc.
5. Sisco Manufacturing Company, Inc.
6. Trerice, H. O. Co.
7. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
8. Weiss Instruments, Inc.

B. Description: Test-station fitting made for insertion into piping tee fitting.

C. Body: Brass or stainless steel with core inser ts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.

D. Thread Size: NPS ¼, ASME B1.20.1 pipe thread.

E. Minimum Pressure and Temperature Rating: 500 psig at 200 degrees F.

F. Core Inserts: Chlorosulfonated polyethylene synthetic and EPDM self-sealing rubber.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Provide direct-mounted pressure gauges in pi ping tees with pressure gauge l ocated on pi pe at the most readable position.

B. Provide valve and snubber in piping for each pressure gauge for fluids.

C. Provide pressure gauges in the following locations:

1. Building water service entrance.
2. Inlet and outlet of each double check valve backflow prevention device.

D. Adjust the faces of meters and gauges to proper angle for best visibility . Position adjustable gauges so they can be read from a standing position on the floor.

E. Provide thermowells with socket extending to center of pipe and in vertical position in piping tees.

F. Provide thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

G. Provide thermowells with extension on insulated piping.

H. Fill thermowells with heat-transfer medium.

I. Provide direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

3.2 PRESSURE-GAUGE SCHEDULE

A. Pressure gauges at the inlet and outlet of the domestic water service shall be the following:

1. Liquid-filled Sealed, direct-mounted, metal case.

B. Pressure gauges at inlet and outlet of each backflow prevention device shall be the following:

1. Liquid-filled Sealed, direct-mounted, metal case.

3.3 PRESSURE-GAUGE SCALE-RANGE SCHEDULE

A. Scale Range for Water Service Piping: 0 to 160 psi.

3.4 THERMOMOTER SCHEDULE

B. Scale Range for Water Service Piping: 40 to 280 degrees F.

END OF SECTION 220519

SECTION 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Bronze ball valves.
2. Bronze swing check valves.

B. Related Sections:

1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

1.2 SUBMITTALS

A. Product Data: For each type of valve as indicated.

1.3 QUALITY ASSURANCE

A. ASME Compliance: ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.

B. NSF Compliance: ASTM / NSF 61, NSF 62 Annex-G and NSF 372 for valve materials for potable-water service with a lead content level not exceeding 0.25 percent weighted maximum average.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve Actuator Types:
1. Hand lever: For quarter-turn valves NPS 2 and smaller except plug valves.

E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
   1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

F. Valve-End Connections:
   1. Solder Joint: With sockets according to ASME B16.18.
   2. Threaded: With threads according to ASME B1.20.1.

2.2 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Conbraco Industries, Inc.; Apollo Valves.
      b. Hammond.
      c. Legend Valve Company.
      d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

   2. Description:

      a. Standard: MSS SP-110.
      b. SWP Rating: 150 psig.
      c. CWP Rating: 600 psig.
      d. Body Design: Two piece.
      e. Body Material: Bronze.
      f. Ends: Threaded.
      g. Seats: PTFE or TFE.
      h. Stem: Bronze.
      i. Ball: Chrome-plated brass.
      j. Port: Full.
      k. Basis of Design Manufacturer: Apollo Valves 77C-LF-100 or 200 Series.

B. For high-pressure water line on downstream side of high-pressure heater unit, ball valves shall be rated for 3,000 psig as manufactured by S-K Automation, Series 3000, or approved equal.

2.3 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Conbraco Industries, Inc.; Apollo Valves
      b. Lunkenheimer Valve.
      c. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

   2. Description:

a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 200 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: Bronze.
g. Basis of Design Manufacturer: Apollo Valves 161S-LF or 161T-LF Series.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

A. Provide valves with unions or flanges at pipe branches to each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Provide valves in horizontal piping with stem at or above center of pipe.

D. Provide valves in position to allow full stem movement.

3.2 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Full port ball valves.
2. Pump-Discharge Check Valves:

a. NPS 2 inches and Smaller: Bronze swing check valves with bronze or nonmetallic disc.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 inches and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2-1/2 to NPS 3 inches: Flanged ends except where threaded valve-end option is indicated in valve schedules below.

3.4 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 3 inches and Smaller:

1. Bronze Full Port Valves: Ma y be provided with s older-joint ends instead of threaded ends.
2. Bronze Angle Valves: Class 125, bronze nonmetallic disc.
3. Ball Valves: Two piece, full port, bronze with bronze trim.
4. Bronze Swing Check Valves: Class 125, bronze disc.

3.5 Pump Discharge Valve Schedule:

A. Pipe NPS 2-1/2 inches and Smaller:

1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
2. Ball Valves: One piece, full port, bronze with bronze trim.
3. Bronze Swing Check Valves: Class 125, bronze disc.

END OF SECTION 220523

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.
5. Pipe positioning systems.
6. Equipment supports.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Welding certificates.

1.4 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Hanger Shield: Hanger with metal shield to cushion to support bearing surface of piping and insulation.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig minimum compressive strength and vapor barrier.

B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 552, Type II cellular glass with 100-psig with minimum compressive strength.

C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened Portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.6 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

B. Adjustable Stanchion Pipe Supports: All welded steel construction, corrosion resistant, base plate with adjustable steel threaded rod. Basis of Design: Watts Regulator Model RK-W-STD or approved equal.

2.7 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Provide hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Thermal-Hanger Shield Installation: Provide on pipe hanger or shield for insulated piping.

D. Fastener System Installation:

1. Provide powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Provide mechanical-expansion anchors in concrete after concrete is placed and completely cured. Provide fasteners according to manufacturer's written instructions.

E. Pipe Positioning-System Installation: Provide support devices to make rigid supply and waste piping connections to each plumbing fixture. See Division 22 plumbing fixture Sections for requirements for pipe positioning systems for plumbing fixtures.

F. Provide hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

H. Provide hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

I. Provide lateral bracing with pipe hangers and supports to prevent swaying.

J. Provide pipe supports on all vertical piping between floor decks attached to wall framing or structure to prevent swaying.

K. Provide building attachments within concrete slabs or attach to structural steel. Provide additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Provide concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

L. Load Distribution: Provide hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

M. Pipe Slopes: Provide hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

N. Insulated Piping:

1. Attach clamps and spacers to piping.

a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Provide MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Provide MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.
   c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.

5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1- inches or less.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Provide hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Provide nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Provide carbon-steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.

F. Provide copper-plated pipe hangers and copper attachments for copper piping and tubing.

G. Provide padded hangers for piping that is subject to scratching.

H. Provide thermal-hanger shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 inch to NPS 6 inches.

2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 inches to NPS 6 inches, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 inch to NPS 6 inches, requiring clamp flexibility and up to 4 inches of insulation.
4. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 inch to NPS 6 inches.
5. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 inch to NPS 6 inches.
6. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 inches to NPS 6 inches, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
7. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 inches to NPS 6 inches, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
8. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 inch to NPS 6 inches, from two rods if longitudinal movement caused by expansion and contraction might occur.
9. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 inches to NPS 6 inches if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 inch to NPS 6 inches.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 inch to NPS 6 inches if longer ends are required for riser clamps.

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:

a. Light (MSS Type 31): 750 lb.
b. Medium (MSS Type 32): 1500 lb.
c. Heavy (MSS Type 33): 3000 lb.

8. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

N. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

O. Provide powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

P. Provide pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Valve tags.

1.2 SUBMITTAL

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Material and Thickness: Multila yer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: Black.
3. Background Color: White.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 8 inches by 2 inches.
6. Minimum L etter Size: 1/2 inch for viewing distances up to 72 inc hes, 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.

B. Label Content: I nclude equipm ent's Drawi ng d esignation or uni que equ ipment number, Drawing num bers where equipm ent is indicated (plans, detail s, and sched ules), plus the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: Ty pewritten for each item of equipment to be labeled, on 8-1/2 inch – b y – 11 - inch b ond paper in clear plast ic or la minated sleeve. Tab ulate equipment identification num ber and identif y Drawing num bers where eq uipment is indicated (pla ns, details, and schedules), plus the Specification Section num ber and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: Yellow.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pre-tensioned Pipe Labels: Pre-coiled, semi rigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

2.4 Valve Tags for Valves:

A. Material and Thickness: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.

B. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

C. Fasteners: Stainless-steel rivets or cable.

D. Basis of Design Manufacturer: Seton Style 300 or approved equal.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Provide or permanently fasten labels on each major item of mechanical equipment including the pumps, power washer and backflow prevention devices.

B. Locate equipment labels where accessible and visible.

C. Provide plastic equipment signs and labels at equipment items.

D. Provide valve tags on all plumbing system valves. Provide a valve tag chart with laminated plastic cover or plastic sleeve. Locate in building mechanical room on wall in location acceptable to Facilities. Provide fasteners to support from wall. Contents of table shall include pipe size, location in building, valve type and connected service.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Division 09 Section "Interior Painting."

B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors and similar access points that permit view of concealed piping.
5. Near equipment items and other points of origination and termination.

6. Spaced at maximum intervals of 20 feet along each run. Reduce intervals to 10 feet in areas of congested piping and equipment and at changes in direction of piping.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

C. ASTM Pipe Label Color Schedule:

1. Domestic Cold Water Piping:

   a. Background Color: Green
   b. Letter Color: White (CW)

2. Sanitary Vent Piping:

   a. Background Color: Green
   b. Letter Color: White (V)

3. Sanitary Waste Piping:

   a. Background Color: Green
   b. Letter Color: White (SAN)

END OF SECTION 220553

SECTION 220700 - PLUMBING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Insulation Materials:
   a. Mineral fiber.

2. Insulating cements.
3. Adhesives.
4. Mastics.
5. Sealants.
6. Factory-applied jackets.
7. Field-applied fabric-reinforcing mesh.
8. Field-applied jackets.
9. Tapes.
10. Securements.
11. Corner angles.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittal:

1. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.

C. Field quality-control reports.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.4 Provide all insulation in compliance with the Energy Conservation Construction Code of New York State (2010).

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

D. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, provide the following:

a. Fibrex Insulations Inc.; Coreplus 1200.
b. Johns Manville; Micro-Lok.
c. Knauf Insulation; 1000 Pipe Insulation.
d. Manson Insulation Inc.; Alley-K.
e. Owens Corning; Fiberglas Pipe Insulation.

2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article

2.2 INSULATING CEMENTS

A. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.

1. Products: Subject to compliance with requirements, provide the following:

a. Insulco, Division of MFS, Inc.; SmoothKote.
b. P. K. Insulation Mfg. Co., Inc.; PK No. 127, and Quik-Cote.
c. Rock Wool Manufacturing Company; Delta One Shot.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide the following:

   a. Childers Products, Division of ITW; CP-82.
   b. Foster Products Corporation, H. B. Fuller Company; 85-20.
   c. ITW TACC, Division of Illinois Tool Works; S-90/80.
   d. Marathon Industries, Inc.; 225.
   e. Mon-Eco Industries, Inc.; 22-25.

2. For indoor a pplications, use adhesive t hat has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Com ply with MIL-A -3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide the following:

   a. Childers Products, Division of ITW; CP-82.
   b. Foster Products Corporation, H. B. Fuller Company; 85-20.
   c. ITW TACC, Division of Illinois Tool Works; S-90/80.
   d. Marathon Industries, Inc.; 225.
   e. Mon-Eco Industries, Inc.; 22-25.

2. For indoor a pplications, use adhesive t hat has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, provide the following:

   a. Dow Chemical Company (The); 739, Dow Silicone.
   b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
   c. P.I.C. Plastics, Inc.; Welding Adhesive.
   d. Speedline Corporation; Speedline Vinyl Adhesive.

2. For indoor a pplications, use adhesive t hat has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 MASTICS

A. Materials shall be co mpatible with insulation materi als, jack ets, and substrate s; co mply with MIL-C-19565C, Type II.

1. For indoor applications, use mastics that have a V OC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor and out door use on below am bient services.

1. Products: Subject to compliance with requirements, provide the following:

a. Childers Products, Division of ITW; CP-35.
b. Foster Products Corporation, H. B. Fuller Company; 30-90.
c. ITW TACC, Division of Illinois Tool Works; CB-50.
d. Marathon Industries, Inc.; 590.
e. Mon-Eco Industries, Inc.; 55-40.
f. Vimasco Corporation; 749.

2. Water-Vapor Perm eance: ASTM E 96, Pro cedure B, 0.01 3 per m at 43-m il dr y film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Products: Subject to compliance with requirements, provide the following

a. Childers Products, Division of ITW; CP-10.
b. Foster Products Corporation, H. B. Fuller Company; 35-00.
c. ITW TACC, Division of Illinois Tool Works; CB-05/15.
d. Marathon Industries, Inc.; 550.
e. Mon-Eco Industries, Inc.; 55-50.
f. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 3 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 200 deg F.
4. Solids Content: 63 percent by volume and 73 percent by weight.
5. Color: White.

2.5 SEALANTS

A. Joint Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 100 to plus 300 deg F.
4. Color: White.
5. For indo or applications, u se sealants th at have a VOC content of 250 g/L or le ss when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide the following:

a. Childers Products, Division of ITW; CP-76.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.

5. Color: White.
6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.6 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.7 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Polyester Fabric: Approximately 1 oz. /sq. yd. with a thread count of 10 strands by 10 strands/sq. inch, in a Leno weave, for equipment and pipe.

1. Products: Subject to compliance with requirements, provide the following:

a. Foster Products Corporation, H. B. Fuller Company; Mast-A-Fab.
b. Vimasco Corporation; Elastafab 894.

2.8 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, provide the following:

a. Johns Manville; Zeston.
b. P.I.C. Plastics, Inc.; FG Series.
c. Proto PVC Corporation; LoSmoke.
d. Speedline Corporation; SmokeSafe.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.9 TAPES

A. ASJ Tape: White vapor- retarder tape matching fa ctory-applied jacket with a crylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide the following:

a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
b. Compac Corp.; 104 and 105.
c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbs. foot/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, provide the following:

a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0555.
b. Compac Corp.; 130.
c. Ideal Tape Co., Inc., an American Biltrite Company; 370 White PVC tape.
d. Venture Tape; 1506 CW NS.

2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbs. f/inch in width.

2.10 CORNER ANGLES

A. PVC Corner Angles: 30 mils thick, minim um 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean and dry surfaces to r eceive insulation. Rem ove materials that will adversely affect insulation application.

B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Provide insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.

B. Provide insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of piping system as specified in insulation system schedules.

C. Provide accessories compatible with insulation materials and suitable for the service. Install all accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Provide insulation with longitudinal seams at top and bottom of horizontal runs.

E. Provide multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Provide insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Provide insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Provide insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Provide insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Provide shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Provide insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.

2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Provide insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.

   a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above ambient services, do not install insulation to the following:

1. Testing agency labels and stamps.
2. Nameplates and data plates.
3. Cleanouts.

3.3 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Provide insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Provide insulation continuously through walls and partitions.

C. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Provide insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Division 07 Section "Firestopping" and fire-resistive joint sealers.

D. Insulation Installation at Floor Penetrations:

1. Pipe: Provide insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Firestopping."

3.4 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Provide insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for

above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

C. Insulate instrument connections for thermometers, pressure gauges, pressure temperature taps, and sensors on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Provide removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Provide same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.

3.5 MINERAL-FIBER INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Provide preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Provide jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Provide preformed sections of same material as straight segments of pipe insulation when available.

2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Provide preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to attach flush to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Provide insulation on flanges as specified for flange insulation application.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of piping. Seal with manufacturers recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect field-insulated equipment, randomly selected by Engineer, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location for each type of equipment defined in the "Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.8 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
1. Underground piping.
2. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.9 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold, Hot, Hot Water Piping: Insulation shall be the following:
   1. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick for cold water piping. 1 inch thick for hot water piping. 1 inch thick for domestic hot water recirculation piping.

B. Indirect Waste: Insulation shall be the following:
   1. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.

C. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities: Insulation shall be the following:
   1. PVC, Preformed Pipe Insulation, Type I: 1/2 inch thick.

3.10 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

   1. Provide PVC fitting covers on pipe elbows only.

D. Piping, Exposed:

   1. Provide PVC fitting covers on pipe elbows only.

END OF SECTION 220700

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Under-building slab and aboveground domestic water pipes, tubes, fittings, and specialties inside the building.
2. Specialty valves.

1.2 PERFORMANCE REQUIREMENTS

A. Provide domestic water piping in compliance with Chapter 6 of the Plumbing Code of New York State (2010).

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with ANSI / NSF 61, NSF 62 Annex-G and NSF 372 for potable domestic water piping and components with lead content not to exceed 0.25 percent maximum weighted average.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

1. Cast-Copper Solder-Joint Fittings: ASME B16.18, pressure fittings.
2. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
3. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

4. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

B. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.

1. Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

2.3 GALVANIZED-STEEL PIPE AND FITTINGS **(All piping downstream of power washer equipment)**

A. Galvanized-Steel Pipe:

1. ASTM A 53/A 53M, Type E, Grade A, **Schedule 80** with schedule 80 fittings.
2. Include ends matching joining method.

B. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106/A 106M, Standard Weight, seamless steel pipe with threaded ends.

C. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

D. Malleable-Iron Unions:

1. ASME B16.39, Class 150.
2. Hexagonal-stock body.
3. Ball-and-socket, metal-to-metal, bronze seating surface.
4. Threaded ends.

E. Flanges: ASME B16.1, Class 125, cast iron.

2.4 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free, unless otherwise indicated; full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

2.5 TRANSITION FITTINGS

A. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

B. Sleeve-Type Transition Coupling: AWWA C219.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Provide copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Provide full port ball shutoff valve immediately upstream of each dielectric fitting.

D. Provide water-pressure-reducing valves downstream from shutoff valves. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for pressure-reducing valves.

E. Provide domestic water piping level with 0.25 percent slope downward toward drain and plumb.

F. Rough-in domestic water piping for water-meter installation according to plan details.

G. Provide piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

H. Provide piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

I. Provide piping adjacent to equipment and specialties to allow service and maintenance.

J. Provide piping to permit valve access, removal or servicing from a standing position on the floor.

K. Provide nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.

L. Provide piping free of sags and bends.

M. Provide fittings for changes in direction and branch connections.

N. Provide unions in copper tubing at final connection to each piece of plumbing equipment and specialty.

O. Provide pressure gauges on the suction and discharge piping connected to each domestic hot water plumbing pump. Comply with requirements in Division 22 Section "Meters and Gauges for Plumbing Piping" for pressure gauges.

P. Provide sleeves for pipi ng penetrati ons of walls, ceilings, and floors. Com ply with requirements for sleeves specified in Divisi on 22 Section " Common Work Results for Plumbing."

3.2 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread steel pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

E. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

F. Type K copper piping installed below beneath floor slabs shall be installed with no fittings or joints. Joints shall be brazed.

3.3 VALVE INSTALLATION

A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.

B. Provide full port ball valve close to water main on each branch and risers serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use full port ball valves for piping NPS 2 inches and smaller.

C. Provide hose end drain valves for equipment at base of each water risers, at low points in horizontal piping, at wash bay equipment connections and where required to drain water piping. Drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."

1. Hose-End Drain Valves: At low points in water mains, risers, and branches.

3.4 TRANSITION FITTING INSTALLATION

A. Provide transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. NPS 2 inches and smaller: Fitting-type coupling.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support products and installation.

1. Vertical Piping: MSS Type 8 or 42 clamps.
2. Individual, Straight, Horizontal Piping Runs:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
b. Longer than 100 Feet: MSS Type 43, adjustable roller hangers.

B. Support vertical piping and tubing at base and at each floor.

C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

D. Provide hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.

E. Provide supports for vertical copper tubing every 8 feet.

F. Provide hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 inches and Smaller: 84 inches with 3/8-inch rod.
2. NPS 1-1/2 inches: 108 inches with 3/8-inch rod.
3. NPS 2 inches: 10 feet with 3/8-inch rod.

G. Provide supports for vertical steel piping every 10 feet.

H. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Provide piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with full port ball shutoff valve; extend and connect branch piping to the following:

1. Domestic Water Pumps: Cold-water suction and discharge piping.
2. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide full port ball valve and union for each connection.

3.7 IDENTIFICATION

A. Identify system components. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for identification materials and installation.

B. Label pressure piping for pump with system operating pressure.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Piping Inspections:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

   a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
   b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

C. Piping Tests:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and

allow standing for four hours. Leaks and loss in test pressure constitute defects that must be repaired.

5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
6. Prepare reports for tests and for corrective action required.

D. Domestic water piping will be considered defective if it does not pass tests and inspections.

E. Provide pressure test, chlorination and inspection reports to be included in the O & M Manual.

3.9 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
b. Fill and isolate system according to either of the following:

1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow standing for 24 hours.
2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow standing for three hours.

c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Prepare and submit reports of purging and disinfecting activities.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.10 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Under-building-slab, domestic water, building service piping, NPS 2 inch and smaller, shall be the following:

1. Soft copper tube, ASTM B 88, Type K; wrought-copper solder-joint fittings**;** and brazed copper pressure-seal fittings.

D. Aboveground domestic water piping, NPS 2 inches and smaller, shall be one of the following:
   1. Hard copper tube, ASTM B 88, Type L ASTM B 88; cast- or wrought- copper solder-joint fittings; and soldered joints. **For water pressures less than 100 psig only**.

   2. Galvanized-steel pipe and nipples; **Schedule 80** with schedule 80 fittings, galvanized, gray-iron threaded fittings; and threaded joints. **For water pressure over 100 psig downstream of pressure washer system**.

3.11 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
   1. Shutoff Duty: Use full port ball valves for piping NPS 3 inches and smaller.
   2. Drain Duty: Hose-end drain valves.

B. Provide check valves to maintain correct direction of domestic water flow to and from equipment.

END OF SECTION 221116

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following domestic water piping specialties:

1. Backflow prevention devices.
2. Strainers.
3. Drain valves.
4. Wash bay equipment.

1.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

B. Provide domestic water piping specialties in compliance with Chapter 6 of the Plumbing Code of New York State (2010).

C. Comply with ANSI / NSF 61, NSF 62 Annex-G and NSF 372 for potable domestic water piping and components with lead content not to exceed 0.25 percent maximum weighted average for domestic water piping specialties.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control test reports.

C. Operation and maintenance data for the final O & M Manuals.

1.4 QUALITY ASSURANCE

A. NSF Compliance:

1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components.

PART 2 - PRODUCTS

2.1 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Prevention Devices (RPZ):

1. Basis-of-Design Product: Subject to compliance with requirements, provide a Watts Regulator Company Model LF 009- QT-S (wash bay equipment make-up water) or a comparable product by one of the following:

   a. Conbraco Industries, Inc.
   b. FEBCO; SPX Valves & Controls.
   c. Watts Industries, Inc.; Water Products Div.
   d. Zurn Plumbing Products Group; Wilkins Div.

2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 10 psig maximum, through middle 1/3 of flow range.
5. Size: 3/4 inch for domestic water make-up for mechanical equipment.
6. Design Flow Rate: 8 gpm.
7. Pressure Loss at Design Flow Rate: 12 psig for sizes NPS 2 inches and smaller
8. Body: Bronze for NPS 2 inches and smaller. Low lead content.
9. End Connections: Threaded for NPS 2 and smaller.
10. Configuration: Designed for horizontal, straight through flow.
11. Accessories:

    a. Valves: Full port ball type with threaded ends on inlet and outlet of NPS 2 and smaller.
    b. Air-Gap Fitting: ASME A112.1.2, manufacturer's matching backflow-preventer connection.

B. Double Check Valve Backflow Prevention Devices (DCV):

1. Basis-of-Design Product: Subject to compliance with requirements, provide a Watts Regulator Company Model LF 007- QT-S (Building water service entrance) or a comparable product by one of the following:

   a. Conbraco Industries, Inc.
   b. FEBCO; SPX Valves & Controls.
   c. Watts Industries, Inc.; Water Products Div.
   d. Zurn Plumbing Products Group; Wilkins Div.

2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 10 psig maximum, through middle 1/3 of flow range.
5. Size: 2 inch for domestic water.
6. Design Flow Rate: 20 gpm.
7. Pressure Loss at Design Flow Rate: 5 psig for sizes NPS 2 inches and smaller
8. Body: Bronze for NPS 2 inches and smaller. Low lead content.

9. End Connections: Threaded for NPS 2 and smaller.
10. Configuration: Designed for horizontal, straight through flow.
11. Accessories:

    a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 and smaller.
    b. Air-Gap Fitting: ASME A112.1.2, manufacturer's matching backflow-preventer connection.

C. Vacuum Breaker Backflow Prevention Devices (VB):

1. Basis-of-Design Product: Subject to compliance with requirements, provide a Watts Regulator Company Model LF 800M4FR (wash bay equipment make-up water) or a comparable product by one of the following:

    a. Conbraco Industries, Inc.
    b. FEBCO; SPX Valves & Controls.
    c. Watts Industries, Inc.; Water Products Div.
    d. Zurn Plumbing Products Group; Wilkins Div.

2. Standard: ASSE 1013.
3. Operation: Freeze resistant and to operate under continuous-pressure applications.
4. Pressure Loss: 10 psig maximum, through middle 1/3 of flow range.
5. Size: 2 inch for domestic water make-up for wash bay equipment.
6. Design Flow Rate: 20 gpm.
7. Pressure Loss at Design Flow Rate: 12 psig for sizes NPS 2 inches and smaller
8. Body: Bronze for NPS 2 inches and smaller. Low lead content.
9. End Connections: Threaded for NPS 2 and smaller.
10. Configuration: Designed for horizontal, straight through flow.
11. Accessories:

    a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 and smaller.
    b. Air-Gap Fitting: ASME A112.1.2, manufacturer's matching backflow-preventer connection.

2.2 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers:

1. Pressure Rating: 125 psig minimum, unless otherwise indicated.
2. Body: Bronze for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or FDA-approved, epoxy coating and for NPS 2-1/2 inches and larger.
3. End Connections: Threaded for NPS 2 inches and smaller; flanged for NPS 2-1/2 inches and larger.
4. Screen: Stainless steel with round perforations, unless otherwise indicated.
5. Perforation Size:

    a. Strainers NPS 2 inches and Smaller: 0.020 inch.
    b. Strainers NPS 2-1/2 to NPS 4inches: 0.045 inch

6. Drain: Factory-installed, hose-end drain valve.
7. Basis of Design Manufacturer: Apollo Valve Series 161-S-LF or 161T-LF, (1/2 to 3 inch).
8. Basis of Design Manufacturer: Watts Regulator Model 77F-DI-FDA-125, (4 inch).

2.3 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 3/4 inches.
4. Body: Copper alloy lead free.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.
10. Basis of Design Manufacturer: Apollo Valve Series 70HC-100-LF or 70HC-200-LF or approved equal.

2.4 WASH BAY EQUIPMENT

A. Hose Reel Equipment:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hanney.
   b. Reel Craft.
   c. T & S Brass.
   d. Chicago.
   e. Ramteq.

2. Spring retractable, high pressure, spring driven or hand crank, water hose reel for power washers of heavy enamel painted steel construction, steel frame, heavy duty hand crank with rubber coated handle, 50 feet of 3/8 inch 3000 psi high pressure hose, tangle free operation, up to 5000 psi operating pressure and complete with same manufacturer's required wall mounting brackets. Basis of Design Manufacturer: Reel Craft Series PW 7650 OHP or H 18006 M or Engineer approved equal.

3. Wash Wand: High pressure wash wand gun of stainless steel, brass and coated rust resistant metal component's, 5000 psi rated with trigger grip and handle and adjustable spray settings.

4. Hose: Synthetic rubber black or red color, high tensile steel wire braided reinforcement, maximum working pressure 3000 psi, Minimum burst pressure 12,000 psi, abrasion and weather resistant outer cover, operable from minus 40 degrees F. to 310 degrees F. in 50

foot lengths. Basis of Design Manufacturer: Pace Inc. Impac 3000 or Engineer approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. Provide backflow prevention devices on each water supply to wash bay equipment that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow prevention devices in same room as connected equipment or system.
2. Provide drain for backflow prevention devices with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.
3. Do not install bypass piping around backflow prevention devices.
4. Provide 2 inch building water service double check valve backflow prevention device in compliance with the dimensions shown on plans and in accordance with the New York State Cross Connection Control Manual requirements.
5. Provide vacuum breaker for make-up water to buffer tank in accordance with manufacturers installation instructions and locate 12 inches above top level of tank.
6. Provide 3/4 inch building water service reduced pressure zone valve backflow prevention device for mechanical boiler make-up water in compliance with the dimensions shown on plans and in accordance with the New York State Cross Connection Control Manual requirements.

C. Provide Y-pattern low lead strainers for water on supply side of the wash bay system.

D. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.

3.2 FIELD QUALITY CONTROL

A. Provide the following tests and prepare test reports:

1. Test each backflow-prevention assembly according to authorities having jurisdiction and the device's reference standard.

B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

END OF SECTION 221119

SECTION 221124 - FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Piping and tubing joining materials.
4. Manual gas shut-off valves.
5. Pressure regulators.

1.2 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:

1. Piping and Valves: 100 psig minimum unless otherwise indicated.
2. Service Regulators: 65 psig minimum unless otherwise indicated.

B. Natural-Gas System Pressure within Buildings: 0.5 psig, 14 inches water column or less.

C. Provide facility natural gas piping in compliance with of the Fuel Gas Code of New York State.

D. Provide in compliance with local fuel gas supplier require ments for underground site installations National Fuel, New York State El ectric and Gas (NYSEG), National Grid or Rochester Gas and Electric (RGE).

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawin gs: For faci lity natural-g as piping layout. Inclu de plans, pi ping layout and elevations, sections, and details for fabrication of pipe anchor s, hangers, suppor ts for multiple pipes, and attachments of the same to building structure. Detail location of anchors.

C. Welding certificates.

D. Field quality-control reports.

E. Operation and maintenance data for the final O & M Manuals.

1.4 QUALITY ASSURANCE

A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade A.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
4. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.

a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

2.2 PIPING SPECIALTIES

A. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller.
3. Strainer Screen: 40-mesh startup strainer and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig.

B. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.3 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for natural gas.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

2.4 MANUAL GAS SHUTOFF VALVES

A. See "Aboveground Manual Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.

B. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.

1. CWP Rating: 125 psig.
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
6. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.

C. Bronze Plug Valves: MSS SP-78.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Lee Brass Company.
   b. McDonald, A. Y. Mfg. Co.
   c. Lunkenheimer.

2. Body: Bronze, complying with ASTM B 584.
3. Plug: Bronze.
4. Ends: Threaded, socket, as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Operator: Square head or lug type with tamperproof feature where indicated.
6. Pressure Class: 125 psig.
7. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
8. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

2.5 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.

4. End Connections: Threaded for regulators NPS 2 and smaller.

B. Line Pressure Regulators: Comply with ANSI Z21.80.
1. Basis-of-Design Pro duct: Subject to compliance with requirements, provi de Sensus Model or comparable product by one of the following:

a. Actaris.
b. American Meter Company.
c. Eclipse Combustion, Inc.
d. Fisher Control Valves and Regulators; Division of Emerson Process Management.
e. Invensys.
f. Maxitrol Company.
g. Richards Industries; Jordan Valve Div.

2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
3. Springs: Zinc-plated steel; interchangeable.
4. Diaphragm Plate: Zinc-plated steel.
5. Seat Disc: Nitrile rubber resistant to gas im purities, abrasion, and deform ation at t he valve port.
6. Orifice: Aluminum; interchangeable.
7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
8. Single-port, s elf-contained regulator with or ifice no larger than required at maxim um pressure inlet, and no pressure sensing piping external to the regulator.
9. Pressure regu lator shall maintain discharge pressure setting downstream , and not exceed 150 percent of design discharge pressure at shutoff.
10. Overpressure Protection Device: Factory mounted on pressure regulator.
11. Atmospheric Vent: Factory - or field-installed, stainless-ste el sc reen in opening if not connected to vent piping.
12. Maximum Inlet Pressure: 1/2 psig.

2.6 DIELECTRIC UNIONS

A. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Capitol Manufacturing Company.
b. Central Plastics Company.
c. Hart Industries International, Inc.
d. Jomar International Ltd.
e. Matco-Norca, Inc.
f. McDonald, A. Y. Mfg. Co.
g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
h. Wilkins; a Zurn company.

2. Description:

a. Standard: ASSE 1079.

b. Pressure Rating: 125 psig minimum at 180 deg F.
c. End Connections: Solder-joint copper alloy and threaded ferrous.

2.7 LABELING AND IDENTIFYING

A. Provide pipe labels on gas piping. Pipe labels are specified in Division 22 Section 220553 "Identification for Plumbing Piping and Equipment".

PART 3 - EXECUTION

3.1 OUTDOOR PIPING INSTALLATION

A. Comply with Fuel Gas Code of New York State 2010 for installation and purging of natural-gas piping.

B. Above Grade Steel Piping:

1. Paint all exterior gas piping one (1) coat primer and two (2) coats metal alkyd finish paint. Final color (gray).

C. Provide fittings for changes in direction and branch connections.

D. Provide pressure gauge upstream and downstream from each service regulator. Pressure gauges are specified in Division 22 Section "Meters and Gauges for Plumbing Piping."

3.2 INDOOR PIPING INSTALLATION

A. Comply with the Fuel Gas Code of New York State 2010 for installation and purging of natural-gas piping.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Provide piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

D. Provide piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

E. Provide piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Provide piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Locate valves for easy access.

H. Provide natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.

I. Provide piping free of sags and bends.

J. Provide fittings for changes in direction and branch connections.

K. Verify final equipment locations for roughing-in.

L. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.

M. Drips and Sediment Traps: Provide drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

N. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.

O. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.

P. Provide eccentric reducer fittings to make reductions in pipe sizes. Provide fittings with level side down.

Q. Connect branch piping from top or side of horizontal piping.

R. Provide unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment.

S. Do not use natural-gas piping as grounding electrode.

T. Provide strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

U. Provide pressure gauge upstream and downstream from each line regulator. Pressure gauges are specified in Division 22 Section "Meters and Gauges for Plumbing Piping."

V. Provide sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section " Common Work Results for Plumbing."

W. Provide sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22 Section "Common Work Results for Plumbing."

X. Provide escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Common Work Results for Plumbing."

Y. Paint all exposed exterior or interior wash bay room steel gas piping one (1) coat primer and two (2) coats metal alkyd finish paint. Final color (safety yellow).

3.3 VALVE INSTALLATION

A. Provide manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing connector.

B. Provide regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

3.4 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints:

1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
2. Cut threads full and clean using sharp dies.
3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
4. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints:

1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
2. Bevel plain ends of steel pipe.
3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hangers and supports specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

B. Provide hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 1 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
2. NPS 1-1/4: Maximum span, 120 inches; minimum rod size, 3/8 inch.
3. NPS 1-1/2 and NPS 2: Maximum span, 120 inches; minimum rod size, 3/8 inch.
4. NPS 2-1/2 to 3 inch: Maximum span, 120 inches; minimum rod size, 1/2 inch

3.6 CONNECTIONS

A. Connect to utility's gas main according to utility's procedures and requirements.

B. Provide natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.

C. Provide piping adjacent to appliances to allow service and maintenance of appliances.

D. Connect piping to appliances using manual gas shutoff valves and unions. Provide valve within 36 inches of each gas-fired appliance and equipment. Provide union between valve and appliances or equipment.

E. Sediment Traps: Provide tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.7 LABELING AND IDENTIFYING

A. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for piping and valve identification.

B. Provide detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below sub grade under pavements and slabs.

3.8 FIELD QUALITY CONTROL

A. Before the natural gas system is put into service or concealed, it shall be tested to ensure that it is gas tight. Test, inspect, and purge natural gas piping according to the New York State Fuel Gas Code and authorities having jurisdiction.

B. Pressure-test the piping system to 10 psig using air. Test duration shall be a minimum of 30 minutes for each 500 cubic feet of pipe volume. Isolate or remove components in piping system designed for operating pressures less than the test pressure to prevent damage.

C. Measure test pressure using manometer or pressure measuring device designed and calibrated to read, record or indicate a pressure loss due to leakage during the pressure test period. Visually inspect the piping system and locate leakage by means of a non- corrosive leak detection fluid, or equivalent nonflammable solution.

D. Where leakage or other defects are located, repair or replace and retest the affected portion of the piping system. Natural gas piping will be considered defective if it does not pass tests and inspections. Prepare test and inspection reports.

E. When the natural gas piping system has been successfully tested and inspected, purge the air from the pipeline using the natural gas prior to placing the system into operation. Introduce the fuel gas into one end of the pipeline and vent the air at the other end to the building exterior away from sources of ignition. The point of discharge of the vent shall be continuously attended throughout the purging process. Close the vent after purging.

3.9 OUTDOOR PIPING SCHEDULE

A. Aboveground natural-gas piping shall be one of the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with wrought-steel fittings and welded joints.

3.10 INDOOR PIPING SCHEDULE

A. Aboveground, branch piping NPS 1 to 2 inch and smaller shall be the following:
1. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground, distribution piping NPS 2-1/2 inch to 3 inch shall be one of the following:
1. Steel pipe with wrought-steel fittings and welded joints.

3.11 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Valves for pipe sizes NPS 2-1/2 and larger shall be the following:
1. Bronze plug valve.

B. Distribution piping valves for pipe sizes NPS 2 and smaller shall be one of the following:
1. Bronze plug valve.

END OF SECTION 221124

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.

1.2 SUBMITTALS

A. Product Data: For pipe and each type of product indicated.

1.3 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

C. The sanitary waste and vent system shall comply with the requirements of Chapters 7, 8 and 9 of the Plumbing Code of New York State.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service class.

B. Gaskets: ASTM C 564, rubber.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Heavy-Duty, Shielded Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ANACO-Husky.
   b. Clamp-All Corp.
   c. Dallas Specialty & Mfg. Co.
   d. MIFAB, Inc.
   e. Mission Rubber Company; a division of MCP Industries, Inc.
   f. Stant.
   g. Tyler Pipe.

2. Standards: ASTM C 1277, ASTM C 1173, CSA B-602 and ASTM C 1540.
3. Description: 301 Stainless-steel shield with double stainless- steel bands and tightening devices; and ASTM C 564, rubber sleeve w ith integral, 60 i nch pounds torque, center pipe stop.
4. Basis of design Manufacturer: Mifab MI-HUB-TR or approved equal Fernco or Husky.

2.4 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

C. Adhesive Primer: ASTM F 656.

1. Adhesive primer shall hav e a VOC content of 550 g/L or less whe n calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatil e Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Solvent Cement: ASTM D 2564.

1. PVC solvent ce ment shall have a VO C cont ent of 510 g/L or less when ca lculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Solvent cement shall co mply with t he testing and pro duct requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatil e Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.5 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
3. Shielded Transition Couplings:

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) Dallas Specialty & Mfg. Co.
      2) Fernco Inc.
      3) Mission Rubber Company; a division of MCP Industries, Inc.
      4) Plastic Oddities; a division of Diverse Corporate Technologies, Inc.

   b. Standard: ASTM C 1173.
   c. Description: Elastomeric, stainless steel full length sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
   d. Sleeve Materials:

      1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
      2) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Division 31 Section "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Provide piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Provide piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Provide piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Provide piping at indicated slopes.

F. Provide piping free of sags and bends.

G. Provide fittings for changes in direction and branch connections.

H. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

I. Lay buried building drainage piping beginning at low point of each system. Provide true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Provide required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

J. Provide soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Sanitary Drainage Piping: 1 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

K. Provide cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

L. Provide aboveground PVC piping according to ASTM D 2665.

M. Provide underground PVC piping according to ASTM D 2321.

N. Plumbing Specialties:
1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Comply with requirements for cleanouts specified in Division 22 Section "Sanitary Waste Piping Specialties."
2. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains specified in Division 22 Section "Sanitary Waste Piping Specialties."

O. Do not enclose, cover, or put piping into operation until it is inspected and approved by the Engineer and Thruway Authority Project Manager.

P. Provide sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section "Common Work Results for Plumbing Piping."

Q. Provide sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22 Section "Common Work Results for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for shielded hubless-piping coupling joints.

C. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendices.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Provide transition couplings at joints of piping with small differences in OD's.
2. In Drainage Piping: Heavy duty shielded transition couplings.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger and support devices and installation specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

1. Provide carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Provide carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
3. Vertical Piping: MSS Type 8 or Type 42 clamps.
4. Provide individual, straight, horizontal piping runs:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

B. Support horizontal piping and tubing within 12 inches of each fitting, and coupling.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

E. Provide hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
5. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

F. Provide supports for vertical cast-iron soil piping every 15 feet.

G. Provide hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
2. NPS 3: 48 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 48 inches with 3/4-inch rod.

H. Provide supports for vertical PVC piping every 48 inches.

I. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Provide test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
5. Comply with requirements for cleanouts and drains specified in Division 22 Section "Sanitary Waste Piping Specialties."
6. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Provide flanges instead of unions for connections NPS 2-1/2 and larger.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections according to the following unless otherwise indicated:

1. Provide unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Provide flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.7 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.8 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Provide inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce thick pungent smoke into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Thick pungent smoke pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

6. Prepare reports for tests and required corrective action.

3.9 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Provide plugs in the ends of uncompleted sanitary sewer piping at the end of each work day and when work stops.

3.10 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping NPS 4 and smaller shall be any of the following:

1. Hubless, service weight cast-iron soil pipe and fittings; heavy-duty shielded hubless-piping couplings; and coupled joints. (Boiler room and air plenum locations only)
2. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
3. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

C. Aboveground, vent piping NPS 4 and smaller shall be any of the following:

1. Hubless, service weight cast-iron soil pipe and fittings; heavy-duty shielded hubless-piping couplings; and coupled joints. (Boiler room and air plenum locations only)
2. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
3. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

D. Underground, soil, waste, and vent piping NPS 4 and smaller shall be the following:

1. Service class, cast-iron soil piping; gaskets; and gasketed joints.
2. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
3. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

E. Underground, soil and waste piping NPS 5 and larger shall be the following:

1. Service weight class, cast-iron soil piping; gaskets; and gasketed joints.

END OF SECTION 221316

SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following sanitary drainage piping specialties:

1. Cleanouts.
2. Floor drains.
3. Roof flashing assemblies.
4. Miscellaneous sanitary drainage piping specialties.
5. Flashing materials.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for grease interceptors.

1.3 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. The sanitary waste and vent piping specialties shall comply with the requirements of Chapters 7, 8 and 9 of the Plumbing Code of New York State.

C. All products shall have vandal resistant fasteners and hardware.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Exposed Cast-Iron Cleanouts (CO):
1. Basis-of-Design Product: Subject to compliance with requirements, provide**;** Zurn Plumbing Products Group; Specification Drainage Operation Model Z-1440 or Z-1445 or a comparable product by one of the following:

a. Josam Company; Josam Div.
b. MIFAB, Inc.
c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
d. Tyler Pipe; Wade Div.
e. Watts Drainage Products Inc.

2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
3. Size: Same as connected drainage piping
4. Body Material: Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Closure: ABS tapered thread plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

B. Cast-Iron Floor Cleanouts (FCO):
1. Basis-of-Design Product: Subject to compliance with requirements, provide Zurn Plumbing Products Group; Specification Drainage Operation Model Z-1400-ZN-VP or a comparable product by one of the following:

   a. Josam Company; Josam Div.
   b. Oatey.
   c. Sioux Chief Manufacturing Company, Inc.
   d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
   e. Tyler Pipe; Wade Div.
   f. Watts Drainage Products Inc.
   g. Zurn Plumbing Products Group; Light Commercial Operation.

2. Standard: ASME A112.36.2M for cast-iron soil pipe with cast-iron ferrule threaded**,** adjustable housing cleanout.
3. Size: Same as connected branch.
4. Type: Threaded, adjustable housing.
5. Body or Ferrule: Cast iron.
6. Clamping Device: Not required.
7. Outlet Connection: Inside calk.
8. Closure: ABS tapered thread plug.
9. Vandal resistant hardware.
10. Adjustable Housing Material: Cast iron with threads.
11. Frame and Cover Material and Finish: Polished nickel-bronze.
12. Frame and Cover Shape: Round.
13. Top Loading Classification: Medium Duty.
14. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

C. Cast-Iron Wall Cleanouts (WCO):
1. Basis-of-Design Product: Subject to compliance with requirements, provide Zurn Plumbing Products Group; Specification Drainage Operation Model Z-1447-VP or a comparable product by one of the following:

   a. Josam Company; Josam Div.
   b. MIFAB, Inc.
   c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
   d. Tyler Pipe; Wade Div.
   e. Watts Drainage Products Inc.

2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Closure: ABS tapered plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

7. Wall Access: Round, deep, chrome-plated bronze cover plate with screw.
8. Vandal resistant hardware.
9. Wall Access: Square, smooth nickel-bronze wall-installation access frame and cover.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains: (FD)
1. Basis-of-Design Product: Subject to compliance with requirements, provide Josam.Model # 38250A-1 or a comparable product by one of the following:
   a. Wade.
   b. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.6.3.
3. Pattern: Combination Floor drain and integral deep seal trap, side outlet spigot, ball float backwater valve.
4. Body Material: Gray iron.
5. Seepage Flange: Required.
6. Anchor Flange: Required.
7. Outlet: 4 inch bottom.
8. Coating on Interior and Exposed Exterior Surfaces: Acid-resistant enamel.
9. Top or Strainer Material: Cast iron.
10. Top of Body and Strainer Finish: Cast iron.
11. Top Shape: Round.
12. Dimensions of Top or Strainer: 12-1/4 inch diameter strainer.
13. Top Loading Classification: Heavy Duty.
14. Inlet Fitting: Gray iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
15. Trap Material: Cast iron.
16. Trap Pattern: Deep-seal P-trap.
17. Trap Features: Trap-seal primer valve drain connection.
18. Ball type back water valve
19. Floor level cleanout with brass cleanout plug

2.3 ROOF FLASHING ASSEMBLIES

A. Roof Flashing Assemblies:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Acorn Engineering Company; Elmdor/Stoneman Div.

   b. Custom Solutions Roof and Metal Products.

   c. Milcor Inc. Commercial Products group of Hart & Cooley, Inc.
   d. Thaler Metal Industries Ltd.

B. Description: Manufactured assembly made of 6.0-lb/sq. ft., 0.0938-inch- thick, copper flashing collar and skirt extending at least 10 inches from pipe, with galvanized-steel boot reinforcement and counter flashing fitting.

1. Open-Top Vent Cap: Without cap.
2. Low-Silhouette Vent Cap: With vandal-proof vent cap.
3. Extended Vent Cap: With field-installed, vandal-proof vent cap.

2.4 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Open Drains:

1. Description: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C 564, rubber gaskets.
2. Size: Same as connected waste piping with increaser fitting of size indicated.

B. Deep-Seal Traps:

1. Description: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.
2. Size: Same as connected waste piping.

a. NPS 2: 4-inch- minimum water seal.
b. NPS 2-1/2 and Larger: 5-inch- minimum water seal.

C. Air-Gap Fittings:

1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
2. Body: Bronze.
3. Inlet: Opening in top of body.
4. Outlet: Larger than inlet.
5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

D. Sleeve Flashing Device:

1. Description: Manufactured, cast-iron fitting, with clamping device that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend 2 inches above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
2. Size: As required for close fit to riser or stacks piping.

E. Stack Flashing Fittings:

1. Description: Counter flashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
2. Size: Same as connected stack vent or vent stack.

2.5 FLASHING MATERIALS

A. Copper Sheet: Copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:

1. General Use: 4.0-lb/sq. ft., 0.0625-inch thickness.
2. Vent Pipe Flashing: 3.0-lb/sq. ft., 0.0469-inch thickness.
3. Burning: 6-lb/sq. ft., 0.0938-inch thickness.

B. Fasteners: Metal compatible with material and substrate being fastened.

C. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

D. Solder: ASTM B 32, lead-free alloy.

E. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

F. Roof Pipe Penetration Flashing: Oatey Company 12900 or 11800 Series aluminum/galvanized no –caulk flashing with neoprene or EPDM pipe boot rated to 180 degrees F.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide cleanouts in aboveground vent piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and 100 feet for larger piping.
4. Locate at base of each vertical vent stack.

B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

C. Provide floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:

a. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 3/4-inch total depression.

3. Provide floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
4. Provide individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

D. Provide roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof. Seal watertight.

E. Assemble open drain fittings and install with top of hub 2 inches above floor.

F. Provide deep-seal traps on floor drains and other waste outlets, if indicated.

G. Provide air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system. Pipe outlet down to floor drain.

H. Provide sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Provide piping adjacent to equipment to allow service and maintenance.

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:

1. Copper Sheets: Burn joints of copper sheets 6.0-lb/sq. ft., 0.0938-inch thickness or thicker. Solder joints of copper sheets 4.0-lb/sq. ft., 0.0625-inch thickness or thinner.

B. Provide sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Provide flashing for piping passing through roofs with counter flashing or commercially made flashing fittings, according to Division 07 Section "Sheet Metal Flashing and Trim."

F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

3.4 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Provide engraved plastic-laminate equipment nameplate or sign on or near each pump.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.5 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in the ends of uncompleted sanitary sewer piping at the end of each work day and when work stops.

END OF SECTION 221319

SECTION 227200 - OIL WATER SEPARATOR SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

This system shall consist of the following as shown on the plans and described in detail below:

A. Oil Water Separator (used at four of the 9 sites as shown on the plans)
B. Grit chamber
C. Progressing cavity pump
D. Associated piping, valves, and fittings

The system components shall be supplied by one supplier. All components shall be affirmed by the supplier to be technically and operationally compatible.

PART 2 - PRODUCTS

2.1 OIL WATER SEPARATOR

A. Manufacturers:
1. Oil water separator shall be Highland Tank Model R-HTC Series “G” with Integral Sand Interceptor Compartment, Ul-SU2215 Approved Rectangular Oil/Water Separator as shown on the plans.
   a. Scope

      The separator shall be designed for gravity separation of sand, grit, settleable solids, or semisolids, and free oils (hydrocarbons and other petroleum products) from wastewater associated with vehicle chassis and body washing operations. Separator shall be installed aboveground. The source of the influent to the separator shall be from vehicle cleaning/maintenance operations.

   b. Specifications

      Provide and install Highland Tank Model R-HTC-600 Series “G” UL-SU2215 Aboveground Parallel Corrugated Plate Gravity Displacement Oil/Water Separator with Integral Sand Interceptor Compartment. Separator shall be furnished with oil level alarm system.

   c. Performance

      1. Influent Characteristics

Provide separator designed for intermittent and variable flows of water, oil, or any combination of non-emulsified oil-water mixtures ranging from zero to 50 gal/min. Minimum separator retention time shall be 10 minutes. Operating temperatures of the influent oil in water mixture shall range from 40 degrees F. to 80 degrees F. The specific gravity of the oils at operating temperatures shall range from 0.71 to 0.92. The specific gravity of the fresh water at operating temperatures shall range from 1.00 to 1.03.

2. *Effluent Characteristics*

The free oil and grease concentration in the effluent from the separator shall not exceed 10 mg/l (10 PPM). To achieve this goal, it will be necessary to remove all free oil droplets equal to and greater than 20 microns.

3. *Design Criteria*

The separator shall be listed to Underwriter's Laboratories UL-SU2215. Construction and performance of the oil/water separators must be in accordance with UL-SU2215. Provide certification documentation detailing criteria under which the system was tested. UL-SU2215 label shall be prominently displayed on cover.

Separator shall be designed in accordance with Stokes Law and the American Petroleum Institute Publication 421, "Monographs on Refinery Environmental Control - Management of Water Discharges; Design and Operation of Oil/Water Separators." Calculations, signed and stamped by a Registered Professional Engineer shall be submitted to document specified effluent quality based on complete removal of the specified oil globule. A separator with lower effective surface areas is not permissible.

Separator shall be the standard patented product of a steel tank manufacturer regularly engaged in the production of such equipment. Manufacturer shall have at least 10 years experience in manufacturing similar units for identical applications. No subcontracting of tank fabrication shall be permitted.

Separator shall be fabricated, inspected, and tested for leakage before shipment from the factory by manufacturer as a completely assembled vessel ready for installation.

Separator shall be rectangular, horizontal, atmospheric-type steel vessel intended for the separation and storage of flammable and combustible liquids. The separator shall have the structural strength to withstand static and dynamic hydraulic loading while empty and during operating conditions.

Separator shall have an oil storage capacity equal to about 30% of the total vessel volume and an emergency oil spill capacity equal to 60% of the total vessel volume.

Separator shall consist of inlet and outlet connections, integral sand interceptor compartment, non-clogging flow distributor and energy dissipater device, stationary under flow baffle, presettling chamber for solids, sludge baffle, oil coalescing chamber with removable parallel corrugated plate coalescer, with removable plates, and sectionalized removable polypropylene impingement coalescers to optimize separation of free oil from water, oil dam, effluent transfer pipes, an effluent clearwell, effluent downcomer at the outlet end of the separator to allow for discharge from the bottom of the effluent clearwell only, access cover(s) for each chamber, fittings for vent, oil and sludge pump-out, sampling, gauging, drain, and lifting lugs.

B. Description

Separator shall be standard prefabricated, inclined parallel-corrugated plate, gravity displacement type unit with removable top cover(s).

The separator shall be a pre-packaged, pre-engineered, ready to install unit consisting of:

- An internal influent nozzle at the inlet end of the separator. Nozzle discharge to be located at the furthest diagonal point from the effluent discharge opening.
- A heavy-duty bulkhead shall retain sand, grit, settleable solids or semisolids and prevent them from entering the separation chamber.
- A velocity head diffusion baffle at the inlet to:
  - reduce horizontal velocity and flow turbulence.
  - distribute the flow equally over the separators cross sectional area.
  - direct the flow in a serpentine path in order to enhance hydraulic characteristics and fully utilize all separator volume.
  - completely isolate all inlet turbulence from the separation chamber.
- A sediment chamber to disperse flow and collect oily solids and sediments.
- A sludge baffle to retain settleable solids and sediment and prevent them from entering the separation chamber.
- An Oil/Water Separation Chamber containing a removable, inclined parallel corrugated plate coalescer, with removable corrugated plates sloped downward toward the sediment chamber, to:
  - shorten the vertical distance than an oil globule has to rise for effective removal. Minimum plate gap to be 3/4".
  - enhance coalescence by generating a slight sinusoidal (wave like) flow pattern thereby causing smaller, slow rising, oil globules to coalesce together on the undersides of the plates forming larger, rapidly rising sheets of oil.
  - direct the paths of the separated oil to the surface of the separator.

- and a sectionalized removable "Petro-Screen™" polypropylene impingement coalescer designed to intercept oil globules of less than 20 microns in diameter. Heavy, one-piece impingement coalescers are not permissible.

- An oil dam with two (2) effluent transfer pipes.
- An effluent clearwell.
- An internal effluent downcomer at the outlet end of the separator, to allow for discharge from the bottom of the effluent clearwell only.
- An effluent connection
- Fittings for vent, interface/level sensor, waste oil pump-out, sampling, drain, and gauge.
- Removable vapor-tight top cover(s), gasket, and bolts with large wing nuts for easy access.
- Lifting lugs at balancing points for handling and installation.
- Identification plates: Plates to be affixed in prominent location and be durable and legible throughout equipment life.
- Internal surfaces commercial grit blast and coated with heavy duty Polyurethane.
- External surfaces commercial grit blast and coated with heavy duty Polyurethane.

C. Accessories

Separator shall be supplied with an audible and visual alarm system that indicates hi oil level (visual only) and hi hi oil level (audible and visual) of oil storage in the oil/water separator will be provided. A silence control shall be provided for the audible alarms. Level sensor(s) to be intrinsically safe. Level sensor floats to be made of stainless steel. The control panel shall be NEMA 4.

D. Quality Assurance

Submittals:

- Shop Drawings: shop drawings for oil/water separators shall show principal dimensions and location of all fittings.
- Instructions: provide three complete sets of installation, operation, and maintenance instructions with separator.
- Quality Control: Quality control, inspection procedures, and reports shall be considered part of the submittal package.

E. Warranty:

- The manufacturer shall warrant its products to be free from defects in material and workmanship for a period of one year from the date of shipment. The warranty shall be limited to repair or replacement of the defective part(s).

F. Approved Manufacturers:

Highland Tank and Mfg. Co., One Highland Road, Box 338, Stoystown, PA 15563, Phone (814) 893-5701, Facsimile (814)-893-6126, www.highlandtank.com, or equal.

2.2 GRIT CHAMBER

Grit chamber shall be deep sump basin compatible with oil-water separator. Size shall be 30" diameter by 72" with exterior coating 15 mils polyurethane and interior coating poly of 15 mils. Include fittings for sensor to operate pump. Capacity shall be 200 gallons and made of mild carbon steel (7 gauge – shell, bottom, and baffle). Chamber shall be as manufacturer by Highland Tank, or equal.

2.3 PUMP AND CONTROLS

Pump shall be progressing cavity for 50 gpm flowrate with 3 phase motor. Model shall be Highland Model IP-10, 5 HP (Netzsch Model NM045BY01L07), or equal. Pump shall be mounted on pump mount base plate assembly. Trap shall be installed on the inlet to insure the stator is flooded.

Controls for system shall be Highland Model CC-HT-F Pump Control/Alarm Panel (NEMA 4), or approved equal. Controls shall provide function for operation of pump via sensor in grit chamber, high water alarm, and high oil level alarm. Sensors shall be Highland HTF 3 float level stem sensor for pump on/off and high water alarm; provide Highland HTF 2 Float interface stem sensor for oil-water separator.

PART 3 - EXECUTION

3.1 INSTALLATION

All installation shall be in accordance with manufacturer's instructions and the applicable specification sections of this project including, but not limited to, electrical, plumbing, and earthwork.

END OF SECTION 227200

SECTION 227300 – PRESSURE WASHER SYSTEM

PART 1 - GENERAL

1.1 GENERAL

This system shall consist of the following as shown on the plans and described in detail below:

A. Pressure washer supply unit – integral pump and heater
B. Wand/trigger Gun, hoses, nozzles – Provide 4 wand, hose, and reel assemblies in locations as shown on the plans.
C. Remote control box, control, and associated connections
D. Necessary connections for electrical, plumbing, and hoses

All components shall be affirmed by the supplier to be technically and operationally compatible for the washer unit, wands, hoses, etc.

PART 2 - PRODUCTS

2.1 PRESSURE WASHER SUPPLY UNIT

A. Manufacturer: Pressure washer supply unit shall be Ramteq model BV0750-63A, NG/LP burner, 208/230V 3-phase power, including Upgrade Package “B” with Remote Control, or approved equal.

Unit shall comply with UL 1776, Standard for High-Pressure Cleaning Machines.

Unit shall run via Natural Gas or Propane as appropriate for the various sites, as listed on the plans.

Unit shall be provided with remote operation controls for on/off, temperature, and pressure so that the unit can be operated from a wall-mounted control box in a separate room.

Unit shall supply wash water at 4 GPM at 2,000 psi.

Unit shall have auto start and time delay shutdown features, bypass thermal shutdown, hour meter and remote ready.

B. Quality Assurance

Submittals:

- Shop Drawings: provide shop drawings; show principal dimensions and location of all fittings.
- Instructions: provide three complete sets of installation, operation, and maintenance instructions.
- Quality Control: Quality control, inspection procedures, and reports shall be considered part of the submittal package.

C. Warranty:

- The manufacturer shall warrant its products to be free from defects in material and workmanship for a period of one year from the date of shipment. The warranty shall be limited to repair or replacement of the defective part(s).

D. Approved Manufacturers:

Ramteq, Houston, TX, Phone (713) 983-6000, or equal

PART 3 - EXECUTION

3.1 Installation

A. All installation shall be in accordance with manufacturer's instructions and the applicable specification sections of this project including, but not limited to, electrical, plumbing, and mechanical.

END OF SECTION 227300

ITEM 627.0023 - - 25 – HVAC

TAB 16-34A, D214509
Vehicle Wash Bay Installation at the Henrietta
and Batavia Maintenance Sites, MP 362.4 and 390.1

1. DESCRIPTION:

1.01 Furnish all labor, materials, equipment and services necessary to complete the work as indicated on the Contract Plans and the attached Specification Summary.

1.02 All work shall conform to the requirements specified in Part 1 – General, of the Sections listed.

2. MATERIALS:

2.01 The materials shall be as specified in Part 2 – Products, of the Sections listed.

3. CONSTRUCTION DETAILS:

3.01 The construction details shall be as specified in Part 3 – Execution, of the Sections listed.

4. METHOD OF MEASUREMENT:

4.01 This item shall be measured for payment on a lump sum basis for the work completed in accordance with the Contract Documents and as directed by the Engineer.

5. BASIS OF PAYMENT:

5.01 Payment for this item shall be made at the lump sum bid price bid. The lump sum price bid shall include cost of furnishing all labor, material, equipment and appliances necessary to complete the work as indicated on the Contract Plans and as specified herein in the Sections listed.

5.02 Detailed Estimate:

A. Before the first certificate of payment is issued for the work under this item, submit a detailed estimate of quantities and prices for all materials, labor, and other items included under this item, which shall aggregate the contract lump sum price bid for this item. Prepare the detailed estimate in the same sequence as the Sections listed.

B. The detailed estimate shall be supported by such evidence, including certified copies of subcontracts, as the Engineer may require.

C. The detailed estimate must be approved by the Engineer who may revise it as, in his/her reasonable judgment, is necessary to make the various item conform to their true values. The value of each certificate of payment will be based on the approved detailed estimate.

5.03 Monthly payments will be made for this item in proportion to the total amount of work completed.

1. SPECIFICATION SUMMARY

1.01 This item includes the following specifications:

A. Section 230513 – COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT
B. Section 230517 – SLEEVES AND SLEEVE SEALS FOR HVAC PIPING
C. Section 230518 – ESCUTCHEONS FOR HVAC PIPING
D. Section 230519 – METERS AND GAGES FOR HVAC PIPING
E. Section 230523.12 – BALL VALVES FOR HVAC PIPING
F. Section 230529 – HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT
G. Section 230548.13 – VIBRATION CONTROLS FOR HVAC
H. Section 230553 – IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
I. Section 230593 – TESTING, ADJUSTING, AND BALANCING FOR HVAC
J. Section 230719 – HVAC PIPING INSULATION
K. Section 230923.12 – CONTROL DAMPERS
L. Section 230923.16 – GARAGE GAS DETECTION SYSTEM
M. Section 232113 – HYDRONIC PIPING
N. Section 232116 – HYDRONIC PIPING SPECIALTIES
O. Section 232123 – HYDRONIC PUMPS
P. Section 233113 – METAL DUCTS
Q. Section 233300 – AIR DUCT ACCESSORIES
R. Section 233413 – AXIAL HVAC FANS
S. Section 233416 – CENTRIFUGAL HVAC FANS
T. Section 235216 – CONDENSING BOILERS
U. Section 235533.16 – GAS-FIRED UNIT HEATERS
V. Section 238316 – RADIANT HEATING HYDRONIC PIPING

SECTION 230513 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.2 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with NEMA MG 1 unless otherwise indicated.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
2. Split phase.

3. Capacitor start, inductor run.
4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Permanently lubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 230513

SECTION 230517 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves.
2. Sleeve-seal systems.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. Metraflex Company (The).
4. Pipeline Seal and Insulator, Inc.
5. Proco Products, Inc.

B. Description: Modular sealing-elem ent unit, designe d for field assem bly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber interlocking li nks shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel.
3. Connecting Bolts and N uts: Carbon steel, w ith corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal sy stem in stalled, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of m echanical equipment areas or other wet areas 2 inches above finished floor level.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provi de 1/4- inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve an d pipi ng or piping insula tion; use joi nt sealants appropriate for size, depth, and location of joint. Comply with requirements f or sealants specified in Section 079200 "Joint Sealants."

E. Fire-Barrier Penetrations: Maintain indi cated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Co mply with requirem ents for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Select type, size, and number of sealing ele ments required for pipi ng material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center pipin g in penetrat ion, assemble sleeve-seal sy stem co mponents, and install in annula r space between piping a nd

sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Concrete Slabs-on-Grade:

a. Piping Smaller Than NPS 2: Cast-iron wall sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

2. Interior Partitions:

a. Piping Smaller Than NPS 2: Galvanized-steel-pipe sleeves.

END OF SECTION 230517

SECTION 230518 - ESCUTCHEONS FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Escutcheons.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.
c. Insulated Piping: One-piece, stamped-steel type.
d. Bare Piping in Equipment Rooms: One-piece, stamped-steel type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 230518

SECTION 230519 - METERS AND GAGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Liquid-in-glass thermometers.
2. Thermowells.
3. Dial-type pressure gages.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Wiring Diagrams: For power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 LIQUID-IN-GLASS THERMOMETERS

A. Plastic-Case, Industrial-Style, Liquid-in-Glass Thermometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Ernst Flow Industries.
   b. Watts; a Watts Water Technologies company.
   c. Weiss Instruments, Inc.

2. Standard: ASME B40.200.

3. Case: Plastic; 7-inch nominal size unless otherwise indicated.
4. Case Form: Adjustable angle unless otherwise indicated.
5. Tube: Glass with magnifying lens and blue or red organic liquid.

6. Tube Background: Nonre flective alu minum with per manently e tched scale markings graduated in deg F.
7. Window: plastic.
8. Stem: Brass and of length to suit installation.

    a. Design for Air-Duct Installation: With ventilated shroud.
    b. Design for Thermowell Installation: Bare stem.

9. Connector: 1-1/4 inches, with ASME B1.1 screw threads.
10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.2 THERMOWELLS

A. Thermowells:

1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
3. Material for Use with Copper Tubing: CNR or CUNI.
4. Type: Stepped shank unless straight or tapered shank is indicated.
5. External Threads: NPS 1/2, with ASME B1.20.1 pipe threads.
6. Internal Threads: 1/2 with ASME B1.1 screw threads.
7. Bore: Diameter required to match thermometer bulb or stem.
8. Insertion Length: Length required to match thermometer bulb or stem.
9. Lagging Extension: Include on thermowells for insulated piping and tubing.
10. Bushings: F or convertin g size of t hermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.3 PRESSURE GAGES

A. Direct-Mounted, Plastic-Case, Dial-Type Pressure Gages:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Ashcroft Inc.
    b. Flo Fab inc.
    c. Weiss Instruments, Inc.

2. Standard: ASME B40.100.

3. Case: Sealed type; plastic; 6-inch nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.

7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
8. Pointer: Dark-colored metal.
9. Window: plastic.
10. Accuracy: Grade B, plus or minus 2 percent of middle half of scale range.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install thermowells with socket extending to center of pipe and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Fill thermowells with heat-transfer medium.

E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

F. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

G. Mount thermal-energy meters on wall if accessible; if not, provide brackets to support meters

H. Install thermometers in the following locations:

1. Inlet and outlet of each hydronic zone.
2. Inlet and outlet of each hydronic boiler.

I. Install pressure gages in the following locations:
1. Suction and discharge of each pump.

3.2 CONNECTIONS

A. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

3.3 ADJUSTING

A. Adjust faces of meters and gages to proper angle for best visibility.

3.4 THERMOMETER SCHEDULE

A. Thermometers at inlet and outlet of each hydronic zone shall be the following:

1. Industrial-style, liquid-in-glass type.

B. Thermometers at inlet and outlet of each hydronic boiler shall be the following:

1. Industrial-style, liquid-in-glass type.

C. Thermometer stems shall be of length to match thermowell insertion length.

3.5 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Heating, Hot-Water Piping: 0 to 250 deg F.

3.6 PRESSURE-GAGE SCHEDULE

A. Pressure gages at suction and discharge of each pump shall be the following:

1. Sealed, direct-mounted, plastic case.

3.7 PRESSURE-GAGE SCALE-RANGE SCHEDULE

A. Scale Range for Heating, Hot-Water Piping: 0 to 160 psi.

END OF SECTION 230519

SECTION 230523.12 - BALL VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Brass ball valves.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded-end valves.
2. ASME B16.18 for solder-joint connections.
3. ASME B31.9 for building services piping valves.

C. Refer to HVAC valve schedule articles for applications of valves.

D. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream piping unless otherwise indicated.

F. Valve Actuator Types:

1. Handlever: For quarter-turn valves smaller than NPS 4.

G. Valves in Insulated Piping:

1. Include 2-inch stem extensions.
2. Extended operating handle of nonthermal-conductive material, and protective sleeves that allow operation of valves without breaking the vapor seals or disturbing insulation.
3. Memory stops that are fully adjustable after insulation is applied.

2.2 BRASS BALL VALVES

A. Two-Piece Brass Ball Valves with Full Port and Stainless-Steel Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hammond Valve.
b. Jenkins Valves; Crane Energy Flow Solutions.
c. Milwaukee Valve Company.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Two piece.
e. Body Material: Forged brass.
f. Ends: Threaded.
g. Seats: PTFE.
h. Stem: Stainless steel.
i. Ball: Stainless steel, vented.
j. Port: Full.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

3.2 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified SWP classes or CWP ratings are unavailable, the same types of valves with higher SWP classes or CWP ratings may be substituted.

B. Select valves with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
2. For Steel Piping, NPS 2 and Smaller: Threaded ends.

3.3 HEATING-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller: Two piece, full port, brass with stainless-steel trim.

1. Valves may be provided with solder-joint ends instead of threaded ends.

END OF SECTION 230523.12

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.
5. Equipment supports.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Structural Steel Welding Qualificatio ns: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedur es and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fi berglass or other pipe insulation pad or c ushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of galvanized steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 thro ugh 58 , cop per-coated-steel, factory -fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or fi eld-fabricated pipe-support assem bly made fr om structural carbon-steel shapes with MS S SP-58 carb on-steel hang er rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Hot Pi ping: Water-repellent treated, AST M C 533, T ype I calcium silicate with 100-psig minimum compressive strength.

B. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

C. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

D. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.4 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.5 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

D. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

E. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

F. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

G. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

H. Insulated Piping:

1. Attach clamps and spacers to piping.

a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.

b. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.

5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

D. Use carbon-steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.

E. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.

F. Use thermal-hanger shield inserts for insulated piping and tubing.

G. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.

H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.

I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

K. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

END OF SECTION 230529

SECTION 230548.13 - VIBRATION CONTROLS FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Elastomeric hangers
2. Spring hangers

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Delegated-Design Submittal: For each vibration isolation device.

1. Include design calculations for selecting vibration isolators.

PART 2 - PRODUCTS

2.1 ELASTOMERIC HANGERS

A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods: .

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Isolation Technology, Inc.
b. Kinetics Noise Control, Inc.
c. Vibration Mountings & Controls, Inc.

2. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.

3. Dampening Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel to steel contact.

2.2 SPRING HANGERS

A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Kinetics Noise Control, Inc.
   b. Mason Industries, Inc.
   c. Vibration Isolation.

2. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.

3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
7. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
8. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
9. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

PART 3 - EXECUTION

3.1 VIBRATION CONTROL DEVICE INSTALLATION

A. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.

END OF SECTION 230548.13

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Duct labels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Brady Corporation.
   b. LEM Products Inc.
   c. Marking Services, Inc.

2. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

3. Letter Color: White.
4. Background Color: Black.
5. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
6. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
7. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
8. Fasteners: Stainless-steel self-tapping screws.
9. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Craftmark Pipe Markers.
2. Marking Sevices Inc.

B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction according to ASME A13.1.

C. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

D. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

E. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: Size letters according to ASME A13.1 for piping.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Pipe Label Locations: Locate pipe labels wher e piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

B. Pipe Label Color Schedule:
1. Heating Water Piping: White letters on a safety-green background.

END OF SECTION 230553

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

a. Constant-volume air systems.

2. Balancing Hydronic Piping Systems:

a. Constant-flow hydronic systems.

1.2 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

D. TABB: Testing, Adjusting, and Balancing Bureau.

E. TAB Specialist: An independent entity meeting qualifications to perform TAB work.

F. TDH: Total dynamic head.

1.3 INFORMATIONAL SUBMITTALS

A. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

B. Certified TAB reports.

1.4 QUALITY ASSURANCE

A. TAB Specialists Qualifications: Certified by AABC NEBB or TABB.

1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC NEBB or TABB.
2. TAB Technician: Employee of the TAB specialist and certified by AABC NEBB or TABB as a TAB technician.

B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine equipment performance data including fan and pump curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

G. Examine test reports specified in individual system and equipment Sections.

H. Examine HVAC equipment and verify that belts are aligned and tight, and equipment with functioning controls is ready for operation.

I. Examine strainers. Verify that startup screens have been replaced by permanent screens with indicated perforations.

J. Examine control valves for proper installation for their intended function of throttling, diverting, or mixing fluid flows.

K. Examine system pumps to ensure absence of entrained air in the suction piping.

L. Examine operating safety interlocks and controls on HVAC equipment.

M. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures for balancing the systems.

B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Airside:

   a. Duct systems are complete with terminals installed.
   b. Volume dampers are open and functional.
   c. Fans are operating, free of vibration, and rotating in correct direction.
   d. Automatic temperature-control systems are operational.
   e. Windows and doors are installed.
   f. Suitable access to balancing devices and equipment is provided.

2. Hydronics:

   a. Verify leakage and pressure tests on water distribution systems have been satisfactorily completed.
   b. Piping is complete with terminals installed.
   c. Water treatment is complete.
   d. Systems are flushed, filled, and air purged.
   e. Strainers are pulled and cleaned.
   f. Control valves are functioning per the sequence of operation.
   g. Shutoff and balance valves have been verified to be 100 percent open.
   h. Pumps are started and proper rotation is verified.
   i. Pump gage connections are installed directly at pump inlet and outlet flanges or in discharge and suction pipe prior to valves or strainers.
   j. Suitable access to balancing devices and equipment is provided.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230719 "HVAC Piping Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material 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. Cross-check the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

D. Check airflow patterns from the outdoor-air louvers, dampers, and exhaust-air dampers through the supply-fan discharge and mixing dampers.

E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

F. Verify that motor starters are equipped with properly sized thermal protection.

G. Check dampers for proper position to achieve desired airflow path.

H. Check for airflow blockages.

I. Check for proper sealing of air-handling-unit components.

J. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

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 total airflow.

a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
b. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.

2. Measure fan static pressures as follows:

a. Measure static pressure directly at the fan outlet or through the flexible connection.
b. Measure static pressure directly at the fan inlet or through the flexible connection.

3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.

4. Obtain approval from Construction Manager for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
5. 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 occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.

1. Measure airflow of submain and branch ducts.
2. Adjust submain and branch duct volume dampers for specified airflow.
3. Re-measure each submain and branch duct after all have been adjusted.

C. Adjust air inlets and outlets for each space to indicated airflows.

1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
2. Measure inlets and outlets airflow.
3. Adjust each inlet and outlet for specified airflow.
4. Re-measure each inlet and outlet after they have been adjusted.

3.6 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Prepare test reports for pumps, coils, and heat exchangers. Obtain approved submittals and manufacturer-recommended testing procedures. Crosscheck the summation of required coil and heat exchanger flow rates with pump design flow rate.

B. Prepare schematic diagrams of systems' "as-built" piping layouts.

C. In addition to requirements in "Preparation" Article, prepare hydronic systems for testing and balancing as follows:

1. Check liquid level in expansion tank.
2. Check highest vent for adequate pressure.
3. Check flow-control valves for proper position.
4. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
5. Verify that motor starters are equipped with properly sized thermal protection.
6. Check that air has been purged from the system.

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 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.
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 gage heights.
d. 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 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 terminals.
2. Adjust each terminal to design flow.
3. Re-measure each terminal after it is adjusted.
4. Position control valves to bypass the coil, and adjust the bypass valve to maintain design flow.
5. Perform temperature tests after flows have been balanced.

D. Verify final system conditions as follows:

1. Re-measure and confirm that total water flow is within design.
2. Re-measure final pumps' operating data, TDH, volts, amps, and static profile.
3. Mark final settings.

E. Verify that memory stops have been set.

3.8 TOLERANCES

A. Set HVAC system's airflow rates and water flow rates within the following tolerances:

1. Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Heating-Water Flow Rate: Plus or minus 10 percent.

B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.9 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Engineer's name and address.
6. Contractor's name and address.
7. Report date.
8. Signature of TAB supervisor who certifies the report.
9. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
10. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

11. Nomenclature sheets for each item of equipment.
12. Data for terminal units, including manufacturer's name, type, size, and fittings.
13. Notes to explain why certain final data in the body of reports vary from indicated values.
14. Test conditions for fans and pump performance forms including the following:

    a. Settings for outdoor and exhaust-air dampers.
    b. Fan drive settings including settings and percentage of maximum pitch diameter.
    c. Inlet vane settings for variable-air-volume systems.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor and exhaust airflows.
2. Water flow rates.
3. Duct inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

E. Gas- and Oil-Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:

1. Unit Data:

    a. System identification.
    b. Location.
    c. Make and type.
    d. Model number and unit size.
    e. Manufacturer's serial number.
    f. Fuel type in input data.
    g. Output capacity in Btu/h.
    h. Ignition type.
    i. Burner-control types.

j. Motor horsepower and rpm.
k. Motor volts, phase, and hertz.
l. Motor full-load amperage and service factor.
m. Sheave make, size in inches, and bore.
n. Center-to-center dimensions of sheave and amount of adjustments in inches.

F. Fan Test Reports: For exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches, and bore.
h. Center-to-center dimensions of sheave and amount of adjustments in inches.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Suction static pressure in inches wg.

G. Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F.
d. Duct static pressure in inches wg.
e. Duct size in inches.
f. Duct area in sq. ft..
g. Indicated airflow rate in cfm.
h. Indicated velocity in fpm.

i. Actual airflow rate in cfm.
j. Actual average velocity in fpm.
k. Barometric pressure in psig.

H. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:

1. Unit Data:

a. Unit identification.
b. Location.
c. Service.
d. Make and size.
e. Model number and serial number.
f. Water flow rate in gpm.
g. Water pressure differential in feet of head or psig.
h. Required net positive suction head in feet of head or psig.
i. Pump rpm.
j. Impeller diameter in inches.
k. Motor make and frame size.
l. Motor horsepower and rpm.
m. Voltage at each connection.
n. Amperage for each phase.
o. Full-load amperage and service factor.
p. Seal type.

2. Test Data (Indicated and Actual Values):

a. Static head in feet of head or psig.
b. Pump shutoff pressure in feet of head or psig.
c. Actual impeller size in inches.
d. Full-open flow rate in gpm.
e. Full-open pressure in feet of head or psig.
f. Final discharge pressure in feet of head or psig.
g. Final suction pressure in feet of head or psig.
h. Final total pressure in feet of head or psig.
i. Final water flow rate in gpm.
j. Voltage at each connection.
k. Amperage for each phase.

I. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.10 VERIFICATION OF TAB REPORT

A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Construction Manager.

B. Construction Manager shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.

C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."

D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

E. If TAB work fails, proceed as follows:

1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB specialist to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB specialist's final payment.
3. If the second verification also fails, design professional may contact AABC Headquarters regarding the AABC National Performance Guaranty.

F. Prepare test and inspection reports.

3.11 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 230719 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulating the following HVAC piping systems:
   1. Heating hot-water piping, indoors.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

   1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
   2. Detail attachment and covering of heat tracing inside insulation.
   3. Detail insulation application at pipe expansion joints for each type of insulation.
   4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
   5. Detail removable insulation at piping specialties.
   6. Detail application of field-applied jackets.
   7. Detail application at linkages of control devices.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

   1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
   2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Products shall not contain asbestos, lead, mercury, or mercury compounds.

B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

C. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

D. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

E. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 1290, Type I.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation.
b. Knauf Insulation.
c. Owens Corning.

F. Mineral-Fiber, Preformed Pipe Insulation:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Knauf Insulation.
c. Owens Corning.

2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 INSULATING CEMENTS

A. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Ramco Insulation, Inc.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Foster Brand; H. B. Fuller Construction Products.

C. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Eagle Bridges - Marathon Industries.
c. Foster Brand; H. B. Fuller Construction Products.

D. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dow Corning Corporation.
b. Johns Manville; a Berkshire Hathaway company.

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

B. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Foster Brand; H. B. Fuller Construction Products.
c. Knauf Insulation.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.

3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.5 SEALANTS

A. Joint Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Eagle Bridges - Marathon Industries.
c. Foster Brand; H. B. Fuller Construction Products.

2. Materials shall be compatible with insulation materials, jackets, and substrates.

3. Permanently flexible, elastomeric sealant.
4. Service Temperature Range: Minus 100 to plus 300 deg F.
5. Color: White or gray.

B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Childers Brand; H. B. Fuller Construction Products.

2. Materials shall be compatible with insulation materials, jackets, and substrates.

3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.

2.6 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.7 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Proto Corporation.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.8 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Avery Dennison Corporation, Specialty Tapes Division.
b. Ideal Tape Co., Inc., an American Biltrite Company.
c. Knauf Insulation.

2. Width: 3 inches.

3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Compac Corporation.
b. Ideal Tape Co., Inc., an American Biltrite Company.
c. Venture Tape.

2. Width: 2 inches.

3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.

2. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.

3. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.

3.3 PENETRATIONS

A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

C. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.4 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic.
8. For services not specified to receive a field-applied jacket, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.

4. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.5 INSTALLATION OF MINERAL-FIBER PREFORMED PIPE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:
   1. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with factory applied self-sealing tape.

B. Insulation Installation on Pipe Fittings and Elbows:

   1. Install preformed sections of same material as straight segments of pipe insulation when available.
   2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

C. Insulation Installation on Valves and Pipe Specialties:

   1. Install preformed sections of same material as straight segments of pipe insulation when available.
   2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
   3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
   4. Install insulation to flanges as specified for flange insulation application.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications. Seal with manufacturer's recommended adhesive.

   1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

   1. Inspect pipe, fittings, strainers, and valves, randomly selected by Engineer, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, two locations of threaded strainers, and three locations of threaded valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.8 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Underground piping.

3.9 INDOOR PIPING INSULATION SCHEDULE

A. Heating-Hot-Water Supply and Return, 200 Deg F and Below: Insulation shall be the following:

1. Mineral-Fiber, Preformed Pipe, Type I: 2 inches thick.

3.10 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.

D. Piping, Exposed:

1. PVC: 20 mils thick.

END OF SECTION 230719

SECTION 230923.12 - CONTROL DAMPERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes control dampers and actuators for DDC systems.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include diagrams for power, signal, and control wiring.

C. Delegated-Design Submittal:

1. Schedule and design calculations for control dampers and actuators, including the following.

   a. Flow at project design and minimum flow conditions.
   b. Face velocity at project design and minimum airflow conditions.
   c. Pressure drop across damper at project design and minimum airflow conditions.
   d. AMCA 500D damper installation arrangement used to calculate and schedule pressure drop, as applicable to installation.
   e. Maximum close-off pressure.
   f. Leakage airflow at maximum system pressure differential (fan close-off pressure).
   g. Torque required at worst case condition for sizing actuator.
   h. Actuator selection indicating torque provided.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE 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. ASME Compliance: Fabricate and label products to comply with ASME Boiler and Pressure Vessel Code where required by authorities having jurisdiction.

C. Ground Fault: Products shall not fail due to ground fault condition when suitably grounded.

D. Selection Criteria:

1. Fail positions unless otherwise indicated:
   a. Outdoor Air: Last position.
   b. Exhaust Air: Last position.

2. Select modulating dampers for a pressure drop of 5 percent of fan total static pressure unless otherwise indicated.

2.2 RECTANGULAR CONTROL DAMPERS

A. General Requirements:

1. Unless otherwise indicated, use parallel blade configuration for two-position control, equipment isolation service, and when mixing two airstreams. For other applications, use opposed blade configuration.
2. Factory assemble multiple damper sections to provide a single damper assembly of size required by the application.

B. Rectangular Dampers with Aluminum Airfoil Blades:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. Ruskin Company.

2. Performance:

   a. Leakage: AMCA 511, Class 1A. Leakage shall not exceed 3 cfm/sq. ft. against 1-in. wg differential static pressure.
   b. Pressure Drop: 0.05-in. wg at 1500 fpm across a 24-by-24-inch damper when tested according to AMCA 500-D, figure 5.3.
   c. Velocity: Up to 6000 fpm.
   d. Temperature: Minus 40 to plus 185 deg F.
   e. Pressure Rating: Damper close-off pressure equal to fan shutoff pressure with a maximum blade deflection of 1/200 of blade length.
   f. Damper shall have AMCA seal for both air leakage and air performance.

3. Construction:

   a. Frame:

      1) Material: ASTM B 211, Alloy 6063 T5 extruded-aluminum profiles,0.07 inch thick.
      2) Hat-shaped channel with integral flange(s). Mating face shall be a minimum of 1 inch.
      3) Width not less than 5 inches.

b. Blades:

1) Hollow, airfoil, extruded aluminum.
2) Parallel or opposed blade configuration as required by application.
3) Material: ASTM B 211, Alloy 6063 T5 aluminum, 0.07 inch thick.
4) Width not to exceed 6 inches.
5) Length as required by close-off pressure, not to exceed 48 inches.

c. Seals:

1) Blades: Replaceable, mechanically attached extruded silicone, vinyl, or plastic composite.
2) Jambs: Stainless steel, compression type.

d. Axles: 0.5-inch-diameter stainless steel, mechanically attached to blades.
e. Bearings:

1) Molded synthetic or stainless-steel sleeve mounted in frame.
2) Where blade axles are installed in vertical position, provide thrust bearings.

f. Linkage:

1) Concealed in frame.
2) Constructed of aluminum and stainless steel.
3) Hardware: Stainless steel.

g. Additional Corrosion Protection for Corrosive Environments:

1) Provide anodized finish for aluminum surfaces in contact with airstream. Anodized finish shall be a minimum of 0.0007 inch thick.
2) Axles, damper linkage, and hardware shall be constructed of Type 316L stainless steel.

C. Rectangular Dampers with Aluminum Flat Blades:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Ruskin Company.

2. Performance:

a. Leakage: Leakage shall not exceed 3.2 cfm/sq. ft. against 1-in. wg differential static pressure.
b. Pressure Drop: 0.07-in. wg at 1500 fpm across a 24-by-24-inch damper when tested according to AMCA 500-D, figure 5.3.
c. Temperature: Minus 50 to plus 250 deg F.
d. Pressure Rating: Damper close-off pressure equal to fan shutoff pressure with a maximum blade deflection of 1/200 of blade length, not to exceed 3-in. wg.
e. Damper shall have AMCA seal for both air leakage and air performance.

3. Construction:

a. Frame:

1) Material: ASTM B 211, Alloy 6063 T5 extruded-aluminum profiles, 0.12 inch thick.
2) Hat-shaped channel with integral flanges.
3) Width not less than 5 inches.

b. Blades:

1) Flat blades of extruded aluminum.
2) Parallel or opposed blade configuration as required by application.
3) Material: ASTM B 211, Alloy 6063 T5 extruded-aluminum profiles, 0.12 inch thick.
4) Width not to exceed 6 inches.
5) Length as required by close-off pressure, not to exceed 48 inches.

c. Seals:

1) Blades: Replaceable, mechanically attached extruded silicone, vinyl or plastic composite.
2) Jambs: Stainless steel, compression type.

d. Axles: 0.5-inch- diameter stainless steel, mechanically attached to blades.

e. Bearings:

1) Molded-synthetic sleeve, mounted in frame.
2) Where blade axles are installed in vertical position, provide thrust bearings.

f. Linkage:

1) Concealed in frame.
2) Constructed of stainless steel.
3) Hardware: Stainless steel.

g. Transition:

1) For round and flat oval duct applications, provide damper assembly with integral transitions to mate to adjoining field connection.
2) Factory mount damper in a sleeve with a close transition to mate to field connection.
3) Damper size and sleeve shall be connection size plus 2 inches.
4) Sleeve length shall be not less than 12 inches for dampers without jackshafts and shall be not less than 16 inches for dampers with jackshafts.
5) Sleeve material shall match adjacent duct.

h. Additional Corrosion Protection for Corrosive Environments:

1) Provide anodized finish for aluminum surfaces in contact with airstream. Anodized finish shall be a minimum of 0.0007 inch thick.
2) Axles, damper linkage, and hardware shall be constructed of Type 316L stainless steel.

2.3 GENERAL CONTROL-DAMPER ACTUATORS REQUIREMENTS

A. Actuators shall operate related damper(s) with sufficient reserve power to provide smooth modulating action or two-position action and proper speed of response at velocity and pressure conditions to which the damper is subjected.

B. Actuators shall produce sufficient power and torque to close off against the maximum system pressures encountered. Actuators shall be sized to close off against the fan shutoff pressure as a minimum requirement.

C. The total damper area operated by an actuator shall not exceed 80 percent of manufacturer's maximum area rating.

D. Provide one actuator for each damper assembly where possible. Multiple actuators required to drive a single damper assembly shall operate in unison.

E. Avoid the use of excessively oversized actuators which could overdrive and cause linkage failure when the damper blade has reached either its full open or closed position.

F. Use jackshafts and shaft couplings in lieu of blade-to-blade linkages when driving axially aligned damper sections.

G. Provide mounting hardware and linkages for connecting actuator to damper.

H. Select actuators to fail in desired position in the event of a power failure.

I. Actuator Fail Positions: As indicated below:

1. Exhaust Air: Last position.
2. Outdoor Air: Last position.

2.4 ELECTRIC AND ELECTRONIC ACTUATORS

A. Type: Motor operated, with or without gears, electric and electronic.

B. Voltage:

1. 120 V.
2. Actuator shall deliver torque required for continuous uniform movement of controlled device from limit to limit when operated at rated voltage.
3. Actuator shall function properly within a range of 85 to 120 percent of nameplate voltage.

C. Construction:

1. Less Than 100 W: Fiber or reinforced nylon gears with steel shaft, copper alloy or nylon bearings, and pressed steel enclosures.
2. 100 up to 400 W: Gears ground steel, oil immersed, shaft-hardened steel running in bronze, copper alloy, or ball bearings. Operator and gear trains shall be totally enclosed in dustproof cast-iron, cast-steel, or cast-aluminum housing.

D. Field Adjustment:

1. Spring return actuators shall be easily switchable from fail open to fail closed in the field without replacement.
2. Provide gear-type actuators with an external manual adjustment mechanism to allow manual positioning of the damper when the actuator is not powered.

E. Two-Position Actuators: Single direction, spring return or reversing type.

F. Fail-Safe:

1. Where indicated, provide actuator to fail to an end position.
2. Internal spring return mechanism to drive controlled device to an end position (open or close) on loss of power.
3. Batteries, capacitors, and other non-mechanical forms of fail-safe operation are acceptable only where uniquely indicated.

G. Integral Overload Protection:

1. Provide against overload throughout the entire operating range in both directions.
2. Electronic overload, digital rotation sensing circuitry, mechanical end switches, or magnetic clutches are acceptable methods of protection.

H. Damper Attachment:

1. Unless otherwise required for damper interface, provide actuator designed to be directly coupled to damper shaft without need for connecting linkages.
2. Attach actuator to damper drive shaft in a way that ensures maximum transfer of power and torque without slippage.
3. Bolt and set screw method of attachment is acceptable only if provided with at least two points of attachment.

I. Enclosure:

1. Suitable for ambient conditions encountered by application.
2. NEMA 250, Type 2 for indoor and protected applications.
3. NEMA 250, Type 4 or Type 4X for outdoor and unprotected applications.
4. Provide actuator enclosure with a heater and controller where required by application.

J. Stroke Time:

1. Operate damper from fully closed to fully open within 15 seconds.
2. Operate damper from fully open to fully closed within 60 seconds.
3. Select operating speed to be compatible with equipment and system operation.

4. Actuators operating in smoke control systems comply with governing code and NFPA requirements.

K. Sound:

1. Spring Return: 62 dBA.
2. Non-Spring Return: 45 dBA.

PART 3 - EXECUTION

3.1 CONTROL-DAMPER APPLICATIONS

A. Control Dampers:

B. Select from damper types indicated in "Control Dampers" Article to achieve performance requirements and characteristics indicated while subjected to full range of system operation encountered.

1. Rectangular Exhaust Air Duct Applications with SMACNA Construction Class and Velocities: Rectangular dampers with aluminum airfoil blades or Rectangular dampers with aluminum flat blades.
2. Rectangular Outdoor Air Duct Applications with SMACNA Construction Class and Velocities: Rectangular dampers with aluminum airfoil blades or Rectangular dampers with aluminum flat blades.

3.2 INSTALLATION, GENERAL

A. Furnish and install products required to satisfy most stringent requirements indicated.

B. Properly support dampers and actuators, tubing, wiring, and conduit to comply with requirements indicated.

C. Provide ceiling, floor, roof, and wall openings and sleeves required by installation. Before proceeding with drilling, punching, or cutting, check location first for concealed products that could potentially be damaged. Patch, flash, grout, seal, and refinish openings to match adjacent condition.

D. Seal penetrations made in fire-rated and acoustically rated assemblies.

E. Fastening Hardware:

1. Stillson wrenches, pliers, or other tools that will cause injury to or mar surfaces of rods, nuts, and other parts are prohibited for assembling and tightening nuts.
2. Tighten bolts and nuts firmly and uniformly. Do not overstress threads by excessive force or by oversized wrenches.
3. Lubricate threads of bolts, nuts, and screws with graphite and oil before assembly.

F. Install products in locations that are accessible and that will permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for Owner's access, confirm unrestricted ladder placement is possible under occupied condition.

3.3 CONTROL DAMPERS

A. Install smooth transitions, not exceeding 15 degrees, to dampers smaller than adjacent duct. Install transitions as close to damper as possible but at distance to avoid interference and impact to performance. Consult manufacturer for recommended clearance.

B. Clearance:

1. Locate dampers for easy access and provide separate support of dampers that cannot be handled by service personnel without hoisting mechanism.
2. Install dampers with at least 24 inches of clear space on sides of dampers requiring service access.

C. Service Access:

1. Dampers and actuators shall be accessible for visual inspection and service.
2. Install access door(s) in duct or equipment located upstream of damper to allow service personnel to hand clean any portion of damper, linkage, and actuator. Comply with requirements in Section 233300 "Air Duct Accessories."

D. Install dampers straight and true, level in all planes, and square in all dimensions. Install supplementary structural steel reinforcement for large multiple-section dampers if factory support alone cannot handle loading.

E. Attach actuator(s) to damper drive shaft.

F. For duct-mounted and equipment-mounted dampers installed outside of equipment, install a visible and accessible indication of damper position from outside.

G. Connect electrical devices and components to electrical grounding system. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

H. Identify system components, wiring, cabling, and terminals. Each piece of wire, cable, and tubing shall have the same designation at each end for operators to determine continuity at points of connection. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems.

3.4 CHECKOUT PROCEDURES

A. Control-Damper Checkout:

1. Check installed products before continuity tests, leak tests, and calibration.
2. Check dampers for proper location and accessibility.
3. Verify that control dampers are installed correctly for flow direction.

4. Verify that proper blade alignment, either parallel or opposed, has been provided.
5. Verify that damper frame attachment is properly secured and sealed.
6. Verify that damper actuator and linkage attachment are secure.
7. Verify that actuator wiring is complete, enclosed, and connected to correct power source.
8. Verify that damper blade travel is unobstructed.

3.5 ADJUSTMENT, CALIBRATION, AND TESTING:

A. Stroke and adjust control dampers following manufacturer's recommended procedure, from 100 percent open to 100 percent closed back to 100 percent open.

B. Check and document open and close cycle times for applications with a cycle time of less than 30 seconds.

C. For control dampers equipped with positive position indication, check feedback signal at multiple positions to confirm proper position indication.

END OF SECTION 230923.12

SECTION 230923.16 – GARAGE GAS DETECTION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following :

1. Carbon-monoxide and Nitrogen-dioxide sensors and transmitters.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include plans, elevations, sections, and mounting details.
2. Include diagrams for power, signal, and control wiring.
3. Number-coded identification system for unique identification of wiring, cable, and tubing ends.

PART 2 - PRODUCTS

2.1 CARBON-MONOXIDE AND NITROGEN DIOXIDE SENSORS AND TRANSMITTERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Honeywell E3point / Vulcain
2. Armstrong Monitoring AMC1400
3. Brasch GSE-NCM LR Series.

B. Description:

1. Electronic cell technology or equivalent technology providing long-term stability and reliability.
2. Two-wire, 4-20 mA output signal, linearized to concentration in ppm.

C. Construction:

1. House electronics in a NEMA Type 4 enclosure conforming to the appropriate UL standard.

2. Equip with digital display for continuous indication of gas concentration.

3. House all sensors in ambient air stream mounted at appropriate elevations for monitored gas.

D. Performance:

1. Measurement Range: Zero to 250 ppm.
2. Accuracy: Within 3 percent of full scale.
3. Repeatability: Within 1 percent of full scale.
4. Temperature Dependence: Within 0.05 percent of full scale over an operating range of 25 to 110 deg F.
5. Long-Term Stability: Within 5 percent of full scale after more than five years.
6. Response Time: Within 60 seconds.
7. Warm-up Time: Within five minutes.
8. Transmitter shall energize alarm function and communicate with BMS to control ventilation fans and area purge sequence.

E. Provide calibration kit. Turn over to Owner at start of warranty period.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Furnish and install hazardous gas monitoring equipment including sensors, audible alarms, control panels as shown on Contract Drawings and as recommended by manufacturer of equipment and as required by authorities having jurisdiction.

B. Furnish and install products required to satisfy more stringent of all requirements indicated.

C. Install products level, plumb, parallel, and perpendicular with building construction.

D. Properly support instruments, tubing, piping, wiring, and conduit to comply with requirements indicated. Brace all products to prevent lateral movement and sway or a break in attachment when subjected to seismic loads.

E. Install products in locations that are accessible and that permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for Owner's access, confirm unrestricted ladder placement is possible under occupied condition.

F. Corrosive Environments:

1. Use products that are suitable for environment to which they are subjected.

2. When conduit is in contact with a corrosive environment, use Type 316 stainless-steel conduit and fittings or conduit and fittings that are coated with a corrosive-resistant coating that is suitable for environment.
3. Where instruments are located in a corrosive environment and are not corrosive resistant from manufacturer, field install products in a NEMA 250, Type 4X enclosure constructed of Type 316L stainless steel.

3.2 ELECTRICAL POWER

A. Furnish and install electrical power to products requiring electrical connections.

B. Furnish and install power wiring. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Furnish and install raceways. Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems."

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Each piece of wire, cable, and tubing shall have the same designation at each end for operators to determine continuity at points of connection. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 CHECKOUT PROCEDURES

A. Check out installed products before continuity tests, leak tests, and calibration.

B. Check instruments for proper location and accessibility.

C. Check instruments for proper installation on direction of flow, elevation, orientation, insertion depth, or other applicable considerations that impact performance.

D. Check instrument tubing for proper isolation, fittings, slope, dirt legs, drains, material, and support.

3.5 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain instrumentation and control devices.

END OF SECTION 230923.16

SECTION 232113 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes pipe and fitting materials and joining methods for the following:

1. Hot-water heating piping.
2. Makeup-water piping.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of the following:

1. Plastic pipe and fittings with solvent cement.
2. RTRP and RTRF with adhesive.
3. Pressure-seal fittings.
4. Chemical treatment.

B. Delegated-Design Submittal:

1. Design calculations and detailed fabrication and assembly of pipe anchors and alignment guides, hangers and supports for multiple pipes, expansion joints and loops, and attachments of the same to the building structure.
2. Locations of and details for penetrations, including sleeves and sleeve seals for exterior walls, floors, basement, and foundation walls.
3. Locations of and details for penetration and firestopping for fire- and smoke-rated wall and floor and ceiling assemblies.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature unless otherwise indicated:

1. Hot-Water Heating Piping: 125 PSI at 200 deg F.
2. Makeup-Water Piping: 80 psig at 55 deg F..
3. Safety-Valve-Inlet and -Outlet Piping: Equal to the pressure of the piping system to which it is attached.

2.2 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tubing: ASTM B 88, Type L.

B. DWV Copper Tubing: ASTM B 306, Type DWV.

C. Wrought-Copper Unions: ASME B16.22.

2.3 PLASTIC PIPE AND FITTINGS

A. PVC Plastic Pipe: ASTM D 1785, with wall thickness as indicated in "Piping Applications" Article.

1. PVC Plastic Pipe Fittings: Socket-type pipe fittings, ASTM D 2466 for Schedule 40 pipe; ASTM D 2467 for Schedule 80 pipe.

2.4 JOINING MATERIALS

A. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

B. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

C. Solvent Cements for PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.5 TRANSITION FITTINGS

A. Plastic-to-Metal Transition Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Charlotte Pipe and Foundry Company.

b. IPEX USA LLC.
c. Viega LLC.

2. One-piece fitting with one threaded brass or copper insert and one solvent-cement-joint end of material and wall thickness to match plastic pipe material.

B. Plastic-to-Metal Transition Unions:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Charlotte Pipe and Foundry Company.
b. IPEX USA LLC.
c. NIBCO INC.

2. Brass or copper end, solvent-cement-joint end of material and wall thickness to match plastic pipe material, rubber gasket, and threaded union.

2.6 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. HART Industrial Unions, LLC.
b. Watts; a Watts Water Technologies company.
c. Zurn Industries, LLC.

2. Description:

a. Standard: ASSE 1079.
b. Pressure Rating: 125 psig minimum at 180 deg F.
c. End Connections: Solder-joint copper alloy and threaded ferrous.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Hot-water heating piping, aboveground, NPS 2 and smaller, shall be the following:

1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered, brazed, or pressure-seal joints.

B. Makeup-water piping installed aboveground shall be the following:

1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.

C. Air-Vent Piping:

1. Inlet: Same as service where installed with metal-to-plastic transition fittings for plastic piping systems according to piping manufacturer's written instructions.
2. Outlet: Type K, annealed-temper copper tubing with soldered or flared joints.

D. Safety-Valve-Inlet and -Outlet Piping for Hot-Water Piping: Same materials and joining methods as for piping specified for the service in which safety valve is installed with metal-to-plastic transition fittings for plastic piping systems according to piping manufacturer's written instructions.

3.2 PIPING INSTALLATIONS

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Select system components with pressure rating equal to or greater than system operating pressure.

K. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

L. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

M. Install piping at a uniform grade of 0.2 percent upward in direction of flow.

N. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

O. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.

P. Install valves according to Section 230523.12 "Ball Valves for HVAC Piping," and Section 230523.14 "Check Valves for HVAC Piping".

Q. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.

R. Install shutoff valve immediately upstream of each dielectric fitting.

S. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for identifying piping.

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

U. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230518 "Escutcheons for HVAC Piping."

3.3 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.

3.4 HANGERS AND SUPPORTS

A. Comply with requirements in Section 230529 "Hangers and Supports for HVAC Piping and Equipment" for hanger, support, and anchor devices. Comply with the following requirements for maximum spacing of supports.

B. Comply with requirements in Section 230548 "Vibration and Seismic Controls for HVAC.

C. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
2. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
3. On plastic pipe, install pads or cushions on bearing surfaces to prevent hanger from scratching pipe.

D. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:

1. NPS 3/4: Maximum span, 5 feet; minimum rod size, 1/4 inch.
2. NPS 1: Maximum span, 6 feet; minimum rod size, 1/4 inch.
3. NPS 1-1/4:Maximum span, 7 feet; minimum rod size, 3/8 inch.
4. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
5. NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.

E. Plastic Piping Hanger Spacing: Space hangers according to pipe manufacturer's written instructions for service conditions. Avoid point loading. Space and install hangers with the fewest practical rigid anchor points.

3.5 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

D. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Pressure Piping: Join ASTM D 1785 schedule number, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule number PVC pipe and socket fittings according to ASTM D 2855.
3. PVC Nonpressure Piping: Join according to ASTM D 2855.

3.6 TERMINAL EQUIPMENT CONNECTIONS

A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.

B. Install control valves in accessible locations close to connected equipment.

C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.

D. Install ports for pressure gages and thermometers at coil inlet and outlet connections. Comply with requirements in Section 230519 "Meters and Gages for HVAC Piping."

3.7 CHEMICAL TREATMENT

A. Fill system with fresh water and add liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products from piping. Circulate solution for a minimum of 24 hours, drain, clean strainer screens, and refill with fresh water.

B. Add initial chemical treatment and maintain water quality in ranges noted above for the first year of operation.

3.8 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:

1. Leave joints, including welds, uninsulated and exposed for examination during test.
2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:

1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
3. Isolate expansion tanks and determine that hydronic system is full of water.
4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times the "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
6. Prepare written report of testing.

C. Perform the following before operating the system:

1. Open manual valves fully.
2. Inspect pumps for proper rotation.
3. Set makeup pressure-reducing valves for required system pressure.
4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).

5. Set temperature controls so all coils are calling for full flow.
6. Inspect and set operating temperatures of boilers to specified values.
7. Verify lubrication of motors and bearings.

END OF SECTION 232113

SECTION 232116 - HYDRONIC PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes special-duty valves and specialties for the following:

1. Hot-water heating piping.
2. Makeup-water piping.
3. Air-vent piping.
4. Safety-valve-inlet and -outlet piping.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of the following:

1. Valves: Incl ude flow and pressure drop curves based on manufacturer's te sting for calibrated-orifice balancing valves and automatic flow-control valves.
2. Air-control devices.
3. Hydronic specialties.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. ASME Compliance: Safety valves and pressure ves sels shall bear t he appropriate ASME labe l. Fabricate an d sta mp air separators an d expans ion tanks to com ply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Hydronic pip ing com ponents and installation sha ll be capable o f withstanding the following minimum working pressure and temperature unless otherwise indicated:

1. Hot-Water Heating Piping: 125 psig at 165 deg F.
2. Makeup-Water Piping: 12 psig at 45 deg F.
3. Air-Vent Piping: 165 deg F.

4. Safety-Valve-Inlet and -Outlet Piping: Equal to the pressure of the piping system to which it is attached.

2.2 VALVES

A. Check and Ball Valves: Comply with requirements specified in Section 230523.12 "Ball Valves for HVAC Piping," and Section 230523.14 "Check Valves for HVAC Piping."

B. Automatic Temperature-Control Valves, Actuators, and Sensors: Comply with requirements specified in Section 230923.11 "Control Valves"Section 15901 "Control Valves."

C. Bronze, Calibrated-Orifice, Balancing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Armstrong Pumps, Inc.
b. Bell & Gossett; a Xylem brand.
c. Taco.

2. Body: Bronze, ball or plug type with calibrated orifice or venturi.

3. Ball: Brass or stainless steel.
4. Plug: Resin.
5. Seat: PTFE.
6. End Connections: Threaded or socket.
7. Pressure Gage Connections: Integral seals for portable differential pressure meter.
8. Handle Style: Lever, with memory stop to retain set position.
9. CWP Rating: Minimum 125 psig.
10. Maximum Operating Temperature: 250 deg F.

D. Diaphragm-Operated, Pressure-Reducing Valves: ASME labeled.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Armstrong Pumps, Inc.
b. Bell & Gossett; a Xylem brand.
c. Watts; a Watts Water Technologies company.

2. Body: Bronze or brass.

3. Disc: Glass and carbon-filled PTFE.
4. Seat: Brass.
5. Stem Seals: EPDM O-rings.
6. Diaphragm: EPT.
7. Low inlet-pressure check valve.
8. Inlet Strainer: Bronze, removable without system shutdown.

9. Valve Seat and Stem: Noncorrosive.
10. Valve Size, Capacity, and Operating Pressure: Selected to suit system in which installed, with operating pressure and capacity factory set and field adjustable.

2.3 AIR-CONTROL DEVICES

A. Manual Air Vents:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Armstrong Pumps, Inc.
   b. Bell & Gossett; a Xylem brand.
   c. Taco, Inc.

2. Body: Bronze.

3. Internal Parts: Nonferrous.
4. Operator: Screwdriver or thumbscrew.
5. Inlet Connection: NPS 1/2.
6. Discharge Connection: NPS 1/8.
7. CWP Rating: 150 psig.
8. Maximum Operating Temperature: 225 deg F.

B. Expansion Tanks:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Armstrong Pumps, Inc.
   b. Bell & Gossett; a Xylem brand.
   c. Taco, Inc.

2. Tank: Welded steel, rated for 125-psig working pressure and 375 deg F maximum operating temperature, with taps in bottom of tank for tank fitting and taps in end of tank for gage glass. Tanks shall be factory tested after taps are fabricated and shall be labeled according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

3. Air-Control Tank Fitting: Cast-iron body, copper-plated tube, brass vent tube plug, and stainless-steel ball check, 100-gal. unit only; sized for compression-tank diameter. Provide tank fittings for 125-psig working pressure and 250 deg F maximum operating temperature.
4. Tank Drain Fitting: Brass body, nonferrous internal parts; 125-psig working pressure and 240 deg F maximum operating temperature; constructed to admit air to compression tank, drain water, and close off system.

C. In-Line Air Separators:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. AMTROL, Inc.
   b. Bell & Gossett; a Xylem brand.
   c. Taco, Inc.

2. Tank: One-piece cast iron with an integral weir constructed to decelerate system flow to maximize air separation.

3. Maximum Working Pressure: Up to 175 psig.
4. Maximum Operating Temperature: Up to 300 deg F.

2.4 HYDRONIC PIPING SPECIALTIES

A. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller.
3. Strainer Screen: Stainless-steel, 40-mesh strainer, or perforated stainless-steel basket.
4. CWP Rating: 125 psig.

PART 3 - EXECUTION

3.1 VALVE APPLICATIONS

A. Install shutoff-duty valves at each branch connection to supply mains and at supply connection to each piece of equipment.

B. Install calibrated-orifice, balancing valves at each branch connection to return main.

C. Install calibrated-orifice, balancing valves in the return pipe of each heating terminal.

D. Install check valves at each pump discharge and elsewhere as required to control flow direction.

E. Install safety valves at hot-water generators and elsewhere as required by ASME Boiler and Pressure Vessel Code. Install drip-pan elbow on safety-valve outlet and pipe without valves to the outdoors; pipe drain to nearest floor drain or as indicated on Drawings. Comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, for installation requirements.

F. Install pressure-reducing valves at makeup-water connection to regulate system fill pressure.

3.2 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.

B. Install piping from boiler air outlet, air separat or, or air purger t o expansion tank with a 2 percent upward slope toward tank.

C. Install in-line air separators in pump suction.

D. Install expansion tanks on the floor. Vent and purge air from hydronic system, and ensure that tank is properly charged with air to suit system Project requirements.

END OF SECTION 232116

SECTION 232123 - HYDRONIC PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Close-coupled, in-line centrifugal pumps.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of pump.

B. Shop Drawings: For each pump.

1. Show pump layout and connections.
2. Include setting drawings with templates for installing foundation and anchor bolts and other anchorages.
3. Include diagrams for power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 CLOSE-COUPLED, IN-LINE CENTRIFUGAL PUMPS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Grundfos Pumps Corporation.
2. ITT Corporation.
3. TACO Incorporated.

B. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, close-coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted horizontally or vertically.

C. Pump Construction:

1. Casing: Radially split, cast iron, with threaded gage tappings at inlet and outlet, replaceable bronze wear rings, and threaded companion-flange connections.

2. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. For constant-speed pumps, trim impeller to match specified performance.
3. Pump Shaft: Stainless steel.
4. Seal: Mechanical seal consisting of carbon rotating ri ng against a ceramic seat held by a stainless-steel spring, and Buna-N bellows and gasket. Include water slinger on shaft between motor and seal.
5. Seal: Packing seal consisti ng of stuffing box w ith a minimum of four rings of graphite-impregnated braided yarn with bronze lanter n ring b etween center two graphit e rings, and bronze packing gland.
6. Pump Bearings: Permanently lubricated ball bearings.

D. Motor: Single speed and rigidly mounted to pump casing.

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency , and marked for intended loc ation and application.
2. Comply with NEMA de signation, temperature rati ng, service f actor, and ef ficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

   a. Enclosure: Open, dripproof.
   b. Enclosure Materials: Cast iron.
   c. Motor Bearings: Permanently lubricated ball bearings.
   d. Efficiency: Premium efficient.

E. Capacities and Characteristics: See equipment schedule on drawings.

2.2 PUMP SPECIALTY FITTINGS

A. Triple-Duty Valve:

1. Angle or straight pattern.
2. 175-psig pressure rating, cast-iron body, pump-discharge fitting.
3. Drain plug and bronze-fitted shutoff, balancing, and check valve features.
4. Brass gage ports with integral check valve and orifice for flow measurement.

PART 3 - EXECUTION

3.1 PUMP INSTALLATION

A. Comply with HI 1.4.

B. Install pumps to provide access for periodic maintenance including removing motors, impellers, couplings, and accessories.

C. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.

D. Equipment Mounting: Install in-line pumps with continuous-thread hanger rods and elastomeric hangers of size required to support weight of in-line pumps.

1. Comply with requirements for hangers and supports specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

3.2 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to pump, allow space for service and maintenance.

C. Connect piping to pumps. Install valves that are same size as piping connected to pumps.

D. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.

E. Install triple-duty valve on discharge side of pumps.

F. Install Y-type strainer and shutoff valve on suction side of pumps.

G. Install pressure gages on pump suction and discharge or at integral pressure-gage tapping, or install single gage with multiple-input selector valve.

H. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

END OF SECTION 232123

SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rectangular ducts and fittings.
2. Sheet metal materials.
3. Sealants and gaskets.
4. Hangers and supports.

B. Related Sections:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233300 "Air Duct Accessori es" for dampers, sound- control devi ces, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated D uct Design: Duct construction, in cluding sheet m etal thicknesse s, sea m and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standar ds - Metal and Flex ible" and perform ance requirements and design criteria indicated in "Duct Schedule" Article.

B. Airstream Su rfaces: Surfa ces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.

10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment and vibration isolation.

C. Delegated-Design Submittal:

1. Sheet metal thicknesses.
2. Joint and seam construction and sealing.
3. Reinforcement details and spacing.
4. Materials, fabrication, assembly, and spacing of hangers and supports.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Structural members to which duct will be attached.
3. Size and location of initial access modules for acoustical tile.
4. Penetrations of smoke barriers and fire-rated construction.
5. Items penetrating finished ceiling including the following:

a. Lighting fixtures.
b. Air inlets.
c. Sprinklers.
d. Access panels.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct- support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SHEET METAL MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

2.3 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 3 inches.
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

2.4 HANGERS AND SUPPORTS

A. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

B. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

C. Trapeze and Riser Supports:

1. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install ducts with fewest possible joints.

D. Install factory - or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

G. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

H. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

I. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.

J. Protect duct interiors from moisture, construction debris and dust, and other foreign materials.

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Outdoor, Exhaust Ducts: Seal Class C.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

C. Hangers Exposed to View: Threaded rod and angle or channel supports.

D. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

E. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 DUCT CLEANING

A. Clean new duct system(s) before testing, adjusting, and balancing.

B. Use service openings for entry and inspection.

1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.

C. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Exhaust fans including fan housings scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Dedicated exhaust and ventilation components.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Provide drainage and cleanup for wash-down procedures.
5. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.7 START UP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.8 DUCT SCHEDULE

A. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
   a. Type: G90 Galvanized.
   b. Pressure Class: Negative 1-inch wg.
   c. Minimum SMACNA Seal Class: A if negative pressure.
   d. SMACNA Leakage Class for Rectangular: 12.
   e. SMACNA Leakage Class for Round and Flat Oval: 12.

B. Branch Configuration:

1. Rectangular Duct: Co mply with SMA CNA's "HVAC Duct Co nstruction St andards - Metal and Flexible," Figure 4-6, "Branch Connection."

   a. Rectangular Main to Rectangular Branch: 45-degree entry.

END OF SECTION 233113

SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
1. Manual volume dampers.
2. Control dampers.
3. Flange connectors.
4. Turning vanes.
5. Duct-mounted access doors.
6. Flexible connectors.
7. Duct accessory hardware.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:

a. Special fittings.
b. Manual volume damper installations.
c. Control-damper installations.
d. Wiring Diagrams: For power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

A. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for finish for ducts.

B. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

2.3 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. McGill AirFlow LLC.
   b. Nailor Industries Inc.
   c. Ruskin Company.

2. Standard leakage rating, with linkage outside airstream.

3. Suitable for horizontal or vertical applications.
4. Frames:

   a. Frame: Hat-shaped, 0.05-inch-thick stainless steel.
   b. Mitered and welded corners.
   c. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

   a. Multiple or single blade.
   b. Parallel- or opposed-blade design.
   c. Stainless-steel, 0.064 inch thick.

6. Blade Axles: Stainless steel.
7. Bearings:

   a. Molded synthetic.
   b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

8. Tie Bars and Brackets: Stainless steel.

2.4 CONTROL DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.

2. Ruskin Company.
3. Tampco.

B. Frames:

1. U shaped.
2. 0.05-inch-thick stainless steel.
3. Mitered and welded corners.

C. Blades:

1. Multiple blade with maximum blade width of 6 inches.
2. Parallel- and opposed-blade design.
3. Stainless steel.
4. 0.064 inch thick single skin or 0.0747-inch-thick dual skin.
5. Blade Edging: PVC.
6. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.

D. Blade Axles: 1/2-inch-diameter; stainless steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.

1. Operating Temperature Range: From minus 40 to plus 200 deg F.

E. Bearings:

1. Molded synthetic.
2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
3. Thrust bearings at each end of every blade.

2.5 FLANGE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Ward Industries; a brand of Hart & Cooley, Inc.

B. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

C. Material: Stainless steel.

D. Gage and Shape: Match connecting ductwork.

2.6 TURNING VANES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Aero-Dyne Sound Control Co.
2. Duro Dyne Inc.
3. Ward Industries; a brand of Hart & Cooley, Inc.

B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

D. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."

E. Vane Construction: Single wall.

2.7 DUCT ACCESS PANEL ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Ductmate Industries, Inc.

B. Labeled according to UL 1978 by an NRTL.

C. Panel and Frame: Minimum thickness 0.0428-inch stainless steel.

D. Fasteners: Stainless steel. Panel fasteners shall not penetrate duct wall.

E. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg F.

F. Minimum Pressure Rating: 10-inch wg, positive or negative.

2.8 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. Ward Industries; a brand of Hart & Cooley, Inc.

B. Materials: Flame-retardant or noncombustible fabrics.

C. Coatings and Adhesives: Comply with UL 181, Class 1.

D. Metal-Edged Connectors: Factory fabricated with a fabric strip 5-3/4 inches wide attached to two strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Provide metal compatible with connected ducts.

E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd..
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

2.9 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install control dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

1. Install steel volume dampers in steel ducts.
2. Install aluminum volume dampers in aluminum ducts.

E. Set dampers to fully open position before testing, adjusting, and balancing.

F. Install test holes at fan inlets and outlets and elsewhere as indicated.

G. Install flexible connectors to connect ducts to equipment.

H. Install duct test holes where required for testing and balancing purposes.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Inspect turning vanes for proper and secure installation.

END OF SECTION 233300

SECTION 233413 - AXIAL HVAC FANS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Tubeaxial fans.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, furnished specialties, and accessories for each fan.
2. Certified fan performance curves with system operating conditions indicated.
3. Certified fan sound-power ratings.
4. Motor ratings and electrical characteristics, plus motor and electrical accessories.
5. Material thickness and finishes, including color charts.
6. Dampers, including housings, linkages, and operators.
7. Fan speed controllers.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.
4. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
5. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show fan room layout and relationships between components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate and certify field measurements.

B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data : For axial fans to include in emergency, operation, and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Belts: One set for each belt-driven unit.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AMCA Compliance: Comply with AMCA performance requirements and bear the AMCA - Certified Ratings Seal.

B. Capacities and Characteristics: See equipment schedule on drawings.

1. Vibration Isolators: Restrained spring isolators having a static deflection of 1 inch.

2.2 TUBEAXIAL FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Loren Cook Company.
3. PennBarry.

B. Description: Fan wheel and housing, factory-mounted motor with belt drive, an inlet cone section, and accessories.

C. Housings: Galvanized steel with flanged inlet and outlet connections.

D. Wheel Assemblies: Cast or extruded aluminum with airfoil-shaped blades mounted on cast-iron wheel plate keyed to shaft with solid-steel key.

E. Wheel Assemblies: Cast aluminum, machined and fitted to shaft.

F. Belt Drives:

1. Factory mounted, with adjustable alignment and belt tensioning.
2. Service Factor Based on Fan Motor Size: 1.2.
3. Fan Shaft: Turned, ground, and polished steel designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.
4. Fan Pulleys: Cast iron with split, tapered bushing; dynamically balanced at factory.

5. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
6. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
7. Belt Guards: Fabricate of steel for motors mounted on outside of fan cabinet.
8. Motor Mount: Adjustable base.
9. Shaft Bearings: Radial, self-aligning bearings.

G. Accessories:

1. Companion Flanges: Rolled flanges of same material as housing.
2. Inspection Door: Bolted door allowing limited access to internal parts of fan, of same material as housing.
3. Mounting Clips: Horizontal clips welded to fan housing, of same material as housing.
4. Shaft Seal: Elastomeric seal and Teflon wear plate, suitable for up to 300 deg F.
5. Motor Cover: Cover with side vents to dissipate motor heat, of same material as housing.

H. Factory Finishes:

1. Sheet Metal Parts: Prime coat before final assembly.
2. Exterior Surfaces: Baked-enamel finish coat after assembly.

2.3 SOURCE QUALITY CONTROL

A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install axial fans level and plumb.

B. Disassemble and reassemble units, as required for moving to the final location, according to manufacturer's written instructions.

C. Lift and support units with manufacturer's designated lifting or supporting points.

D. Equipment Mounting:

1. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

E. Install units with clearances for service and maintenance.

F. Label fans according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.2 CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that cleaning and adjusting are complete.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
5. Adjust belt tension.
6. Adjust damper linkages for proper damper operation.
7. Verify lubrication for bearings and other moving parts.
8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
9. Disable automatic temperature-control operators, energize motor and confirm proper motor rotation and unit operation, adjust fan to indicated rpm, and measure and record motor voltage and amperage.
10. Shut unit down and reconnect automatic temperature-control operators.
11. Remove and replace malfunctioning units and retest as specified above.

B. Test and adjust controls and safeties. Controls and equipment will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 233413

SECTION 233416 - CENTRIFUGAL HVAC FANS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: For each product.

1. Backward-inclined centrifugal fans.
2. Forward-curved centrifugal fans.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Include rated capacities, furnished specialties, and accessories for each fan.
2. Certified fan performance curves with system operating conditions indicated.
3. Certified fan sound-power ratings.
4. Motor ratings and electrical characteristics, plus motor and electrical accessories.
5. Material thickness and finishes, including color charts.
6. Dampers, including housings, linkages, and operators.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.
4. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
5. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show fan room layout and relationships between components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate and certify field measurements.

B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For centrifugal fans to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AMCA Compliance: Comply with AMCA performance requirements and bear the AMCA-Certified Ratings Seal.

B. Capacities and Characteristics: See equipment schedule on drawings.

2.2 BACKWARD-INCLINED CENTRIFUGAL FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Central Blower Company.
2. Greenheck.
3. Loren Cook Company.

B. Description:

1. Factory-fabricated, -assembled, -tested, and -finished, direct-driven centrifugal fans consisting of housing, wheel, motor, and support structure.
2. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations.
3. Factory-installed and -wired disconnect switch.

C. Housings:

1. Formed panels to make curved-scroll housings with shaped cutoff.
2. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
3. Horizontally split, bolted-flange housing.
4. Spun inlet cone with flange.
5. Outlet flange.

D. Backward-Inclined Wheels:

1. Single-width-single-inlet and double-width-double-inlet construction with curved inlet flange, backplate, backward-inclined blades, and fastened to shaft with set screws.
2. Welded or riveted to flange and backplate; cast-iron or cast-steel hub riveted to backplate.

E. Accessories:

1. Access for Inspection, Cleaning, and Maintenance: Comply with requirements in ASHRAE 62.1.
2. Scroll Drain Connection: NPS 1 steel pipe coupling welded to low point of fan scroll.
3. Companion Flanges: Rolled flanges for duct connections of same material as housing.
4. Inlet Screens: Grid screen of same material as housing.
5. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.

2.3 SOURCE QUALITY CONTROL

A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install centrifugal fans level and plumb.

B. Disassemble and reassemble units, as required for moving to the final location, according to manufacturer's written instructions.

C. Lift and support units with manufacturer's designated lifting or supporting points.

D. Equipment Mounting:

1. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

E. Install units with clearances for service and maintenance.

F. Label fans according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.2 CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."

B. Install ducts adjacent to fans to allow service and maintenance.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that cleaning and adjusting are complete.
4. Verify lubrication for bearings and other moving parts.
5. See Section 230593 "Testing, Adjusting, and Balancing For HVAC" for testing, adjusting, and balancing procedures.
6. Remove and replace malfunctioning units and retest as specified above.

B. Test and adjust controls and safeties. Controls and equipment will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 233416

SECTION 235216 - CONDENSING BOILERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes gas-fired, water-jacketed condensing boilers, trim, and accessories for generating hot water.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For boilers, boiler trim, and accessories. Include plans, elevations, sections, and mounting details.

1. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Include diagrams for power, signal, and control wiring.

C. Delegated-Design Submittal: For each boiler.

1. Design calculations and vibration isolation base details, signed and sealed by a qualified professional engineer.

a. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
b. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

1.3 INFORMATIONAL SUBMITTALS

A. Source quality-control reports.

B. Field quality-control reports.

C. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of boilers that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Condensing Boilers:

a. Leakage and Materials: 10 years from date of Substantial Completion
b. Heat Exchanger Damaged by Thermal Stress and Corrosion: Not prorated for five years from date of Substantial Completion

PART 2 - PRODUCTS

2.1 PERFORMANCE 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. ASME Compliance: Fabricate and label boilers to comply with 2010 ASME Boiler and Pressure Vessel Code.

C. ASHRAE/IES 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."

D. DOE Compliance: Minimum efficiency shall comply with 10 CFR 430, Subpart B, Appendix N.

E. UL Compliance: Test boilers for compliance with UL 795. Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.

F. CSA Compliance: Test boilers for compliance with CSA B51.

2.2 WATER-JACKETED CONDENSING BOILERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. LAARS Heating Systems Company.
2. Lochinvar.
3. Viessmann Manufacturing Co. (US) Inc.

B. Description: Factory-fabricated, -assembled, and -tested, water-jacketed condensing boiler with heat exchanger sealed pressure tight, built on a steel base, including insulated jacket; flue-gas vent; water supply, return, and condensate drain connections; and controls. Water-heating service only.

C. Heat Exchanger: Stainless-steel primary and secondary combustion chamber.

D. Burner: Propane gas, forced draft; swing-open front and burner observation port.

E. Blower: Centrifugal fan, forced draft. Include prepurge and postpurge of the combustion chamber.

1. Motors: Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

a. Motor Sizes: Minimum size as indicated; if not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

F. Gas Train: Combination gas valve with manual shutoff and pressure regulator. Include 100 percent safety shutoff with electronic flame supervision.

G. Ignition: Electric-spark ignition with 100 percent main-valve shutoff with electronic flame supervision.

H. Casing:

1. Jacket: Sheet metal, with snap-in or interlocking closures.
2. Control Compartment Enclosures: NEMA 250, Type 1A.
3. Finish: Powder-coated protective finish.
4. Insulation: Minimum 4-inch-thick, mineral-fiber insulation surrounding the heat exchanger.
5. Combustion-Air Connections: Inlet and vent duct collars.

I. Capacities and Characteristics: See equipment schedule on drawings.

2.3 TRIM

A. Safety Relief Valve: ASME rated.

B. Pressure and Temperature Gage: Minimum 3-1/2-inch-diameter, combination water-pressure and -temperature gage. Gages shall have operating-pressure and -temperature ranges, so normal operating range is about 50 percent of full range.

C. Drain Valve: Minimum NPS 3/4 hose-end gate valve.

D. Circulation Pump: Nonoverloading, in-line pump with split-capacitor motor having thermal-overload protection and lubricated bearings; designed to operate at specified boiler pressures and temperatures.

2.4 ELECTRICAL POWER

A. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in electrical Sections.

B. Single-Point Field Power Connection: Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to boiler.

2.5 VENTING KITS

A. Kit: Complete system, ASTM A 959, PVC pipe, vent terminal, thimble, indoor plate, vent adapter, condensate trap and dilution tank, and sealant.

B. Combustion-Air Intake: Complete system, PVC, pipe, vent terminal with screen, inlet air coupling, and sealant.

2.6 SOURCE QUALITY CONTROL

A. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency; perform hydrostatic test.

B. Test and inspect factory-assembled boilers, before shipping, according to 2010 ASME Boiler and Pressure Vessel Code.

PART 3 - EXECUTION

3.1 BOILER INSTALLATION

A. Equipment Mounting:

1. Install boilers on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."

B. Install gas-fired boilers according to NFPA 54.

C. Assemble and install boiler trim.

D. Install electrical devices furnished with boiler but not specified to be factory mounted.

E. Install control wiring to field-mounted electrical devices.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to boiler to allow service and maintenance.

C. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.

D. Connect piping to boilers, except safety relief valve connections, with flexible connectors of materials suitable for service. Flexible connectors and their installation are specified in Section 232116 "Hydronic Piping Specialties."

E. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of gas-train connection. Provide a reducer if required.

F. Connect hot-water piping to supply- and return-boiler tappings with shutoff valve and union or flange at each connection.

G. Install piping from safety relief valves to nearest floor drain.

H. Boiler Venting:

1. Install flue venting kit and combustion-air intake.
2. Connect full size to boiler connections.

I. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Perform installation and startup checks according to manufacturer's written instructions.
2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

a. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level, and water temperature.
b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

B. Boiler will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

D. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.4 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain boilers. Refer to Section 010000 "General Notes."

END OF SECTION 235216

SECTION 235533.16 - GAS-FIRED UNIT HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes gas-fired unit heaters.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of gas-fired unit heater.

1. Include rated capacities, operating characteristics, and accessories.

B. Shop Drawings: For gas-fired unit heaters. Include plans, elevations, sections, and attachment details.
1. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, elevations, and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Structural members to which equipment will be attached.
2. Items penetrating roof and the following:

a. Vent and gas piping rough-ins and connections.

B. Field quality-control reports.

C. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace heat exchanger of gas-fired unit heater that fails in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Modine Manufacturing Company.
2. REZNOR; Thomas & Betts Corporation, a member of ABB Group.
3. Trane.

2.2 PERFORMANCE 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. Capacities and Characteristics: See equipment schedule on drawings.

2.3 MANUFACTURED UNITS

A. Description: Factory assembled, piped, and wired, and complying with ANSI Z83.8/CSA 2.6.

B. Gas Type: Design burner for propane gas having characteristics same as those of gas available at Project site.

C. Type of Venting: Indoor, separated combustion, power vented.

D. Housing: Steel, with integral draft hood and inserts for suspension mounting rods.

1. External Casings and Cabinets: Baked enamel over corrosion-resistant-treated surface.

E. Accessories:

1. Four-point suspension kit.
2. Power Venter: Centrifugal aluminized-steel fan, with stainless-steel shaft; 120-V ac motor.
3. Concentric, Terminal Vent Assembly: Combined combustion-air inlet and power-vent outlet with wall or roof caps. Include adapter assembly for connection to inlet and outlet pipes, and flashing for wall or roof penetration.

F. Heat Exchanger: Aluminized steel for UH-1; 316 stainless steel for UH-2.

G. Burner Material: Aluminized steel with stainless-steel inserts.

H. Centrifugal Unit Fan:

1. Steel, centrifugal fan dynamically balanced and resiliently mounted.
2. Direct-Driven Drive Assembly

I. Motors:

1. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
2. Enclosure Materials: Rolled steel.
3. Motor Bearings: Permanently lubricated .
4. Efficiency: Premium efficient.

J. Controls: Regulated redundant gas valve containing pilot solenoid valve, electric gas valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff all in one body.

1. Gas Control Valve: Single stage.
2. Ignition: Electronically controlled electric spark with flame sensor.
3. Fan Thermal Switch: Operates fan on heat-exchanger temperature.
4. Control transformer.
5. High Limit: Thermal switch or fuse to stop burner.
6. Thermostat: Devices and wiring are specified in Section 230923.27 "Temperature Instruments."
7. Wall-Mounted Thermostat:

a. Single stage.
b. Fan on-off-automatic switch.
c. 24-V ac.
d. 50 to 90 deg F operating range.

K. Electrical Connection: Factory wire motors and controls for a single electrical connection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install and connect gas-fired unit heaters and associated gas and vent features and systems according to NFPA 54, applicable local codes and regulations, and manufacturer's written instructions.

3.2 EQUIPMENT MOUNTING

A. Suspended Units: Suspend from substrate using threaded rods, spring hangers, and building attachments. Secure rods to unit hanger attachments. Adjust hangers so unit is level and plumb.

B. Substrate-Mounted Units: Provide supports connected to substrate. Secure units to supports.

1. Spring hangers are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
2. Threaded Rods, Spring Hangers, and Building Attachments: Comply with requirements in Section 230529 "Hangers and Supports for HVAC Piping and Equipment".

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to gas-fired unit heater, allow space for service and maintenance.

C. Gas Piping: Comply with Section 231126 "Facility Liquefied-Petroleum Gas Piping." Connect gas piping to gas train inlet; provide union with enough clearance for burner removal and service.

D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections:

1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
2. Verify proper motor rotation.
3. Test Reports: Prepare a written report to record the following:

a. Test procedures used.
b. Test results that comply with requirements.
c. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Gas-fired unit heater will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust initial temperature set points.

B. Adjust burner and other unit components for optimum heating performance and efficiency.

3.6 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain gas-fired unit heaters.

END OF SECTION 235533.16

SECTION 238316 - RADIANT-HEATING HYDRONIC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes radiant-heating piping, including pipes, fittings, and piping specialties.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. PEX: Crosslinked polyethylene.

C. PEX/AL/PEX: Crosslinked polyethylene/aluminum/crosslinked polyethylene.

D. PTFE: Polytetrafluoroethylene plastic.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data for piping, fittings, manifolds, specialties, and controls; include pressure and temperature ratings, oxygen-barrier performance, fire-performance characteristics, and water-flow and pressure-drop characteristics.

B. Shop Drawings: Show piping layout and details drawn to scale, including valves, manifolds, controls, and support assemblies, and their attachments to building structure.

1. Shop Drawing Scale: 1/4 inch = 1 foot.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For radiant-heating piping valves and equipment to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 PEX PIPE AND FITTINGS

A. Pipe Material: PEX plastic according to ASTM F 876.

B. Oxygen Barrier: Limit oxygen diffusion through the tube to maximum 0.10 mg per cu. m/day at 104 deg F according to DIN 4726.

C. Fittings: ASTM F 1807, metal insert and copper crimp rings.

D. Pressure/Temperature Rating: Minimum 100 psig and 180 deg F.

2.2 DISTRIBUTION MANIFOLDS

A. Manifold: Minimum NPS 1, brass, modular plastic or stainless steel.

B. Main Shutoff Valves:

1. Factory installed on supply and return connections.
2. Three-piece body.
3. Body: Brass or bronze.
4. Ball: Chrome-plated bronze.
5. Seals: PTFE.
6. CWP Rating: 150 psig.
7. Maximum Operating Temperature: 225 deg F.

C. Manual Air Vents:

1. Body: Bronze.
2. Internal Parts: Nonferrous.
3. Operator: Key furnished with valve, or screwdriver bit.
4. Inlet Connection: NPS 1/2.
5. Discharge Connection: NPS 1/8.
6. CWP Rating: 150 psig.
7. Maximum Operating Temperature: 225 deg F.

D. Balancing Valves:

1. Body: Plastic or bronze, ball or plug, or globe cartridge type.
2. Ball or Plug: Brass or stainless steel.
3. Globe Cartridge and Washer: Brass with EPDM composition washer.
4. Seat: PTFE.
5. Visual Flow Indicator: Flowmeter with visible indication in a clear plastic cap at top of valve.
6. Differential Pressure Gage Connections: Integral seals for portable meter to measure loss across calibrated orifice.
7. Handle Style: Lever or knob, with memory stop to retain set position if used for shutoff.

8. CWP Rating: Minimum 125 psig.
9. Maximum Operating Temperature: 250 deg F.

E. Zone Control Valves:

1. Body: Plastic or bronze, ball or plug, or globe cartridge type.
2. Ball or Plug: Brass or stainless steel.
3. Globe Cartridge and Washer: Brass with EPDM composition washer.
4. Seat: PTFE.
5. Actuator: Replaceable electric motor.
6. CWP Rating: Minimum 125 psig.
7. Maximum Operating Temperature: 250 deg F.

F. Thermometers:

1. Mount on supply and return connections.
2. Case: Dry type, metal or plastic, 2-inch diameter.
3. Element: Bourdon tube or other type of pressure element.
4. Movement: Mechanical, connecting element and pointer.
5. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.
6. Pointer: Black metal.
7. Window: Plastic.
8. Connector: Rigid, back type.
9. Thermal System: Liquid- or mercury-filled bulb in copper-plated steel, aluminum, or brass stem.
10. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

G. Mounting Brackets: Copper, or plastic- or copper-clad steel, where in contact with manifold.

2.3 PIPING SPECIALTIES

A. Cable Ties:

1. Fungus-inert, self-extinguishing, one-piece, self-locking, Type 6/6 nylon cable ties.
2. Minimum Width: 1/8 inch.
3. Tensile Strength: 20 lb, minimum.
4. Temperature Range: Minus 40 to plus 185 deg F.

2.4 CONTROLS

A. Wall-Mounted Thermostat:

1. Minimum temperature range from 50 to 90 deg F.
2. Manually operated with on-off switch.
3. Day and night setback and clock program with minimum four periods per day.

4. Operate pumps or open zone control valves if room temperature falls below the thermostat setting, and stop pumps or close zone control valves when room temperature rises above the thermostat setting.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces and substrates to receive radiant-heating piping for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Ensure that surfaces and pipes in contact with radiant-heating piping are free of burrs and sharp protrusions.
2. Ensure that surfaces and substrates are level and plumb.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Install the following types of radiant-heating piping for the applications described:
1. Piping in Interior Reinforced-Concrete Floors: PEX.

3.3 INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings or coordination drawings.

B. Install radiant-heating piping continuous from the manifold through the heated panel and back to the manifold without piping joints in heated panels.

C. Connect radiant piping to manifold in a reverse-return arrangement.

D. Do not bend pipes in radii smaller than manufacturer's minimum bend radius dimensions.

E. Fire- and Smoke-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials according to Section 078413 "Penetration Firestopping."

F. Piping in Interior Reinforced-Concrete Floors:

1. Secure piping in concrete floors by attaching pipes to reinforcement using cable ties.
2. Space cable ties a maximum of 18 inches o.c. and at center of turns or bends.
3. Maintain 3” minimum cover.
4. Install a sleeve of 3/8-inch-thick, foam-type insulation or PE pipe around tubing and extending for a minimum of 10 inches on each side of slab joints to protect the tubing

passing through expansion or control joints. Anchor sleeve to slab form at control joints to provide maximum clearance for saw cut.

5. Maintain minimum 40-psig pressure in piping during concrete placement and continue for 24 hours after placement.

3.4 FIELD QUALITY CONTROL

A. Prepare radiant-heating piping for testing as follows:

1. Open all isolation valves and close bypass valves.
2. Open and verify operation of zone control valves.
3. Flush with clean water and clean strainers.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Leak Test: After installation, charge system and test for leaks. Subject piping to inert gas test pressure that is not less than 1.5 times the design pressure but not more than 100 psig. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Radiant-heating piping will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Protect hydronic piping system from damage during construction.

END OF SECTION 238316

ITEM 627.0026 - - 25 – ELECTRICAL

TAB 16-34A, D214509
Vehicle Wash Bay Installation at the Henrietta
and Batavia Maintenance Sites, MP 362.4 and 390.1

1. DESCRIPTION:

1.01 Furnish all labor, materials, equipment and services necessary to complete the work as indicated on the Contract Plans and the attached Specification Summary.

1.02 All work shall conform to the requirements specified in Part 1 – General, of the Sections listed.

2. MATERIALS:

2.01 The materials shall be as specified in Part 2 – Products, of the Sections listed.

3. CONSTRUCTION DETAILS:

3.01 The construction details shall be as specified in Part 3 – Execution, of the Sections listed.

4. METHOD OF MEASUREMENT:

4.01 This item shall be measured for payment on a lump sum basis for the work completed in accordance with the Contract Documents and as directed by the Engineer.

5. BASIS OF PAYMENT:

5.01 Payment for this item shall be made at the lump sum bid price bid. The lump sum price bid shall include cost of furnishing all labor, material, equipment and appliances necessary to complete the work as indicated on the Contract Plans and as specified herein in the Sections listed.

5.02 Detailed Estimate:

A. Before the first certificate of payment is issued for the work under this item, submit a detailed estimate of quantities and prices for all materials, labor, and other items included under this item, which shall aggregate the contract lump sum price bid for this item. Prepare the detailed estimate in the same sequence as the Sections listed.

B. The detailed estimate shall be supported by such evidence, including certified copies of subcontracts, as the Engineer may require.

C. The detailed estimate must be approved by the Engineer who may revise it as, in his/her reasonable judgment, is necessary to make the various item conform to their true values. The value of each certificate of payment will be based on the approved detailed estimate.

5.03 Monthly payments will be made for this item in proportion to the total amount of work completed.

1. SPECIFICATION SUMMARY

1.01 This item includes the following specifications:

A. Section 260200 – GENERAL ELECTRICAL REQUIREMENTS
B. Section 260519 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
C. Section 260526 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
D. Section 260529 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
E. Section 260533 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
F. Section 262416 – PANELBOARDS
G. Section 262726 – WIRING DEVICES
H. Section 262816 – ENCLOSED SWITCHES AND CIRCUIT BREAKERS
I. Section 262913 – ENCLOSED CONTROLLERS

SECTION 260200 – GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. The General Conditions, Supplementary General Conditions, Instructions to Bidders, General Requirements, and Division 1 of these Specifications are part of the work of this Section.

B. Section 260200 General Electrical Requirements applies to the work of each Electrical Specification Section.

1.2 EQUIPMENT AND MATERIALS SPECIFIED

A. Where products are named in the Electrical specifications, the first named product is the Designer's basis for design. Other product manufacturers named in the specifications are acceptable; however, the Contractor must first confirm that these products fit into the available space, and meet all performance requirements indicated on the Contract Documents, prior to submitting them for approval. Where products do not fit into available space or do not meet all performance requirements, the product is not acceptable.

B. Where the Contractor submits for approval equipment or materials other than those that are the Designer's basis for design, the Contractor shall first demonstrate in writing that the equipment or materials will fit into available space, and will meet or exceed all performance requirements indicated on the drawings. Where, in the opinion of the Designer, any characteristic of the product or material requires that modifications be made to this or any other Contract of this project, the cost of all such modifications to this and other Contracts shall be borne by the Contractor offering the substitution.

1.3 ABSENCE OF SPECIFICATION

A. Where the drawings or the specifications do not name a particular brand or manufacturer of any item, these items are still part of the Work. This Contractor shall provide all such items that may be fairly and reasonably judged throughout the construction industry to be the most appropriate and best quality item for the intended application. Provide submittals for proposed items to the Designer or Owner for review and approval.

1.4 SCOPE OF WORK

A. Refer to Drawings for description of the work to be performed under this Contract.

1.5 DRAWINGS AND SPECIFICATIONS

A. The drawings are diagrammatic, and have been developed by the Designer for the purpose of indicating the sizes, capacities, and the general arrangement of the systems to be installed under this Contract. Install all equipment in complete compliance with manufacturer's instructions, applicable codes and ordinances, and in a neat and workmanlike manner. Field inspect all existing conditions, and identify any obstacles or interferences which may affect the execution of the work. Carefully lay out the routing and location of all equipment and materials so as to accommodate obstacles and interferences, and to provide proper maintenance and access clearances. Notify the Owner's representative of any conflicts that will affect the quality, performance, or appearance of the systems installed under this Contract, prior to installing them.

B. Refer to the Architectural Plans for dimensioned drawings. Do not determine dimensions by scaling the Drawings.

1.6 CODES AND STANDARDS

A. Install all work in complete compliance with the applicable provisions of the following:

1. Building Code of New York State
2. Energy Conservation Construction Code of New York State
3. National Electrical Code, NFPA 70
4. Underwriter's Laboratories
5. National Fire Protection Association Standards
6. Occupational, Safety and Health Act (OSHA)

B. All electrical equipment and materials shall be U.L. (Underwriter's Laboratories) listed.

C. Requirements of other agencies apply to the work of the Contract, including IEEE, ANSI, NEMA, ASTM, and are referenced in specific specification sections.

1.7 SUBMITTALS, SHOP DRAWINGS, WIRING DIAGRAMS

A. Unless otherwise waived, provide submittals for all equipment and materials that are part of this Contract.

B. Submittals shall include dimensions, weights, capacities, and a list of all specific features and accessories that are to be provided for this project, and in sufficient detail to permit the Designer or Owner to determine compliance with specified requirements.

C. Provide shop drawings for approval by the Designer or Owner of all fabricated systems and materials, including, but not limited to:
1. Panelboards
2. Controllers
3. Equipment supports and concrete bases.

D. Refer to Division 1 for additional requirements for submittals and shop drawings. Where such requirements conflict with this section, the more stringent shall apply.

1.8 LAYOUT, COORDINATION AND SEQUENCING

A. GENERAL

1. Coordinate the work with the work of other contractors working on this project.
2. It is the responsibility of this Contractor to lay out and adjust the location of the work of this Contract. Contractor's layout shall accommodate all obstacles and interferences anticipated or encountered. Contractor shall relocate obstacles and interferences where required, and as may additionally be directed by the Engineer.
3. Install the work sequentially with respect to the work of other trades, and as directed by the Construction Manager or General Contractor in a timely manner, and so as not to delay the work of other trades or of the Project schedule.
4. Adhere to the established Construction Schedule for the Project.
5. Order all equipment and materials in a timely manner so as not to delay the Project. Notify the Engineer of any delays in the timely procurement of equipment and materials.

B. COORDINATION DRAWINGS

1. Prepare ¼"=1'-0" scale, or other scale as directed, floor plans and sections showing all work under this contract. Show the work of all trades, including General Construction, Structural, HVAC, Plumbing, Fire-Protection, and Electrical work on separate layers. Cooperate with other Contractors in the preparation of Coordination drawings. Bring to the Engineer's attention all obstacles and interferences for resolution; adjust location of systems, materials and equipment as directed by the Designer to accommodate obstacles and interferences.
2. Prepare coordination drawings in a timely manner, and so as not to delay the project.

1.9 RECORD DRAWINGS

A. This Contractor shall prepare record drawings of the completed work of this Contract.

B. Refer to Division 1 for requirements for the preparation and submission of Record Drawings.

1.10 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Operation instruction: after all systems have been completely installed and satisfactorily tested, instruct the Owner's representative on the operation of all systems and equipment that are part of this Contract. Instruction shall be a "hands on" session, whereby the Contractor physically demonstrates the proper operation of all items of equipment. Provide written instructions for the Owner's use prior to the time of instruction, and amend same where required. Include sufficient time to permit the Owner to master the operation of all systems.

B. Provide two (2) bound sets of maintenance manuals covering all systems installed under this contract. Manuals shall adhere to the following requirements:

1. Bound in three-ring binders.
2. Cover sheet to include Project title, Contractors name, contact person, contact information, name and contact information of all factory equipment representatives.
3. Table of contents; tabulated section for each major system.
4. Operations instructions for each major system.
5. Include the following for each item of equipment furnished under this contract:
   a. Maintenance instructions
   b. Manufacturer's data sheets
   c. Recommended spare parts inventory
   d. Wiring diagrams
6. Preventative maintenance schedule
7. Record drawings

1.11 ROUGHING IN

A. Rough in all equipment, fixtures, switchboards, panels, boxes, conduit prior to the installation of covering wall, ceiling and floor finishes.

B. Arrange for all required inspections and testing of concealed work prior to installation of covering wall, ceiling and floor finishes.

C. Where work is to be installed in existing wall and ceiling cavities, carefully cut open walls, ceilings, floors, taking care to preserve the structural integrity of same. Provide new lintels and other structural supports and reinforcement. Install and secure new work with these cavities, and restore ceiling, wall and floor assemblies and finishes to match existing.

D. Where work is to be installed in new chases, coordinate location of all openings and install new work plumb and perpendicular.

1.12 CUTTING AND PATCHING

A. Provide cutting and patching for all work under this Contract.

1.13 CONCEALMENT

A. Conceal all raceways, wiring, and cables above ceilings and within walls, below slabs, and elsewhere through the building, except in unfinished spaces. Where a conflict exists that renders concealment impossible, notify the Designer before starting the work and install as directed.

1.14 FIRE-STOPPING

A. Refer to Division 7, Section Firestopping. Where the provisions contained in Division 7 Section Firestopping conflict with the requirements contained herein, the more stringent shall apply.

B. Where Division 7 Section Firestopping is not included, the provisions contained herein shall apply.

C. Provide materials and products listed by an independent testing laboratory for Through-Penetration Fire Stop Systems, to meet requirements of Fire Tests of Through Penetrations Fire-Stops, ASTM E814.

D. Provide fire stop system at all locations where piping, tubing, conduit, cables, ductwork, and similar items pass through or penetrate any fire rated wall or floor assembly. Where fire ratings of wall and floor assemblies are not indicated on the drawings, Contractor is to assume that all floor and wall assembles are two (2) hour fire rated assemblies.

1.15 ACCESS DOORS AND PANELS

A. Provide access doors for all recessed junction boxes, controls, and for all other items of equipment that require access.

B. Access doors used shall be specifically designed for the material composing the wall or ceiling where installed.

C. Unless otherwise indicated, access doors shall be prime painted steel, minimum 14 gauge frame and panel, except where used in toilet rooms, kitchens and showers, where they shall be 16 gauge frame and panel stainless steel. Unless otherwise indicated, hinges shall be piano hinge style.

D. Access doors used in fire rated walls, partitions and ceilings shall be Underwriters Laboratories 1-1/2 hour class B fire rated.

E. Locks shall be screwdriver type, unless otherwise indicated.

F. Access doors shall be securely attached to the wall, ceiling, or framing material, and installed in complete conformance to manufacturer's installation instructions.

G. The contractor shall coordinate the location of all access doors to permit unrestricted access to the equipment to be accessed. Where multiple items of equipment in the same vicinity can be grouped together, provide access panels of proper size to permit unrestricted access to all such items. The Contractor shall incorporate access panel locations into the preparation of Coordination Drawings, and shall adjust specific quantities and locations of access panels to permit access all items of equipment which require access.

H. Access doors as manufactured by Milcor, or approved equivalent.

1.16 EQUIPMENT INSTALLATION

A. Install all equipment in compliance with manufacturer's instructions and the Contract Documents. Notify the Owner where manufacturer's instructions differ from the Contract Documents for resolution.

B. Lay out equipment to provide access to all components requiring maintenance. Provide clearances as required by applicable codes and standards, as well as manufacturer's recommendations, and good practice.

C. Lay out equipment so as to provide adequate removal clearance for coils, tubes, fan assemblies, and similar components.

D. Equipment shall be plumb and level, and secured to supporting structures as specified, recommended by manufacturer, and as dictated by good practice.

1.17 EQUIPMENT SUPPORTS

A. Provide supporting structures for all electrical equipment.

B. Equipment support frames:
1. Provide steel support frames for all equipment under this Contract that is to be installed on walls, or on floor standing frames including: panelboards, motor starters, disconnect switches, transfer switches, control panels, current transformer cabinets, meter channels, and similar equipment.
2. Use galvanized structural steel channels and steel angles, bolted construction.
3. Provide ¼" steel plate at each vertical floor support, anchor bolted to floor; anchor top of each vertical support to structure above.
4. Provide diagonal bracing to restrain deflection in the three perpendicular axes.
5. Attach equipment to frame using approved fasteners and vibration isolating mounting hardware.
6. For transformers and similar suspended equipment, use horizontal frames of steel angle or channels, suspended from above from four points with threaded rods, forged steel turnbuckles and associated hardware for suspended items such as transformers, and similar equipment as approved by the Designer. Provide lateral sway bracing anchored to structure for each orthogonal axis. Use steel angles or channels for this purpose.
   a. Threaded rod schedule, total weight suspended based on minimum four (4) rods:

	Weight	Rod Diameter (4 rods required to support Weight)
1)	0-300 lbs.	3/8"
2)	301-585 lbs.	½"
3)	586-900 lbs.	5/8"
4)	901-1350 lbs.	¾"
5)	1351-2500 lbs.	1"
6)	¼" dia. rod is not permitted	

1.18 START-UP AND TESTING

A. Engage the services of a qualified factory representative for all manufactured equipment to assist in the start-up of all systems and equipment installed under this Contract.

B. Test all systems, equipment, components, and controls installed under this Contract.

C. Test all related accessories installed under this Contract.

D. Testing requirements are contained in Division 26 specifications for each specific equipment, component, and material type.

E. Correct all deficient items detected and re-test until results are satisfactory.

F. Upon completion of testing, submit a comprehensive written test report to the Owner for review and approval.

1.19 EXISTING CONDITIONS

A. Inspect the existing premises where the work is performed prior to submitting a proposal to perform the work. Note all instances where interferences and/or obstacles will affect the layout of the work.

1.20 IDENTIFICATION

A. Identify all equipment, fixtures, panels, starters, disconnects, wiring devices, and controls with permanent, marking system as specified.

1.21 PAINTING

A. All painting shall consist of one prime and two finish color coats of non-lead oil base paint, unless otherwise indicated. Provide heat resistant paint where temperatures exceed 200 deg F. Provide Pittsburgh Paint Co. "Galvanized Iron Primer" for all galvanized surfaces. Clean all surfaces to be painted thoroughly before painting. Paint color for piping shall conform to Owner's requirements. Paint shall be as manufactured by Sherwin Williams, Pratt and Lambert, or approved equivalent.

B. Touch up all factory painted equipment where surface has been scratched or where paint finish is otherwise damaged.

1.22 CLEANING

A. Keep the job site and premises clean at all times.

B. Contractor shall maintain all installed work clean throughout the duration of the project.
   1. Remove debris, dirt, grease, paint, plaster, etc. from all equipment and materials installed.
   2. Restore original finish of any equipment and materials damaged during construction.

1.23 LICENSING

A. Contractor shall maintain all required licenses to perform the work of his respective trade in the locality where the project is constructed.

B. All electrical work shall be performed under the supervision of a licensed electrician.

1.24 PERMITS

A. Apply for all required permits associated with the work of this Contract and pay the cost of all associated permitting fees.

B. Electrical Inspection: Arrange to have the completed electrical installation inspected by an approved Electrical Inspector; pay all fees.

1.25 BALANCING

A. Balance loads on all panelboards by re-arranging circuits on phases or legs as required to achieve load balance within 5% among phases.

1.26 GROUNDING

A. Ground all equipment, devices, raceways per National Electrical Code.

B. Refer to Specification Section Grounding for requirements.

PART 2 - PRODUCTS – not used

PART 3 - EXECUTION – not used

END OF SECTION 260200

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

A. VFC: Variable-frequency controller.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: Indicate type, use, location, and termination locations.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Cerro Wire LLC.
2. General Cable Technologies Corporation.
3. Southwire Company.

B. 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.

C. Conductor and Cable Mar king: Comply with wire and cable marking according to UL's "W ire and Cable Marking and Application Guide."

D. Comply with UL 1277, UL 1685, and NFPA 70 for Type TC-ER cable used in VFC circuits.

E. Conductors: Copper, complying with NEMA WC 70/ICEA S-95-658.
   1. Conductor Insulatio n: Com ply wit h NEMA WC 70/ICEA S-95-658 for Type THHN/THWN-2.

2.2 CONNECTORS AND SPLICES

A. Manufacturers: Subject to co mpliance with requi rements, avail able m anufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   1. 3M Electrical Products.
   2. Hubbell Power Systems, Inc.

B. Description: Factory-fabricated connectors and sp lices of size, am pacity rating, m aterial, type, and class for application a nd service indicated; lis ted and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Feeders: Copper for feeders sm aller than No. 4 AW G; copper or alum inum for feeders No. 4 AWG and larger. Conduc tors shall be solid fo r No. 10 AWG and sm aller; stranded for No. 8 AWG and larger.

C. Branch Circuits: Copper. Solid f or No. 12 AWG an d smaller; stranded for No . 10 AWG a nd larger.

3.2 CONDUCTOR INSUL ATION AND M ULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.

B. Feeders Concealed in Ceilings, Walls, Partiti ons, and Crawlspaces: Ty pe THHN/THWN-2, single conductors in raceway.

C. Feeders Concealed i n Concrete, below Slabs-on-Grade, an d Underground: Type THHN/THWN-2, single conductors in raceway.

D. Exposed Branch Circuits: Type THHN/THWN-2, single conductors in raceway.

E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.

F. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Perform each of the following visual and electrical tests:

a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
b. Test bolted connections for high resistance using one of the following:

1) A low-resistance ohmmeter.
2) Calibrated torque wrench.
3) Thermographic survey.

c. Inspect compression applied connectors for correct cable match and indentation.
d. Inspect for correct identification.
e. Inspect cable jacket and condition.
f. Insulation-resistance test on each conductor with respect to ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.
g. Continuity test on each conductor and cable.
h. Uniform resistance of parallel conductors.

B. Cables will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes grounding and bonding systems and equipment.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Certified by NETA.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Burndy; Part of Hubbell Electrical Systems.
2. ERICO International Corporation.
3. ILSCO.
4. Thomas & Betts Corporation; A Member of the ABB Group.

2.2 SYSTEM DESCRIPTION

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. Comply with UL 467 for grounding and bonding materials and equipment.

2.3 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.

2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

C. Conduit Hubs: Mechanical type, terminal with threaded hub.

D. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

E. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.

F. Straps: Solid copper, copper lugs. Rated for 600 A.

G. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.

H. Water Pipe Clamps:

1. Mechanical type, two pieces with stainless-steel bolts.

a. Material: Tin-plated aluminum
b. Listed for direct burial.

2.5 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

3.3 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Receptacle circuits.
3. Single-phase motor and appliance branch circuits.
4. Three-phase motor and appliance branch circuits.
5. Flexible raceway runs.

C. Water Heater: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

D. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

3.4 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

2. For grounding electrode system, install at least two rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.

   a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
   b. Perform tests by fall-of-potential method according to IEEE 81.

C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Hangers and supports for electrical equipment and systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

a. Hangers.
b. Steel slotted support systems.
c. Trapeze hangers.
d. Clamps.
e. Brackets.

2. Include rated capacities and furnished specialties and accessories.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Allied Tube & Conduit; a part of Atkore International.
b. B-line, an Eaton business.
c. ERICO International Corporation.

d. Thomas & Betts Corporation; A Member of the ABB Group.
e. Unistrut; Part of Atkore International.

2. Material: Stainless Steel, Type 304.

3. Channel Width: 1-5/8 inches.
4. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
5. Channel Dimensions: Selected for applicable load criteria.

B. Conduit and Cable Support Devices: Stainless-steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1) B-line, an Eaton business.
2) Empire Tool and Manufacturing Co., Inc.
3) Hilti, Inc.
4) MKT Fastening, LLC.

2. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.

3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
5. Toggle Bolts: Stainless-steel springhead type.
6. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems unless requirements in this Section are stricter.

B. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for RMCs as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slottedsupport system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with single-bolt conduit clamps.

E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA 1, RMCs may be supported by openings through structure members, according to NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
6. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Touchup: Comply with requirements in Section 099600 "High-Performance Coatings" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Boxes, enclosures, and cabinets.

1.3 DEFINITIONS

A. GRC: Galvanized rigid steel conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, hinged-cover enclosures, and cabinets.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Electri-Flex Company.

2. O-Z/Gedney; a brand of Emerson Industrial Automation.
3. Southwire Company.

B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.

1. Comply with NEMA RN 1.
2. Coating Thickness: 0.040 inch, minimum.

E. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

F. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.

2. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

G. Joint Compound for GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Anamet Electrical, Inc.
2. CertainTeed Corporation.
3. Kraloy.

B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. RNC: Type EPC-80-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

2.3 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Crouse-Hinds, an Eaton business.
2. EGS/Appleton Electric.
3. O-Z/Gedney; a brand of Emerson Industrial Automation.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

E. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

F. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

G. Gangable boxes are prohibited.

H. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 3R or Type 4 based on location with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC.
2. Concealed Conduit, Aboveground: GRC.
3. Underground Conduit: RNC, Type EPC-80-PVC, direct buried.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed in washbay PVC coated GRC.
2. Exposed in mechanical room GRC.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

G. Support conduit within 12 inches of enclosures to which attached.

H. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-footintervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Engineer for each specific location.

I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

J. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

K. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

L. 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 bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

M. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

N. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

O. 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.

P. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

Q. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

R. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where otherwise required by NFPA 70.

S. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

T. Expansion-Joint Fittings:

1. Install in each run of aboveground RMC conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

   a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
   b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
   c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.

4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

U. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit forequipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in all locations.

V. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

W. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

X. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

Y. Locate boxes so that cover or plate will not span different building finishes.

Z. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

AA. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Section 312000 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.

5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
    b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

6. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits but a minimum of 6 inches below grade. Align planks along centerline of conduit.
7. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 262416 - PANELBOARDS

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. Lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS

A. ATS: Acceptance testing specification.

B. GFCI: Ground-fault circuit interrupter.

C. GFEP: Ground-fault equipment protection.

D. MCCB: Molded-case circuit breaker.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

   1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
   2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

   1. Include dimensioned plans, elevations, sections, and details.
   2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
   3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
   4. Detail bus configuration, current, and voltage ratings.
   5. Short-circuit current rating of panelboards and overcurrent protective devices.
   6. Include evidence of NRTL listing for series rating of installed devices.
   7. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

1.5 INFORMATIONAL SUBMITTALS

A. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. Include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Keys: Two spares for each type of panelboard cabinet lock.
2. Circuit Breakers Including GFCI and GFEP Types: Two spares for each panelboard.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: ISO 9001 or 9002 certified.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Handle and prepare panelboards for installation according to NEMA PB 1.

1.10 FIELD CONDITIONS

A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of electric service.
2. Do not proceed with interruption of electric service without Owner's written permission.
3. Comply with NFPA 70E.

1.11 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS COMMON REQUIREMENTS

A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NEMA PB 1.

E. Comply with NFPA 70.

F. Enclosures: Flush-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.
   a. Mechanical room Areas: NEMA 250, Type 4.

2. Height: 84 inches maximum.
3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.
5. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.

G. Incoming Mains:

1. Location: Convertible between top and bottom.
2. Main Breaker: Main lug interiors up to 400 amperes shall be field convertible to main breaker.

H. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.

   a. Plating shall run entire length of bus.
   b. Bus shall be fully rated the entire length.

2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.
5. Split Bus: Vertical buses divided into individual vertical sections.

I. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Terminations shall allow use of 75 deg C rated conductors without derating.
3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
4. Main and Neutral Lugs: Compression type, with a lug on the neutral bar for each pole in the panelboard.
5. Ground Lugs and Bus-Configured Terminators: Compression type, with a lug on the bar for each pole in the panelboard.

J. Future Devices: Panelboards or load centers shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

1. Percentage of Future Space Capacity: 20 percent.

K. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

1. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.

2.2 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Eaton.
2. General Electric Company; GE Energy Management - Electrical Distribution.
3. Square D; by Schneider Electric.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: Circuit breaker or lugs only.

D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Door-in-door construction with concealed hinges; secured with multipoint latch with tumbler lock; keyed alike. Outer door shall permit full access to the panel interior. Inner door shall permit access to breaker operating handles and labeling, but current carrying terminals and bus shall remain concealed.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Eaton
2. General Electric Company; GE Energy Management - Electrical Distribution
3. Square D; by Schneider Electric

B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers:

a. Inverse time-current element for low-level overloads.
b. Instantaneous magnetic trip element for short circuits.
c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
4. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).
5. MCCB Features and Accessories:

a. Standard frame sizes, trip ratings, and number of poles.
b. Breaker handle indicates tripped status.
c. UL listed for reverse connection without restrictive line or load ratings.
d. Lugs: Compression style, suitable for number, size, trip ratings, and conductor materials.
e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
f. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
g. Multipole units enclosed in a single housing with a single handle or factory assembled to operate as a single unit.
h. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
i. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

2.4 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Directory card inside panelboard door, mounted in metal frame with transparent protective cover.

1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.

B. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.

D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Comply with NECA 1.

C. Install panelboards and accessories according to NEMA PB 1.1.

D. Equipment Mounting:
1. Attach panelboard to the vertical finished or structural surface behind the panelboard.

E. Mount top of trim 72 inches above finished floor unless otherwise indicated.

F. Mount panelboard cabinet plumb and rigid without distortion of box.

G. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

H. Mount surface-mounted panelboards to steel slotted supports 5/8 inch in depth. Orient steel slotted supports vertically.

I. Install overcurrent protective devices and controllers not already factory installed.
   1. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.

J. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

K. Install filler plates in unused spaces.

L. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:

   1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
   2. Test continuity of each circuit.

B. Tests and Inspections:

   1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA ATS, Paragraph 7.6 Circuit Breakers. Perform optional tests. Certify compliance with test parameters.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
   3. Perform the following infrared scan tests and inspections and prepare reports:

      a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
      b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
      c. Instruments and Equipment:

1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

C. Panelboards will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes. Prior to making circuit changes to achieve load balancing, inform Engineer of effect on phase color coding.

1. Measure loads during period of normal facility operations.
2. Perform circuit changes to achieve load balancing outside normal facility operation schedule or at times directed by the Engineer. Avoid disrupting services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After changing circuits to achieve load balancing, recheck loads during normal facility operations. Record load readings before and after changing circuits to achieve load balancing.
4. Tolerance: Maximum difference between phase loads, within a panelboard, shall not exceed 20 percent.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Straight-blade convenience, receptacles.
2. GFCI receptacles.
3. Twist-locking receptacles.
4. Cord and plug sets.
5. Toggle switches.
6. Wall plates.

1.3 DEFINITIONS

A. Abbreviations of Manufacturers' Names:

1. Cooper: Cooper Wiring Devices; Division of Cooper Industries, Inc.
2. Hubbell: Hubbell Incorporated: Wiring Devices-Kellems.
3. Leviton: Leviton Mfg. Company, Inc.
4. Pass & Seymour: Pass& Seymour/Legrand.

B. EMI: Electromagnetic interference.

C. GFCI: Ground-fault circuit interrupter.

D. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

D. Devices for Owner-Furnished Equipment:

1. Receptacles: Match plug configurations.
2. Cord and Plug Sets: Match equipment requirements.

E. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STRAIGHT-BLADE RECEPTACLES

A. Duplex Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Eaton (Arrow Hart).
b. Hubbell Incorporated; Wiring Device-Kellems.
c. Pass & Seymour/Legrand (Pass & Seymour).

2.3 GFCI RECEPTACLES

A. General Description:

1. 125 V, 20 A, straight blade, feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Eaton (Arrow Hart).
b. Hubbell Incorporated; Wiring Device-Kellems.
c. Pass & Seymour/Legrand (Pass & Seymour).

2.4 TWIST-LOCKING RECEPTACLES

A. Twist-Lock, Single Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration L5-20R, and UL 498.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Eaton (Arrow Hart).
b. Hubbell Incorporated; Wiring Device-Kellems.
c. Pass & Seymour/Legrand (Pass & Seymour).

2. Grounding: Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2.5 CORD AND PLUG SETS

A. Description:

1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.6 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Single Pole:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1) Eaton (Arrow Hart).
2) Hubbell Incorporated; Wiring Device-Kellems.
3) Pass & Seymour/Legrand (Pass & Seymour).

2.7 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.8 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: Brown unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.

2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

3.2 IDENTIFICATION

A. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

A. Test Instruments: Use instruments that comply with UL 1436.

B. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

C. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

D. Wiring device will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION 262726

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Molded-case circuit breakers (MCCBs).
4. Enclosures.

1.3 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.

B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals.

1. Include the following:

a. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: One year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

D. Comply with NFPA 70.

2.2 FUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Eaton.
2. General Electric Company.
3. Square D; by Schneider Electric.

B. Type HD, Heavy Duty:

1. Single throw.
2. Three pole.
3. 600-V ac.
4. 200 A and smaller.
5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses.
6. Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.3 NONFUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Eaton.
2. General Electric Company.
3. Square D; by Schneider Electric.

B. Type HD, Heavy Duty, Three Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.

2.4 MOLDED-CASE CIRCUIT BREAKERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Eaton.
2. General Electric Company.
3. Square D; by Schneider Electric.

B. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.

C. 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.

D. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be 100 percent rated. Circuit breaker/circuit breaker combinations for series connected interrupting ratings shall be listed by UL as recognized component combinations. Any series rated combination used shall be marked on the end-use equipment along with the statement "Caution - Series Rated System. _____ Amps Available. Identical Replacement Component Required."

E. MCCBs shall be equipped with a device for locking in the isolated position.

F. Lugs shall be suitable for 194 deg F rated wire, sized according to the 167 deg F temperature rating in NFPA 70.

G. Standards: Comply with UL 489 and NEMA AB 3, with interrupting capacity to comply with available fault currents.

H. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

I. Ground-Fault Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).

J. Ground-Fault Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).

K. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
3. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.

2.5 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

B. Enclosure Finish: The enclosure shall be finished with a brush finish on Type 304 stainless steel (NEMA 250 Type 4-4X stainless steel).

C. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 Types 7 and 9 enclosures shall be provided with threaded conduit openings in both endwalls.

D. Operating Mechanism: The circuit-breaker operating handle shall be externally operable with the operating mechanism being an integral part of the box, not the cover. The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

E. Enclosures designated as NEMA 250 Type 4, 4X stainless steel, 12, or 12K shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.

F. NEMA 250 Type 7/9 enclosures shall be furnished with a breather and drain kit to allow their use in outdoor and wet location applications.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

3.2 PREPARATION

A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Owner no fewer than seven days in advance of proposed interruption of electric service.

2. Indicate method of providing temporary electric service.
3. Do not proceed with interruption of electric service without Owner's written permission.
4. Comply with NFPA 70E.

3.3 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.

1. Wash Bay: NEMA 250, Type 4X.
2. Mechanical Room: NEMA 250, Type 4.

3.4 INSTALLATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

C. Install fuses in fusible devices.

D. Comply with NFPA 70 and NECA 1.

3.5 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.

B. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections for Switches:

1. Visual and Mechanical Inspection:

a. Inspect physical and mechanical condition.
b. Inspect anchorage, alignment, grounding, and clearances.
c. Verify that the unit is clean.
d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
e. Verify that fuse sizes and types match the Specifications and Drawings.
f. Verify that each fuse has adequate mechanical support and contact integrity.

g. Inspect bolted electrical connections for high resistance using one of the two following methods:

1) Use a low-resistance ohmmeter.

a) Compare bolted connection resistance values to 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 in accordance with manufacturer's published data or NETA ATS Table 100.12.

a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
i. Verify correct phase barrier installation.
j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

2. Electrical Tests:

a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
b. Measure contact resistance across each switchblade fuseholder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
e. Perform ground fault test according to NETA ATS 7.14 "Ground Fault Protection Systems, Low-Voltage."

C. Tests and Inspections for Molded Case Circuit Breakers:

1. Visual and Mechanical Inspection:

a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
b. Inspect physical and mechanical condition.

c. Inspect anchorage, alignment, grounding, and clearances.
d. Verify that the unit is clean.
e. Operate the circuit breaker to ensure smooth operation.
f. Inspect bolted electrical connections for high resistance using one of the two following methods:

1) Use a low-resistance ohmmeter.

a) Compare bolted connection resistance values to 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 in accordance with manufacturer's published data or NETA ATS Table 100.12.

a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

g. Inspect operating mechanism, contacts, and chutes in unsealed units.
h. Perform adjustments for final protective device settings in accordance with the coordination study.

2. Electrical Tests:

a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
b. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
c. Perform a contact/pole resistance test. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
d. Perform insulation resistance tests on all control wiring with respect to ground. Applied potential shall be 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable. Test duration shall be one minute. For units with solid state components, follow manufacturer's recommendation. Insulation resistance values shall be no less than two megohms.

e. Test functionality of the trip unit by means of primary current injection. Pickup values and trip characteristics shall be as specified and within manufacturer's published tolerances.

f. Perform minimum pickup voltage tests on shunt trip and close coils in accordance with manufacturer's published data. Minimum pickup voltage of the shunt trip and close coils shall be as indicated by manufacturer.
g. Verify correct operation of auxiliary features such as trip and pickup indicators; electrical close and trip operation; trip-free, anti-pump function; and trip unit battery condition. Reset all trip logs and indicators. Investigate units that do not function as designed.
h. Verify operation of charging mechanism. Investigate units that do not function as designed.

3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

1. Test procedures used.
2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
3. List deficiencies detected, remedial action taken, and observations after remedial action.

3.7 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 262816

SECTION 262913 - ENCLOSED CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes the following enclosed controllers rated 600 V and less:

1. Full-voltage manual.
2. Full-voltage magnetic.
3. Reduced-voltage solid state.

1.3 DEFINITIONS

A. CPT: Control power transformer.

B. MCCB: Molded-case circuit breaker.

C. MCP: Motor circuit protector.

D. N.C.: Normally closed.

E. N.O.: Normally open.

F. OCPD: Overcurrent protective device.

G. SCR: Silicon-controlled rectifier.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of enclosed controller. Include manufacturer's technical data on features, performance, electrical characteristics, ratings, and enclosure types and finishes.

B. Shop Drawings: For each enclosed controller. Include dimensioned plans, elevations, sections, details, and required clearances and service spaces around controller enclosures.

1. Show tabulations of the following:

a. Each installed unit's type and details.
b. Factory-installed devices.

c. Nameplate legends.
d. Short-circuit current rating of integrated unit.
e. Listed and labeled for integrated short-circuit current (withstand) rating of OCPDs in combination controllers by an NRTL acceptable to authorities having jurisdiction.
f. Features, characteristics, ratings, and factory settings of individual OCPDs in combination controllers.

2. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Field quality-control reports.

C. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed, and arrange to demonstrate that switch settings for motor running overload protection suit actual motors to be protected.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed controllers to include in emergency, operation, and maintenance manuals. Include the following:

1. Routine maintenance requirements for enclosed controllers and installed components.
2. Manufacturer's written instructions for testing and adjusting circuit breaker and MCP trip settings.
3. Manufacturer's written instructions for setting field-adjustable overload relays.
4. Manufacturer's written instructions for testing, adjusting, and reprogramming reduced-voltage solid-state controllers.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

B. 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.

C. Comply with NFPA 70.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store enclosed controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect enclosed controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.

B. If stored in areas subject to weather, cover enclosed controllers to protect them from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside controllers.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
2. Altitude: Not exceeding 6600 feet.

B. Interruption of Existing Electrical Systems: Do not interrupt electrical systems in facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of electrical systems.
2. Indicate method of providing temporary utilities.
3. Do not proceed with interruption of electrical systems without Owner's written permission.
4. Comply with NFPA 70E.

1.10 COORDINATION

A. Coordinate layout and installation of enclosed controllers with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 FULL-VOLTAGE CONTROLLERS

A. General Requirements for Full-Voltage Controllers: Comply with NEMA ICS 2, general purpose, Class A.

B. Motor-Starting Switches: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off or on.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Eaton.
   b. Rockwell Automation, Inc.
   c. Square D; by Schneider Electric.

2. Configuration: Nonreversing.
3. Surface mounting.
4. Red pilot light.

C. Fractional Horsepower Manual Controllers: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off, on, or tripped.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Eaton.
   b. Rockwell Automation, Inc.
   c. Square D; by Schneider Electric.

2. Configuration: Nonreversing.
3. Overload Relays: Inverse-time-current characteristics; NEMA ICS 2, Class 10 tripping characteristics; heaters matched to nameplate full-load current of actual protected motor; external reset push button; bimetallic type.
4. Surface mounting.
5. Red pilot light.

D. Magnetic Controllers: Full voltage, across the line, electrically held.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Eaton.
   b. Rockwell Automation, Inc.
   c. Square D; by Schneider Electric.

2. Configuration: Nonreversing.

3. Contactor Coils: Pressure-encapsulated type.

   a. Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.

4. Power Contacts: Totally enclosed, double-break, silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.

5. Control Circuits: 120-V ac; obtained from integral CPT, with primary and secondary fuses, with CPT of sufficient capacity to operate integral devices and remotely located pilot, indicating, and control devices.

    a. CPT Spare Capacity: 50 VA.

6. Bimetallic Overload Relays:

    a. Inverse-time-current characteristic.
    b. Class 10 tripping characteristic.
    c. Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
    d. Ambient compensated.
    e. Automatic resetting.

7. Solid-State Overload Relay:

    a. Switch or dial selectable for motor running overload protection.
    b. Sensors in each phase.
    c. Class 10/20 selectable tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
    d. Class II ground-fault protection, with start and run delays to prevent nuisance trip on starting.
    e. Analog communication module.

8. N.C., isolated overload alarm contact.
9. External overload reset push button.

E. Combination Magnetic Controller: Factory-assembled combination of magnetic controller, OCPD, and disconnecting means.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Eaton.
    b. Rockwell Automation, Inc.
    c. Square D; by Schneider Electric.

2. Fusible Disconnecting Means:

    a. NEMA KS 1, heavy-duty, horsepower-rated, fusible switch with clips or bolt pads to accommodate Class R fuses.
    b. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.

3. Auxiliary Contacts: N.O./N.C., arranged to activate before switch blades open.
4. Nonfusible Disconnecting Means:

    a. NEMA KS 1, heavy-duty, horsepower-rated, nonfusible switch.

b. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
c. Auxiliary Contacts: N.O./N.C., arranged to activate before switch blades open.

5. MCP Disconnecting Means:

a. UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents, instantaneous-only circuit breaker with front-mounted, field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
b. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
c. Auxiliary contacts "a" and "b" arranged to activate with MCP handle.
d. N.O. alarm contact that operates only when MCP has tripped.
e. Current-limiting module to increase controller short-circuit current (withstand) rating to 100 kA.

6. MCCB Disconnecting Means:

a. UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents; thermal-magnetic MCCB, with inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.
b. Front-mounted, adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
c. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
d. Auxiliary contacts "a" and "b" arranged to activate with MCCB handle.
e. N.O. alarm contact that operates only when MCCB has tripped.

2.2 REDUCED-VOLTAGE SOLID-STATE CONTROLLERS

A. General Requirements for Reduced-Voltage Solid-State Controllers: Comply with UL 508.

B. Reduced-Voltage Solid-State Controllers: An integrated unit with power SCRs, heat sink, microprocessor logic board, door-mounted digital display and keypad, bypass contactor, and overload relay; suitable for use with NEMA MG 1, Design B, polyphase, medium induction motors.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Eaton.
b. Rockwell Automation, Inc.
c. Square D; by Schneider Electric.

2. Configuration: Standard duty;.

3. Starting Mode: field selectable.

4. Stopping Mode: field selectable.
5. Shorting (Bypass) Contactor: Operates automatically when full voltage is applied to motor, and bypasses the SCRs. Solid-state controller protective features shall remain active when the shorting contactor is in the bypass mode.
6. Shorting and Input Isolation Contactor Coils: Pressure-encapsulated type; manufacturer's standard operating voltage, matching control power or line voltage, depending on contactor size and line-voltage rating.
7. Logic Board: Identical for all ampere ratings and voltage classes, with environmental protective coating.
8. Control Circuits: 120-V ac; obtained from integral CPT, with primary and secondary fuses.

    a. CPT Spare Capacity: 100 VA.

9. Adjustable acceleration-rate control using voltage or current ramp, and adjustable starting torque control with up to 400 percent current limitation for 20 seconds.
10. SCR bridge shall consist of at least two SCRs per phase, providing stable and smooth acceleration with external feedback from the motor or driven equipment.
11. Keypad, front accessible; for programming the controller parameters, functions, and features; shall be manufacturer's standard and include not less than the following functions:

    a. Adjusting motor full-load amperes, as a percentage of the controller's rating.
    b. Adjusting current limitation on starting, as a percentage of the motor full-load current rating.
    c. Adjusting linear acceleration and deceleration ramps, in seconds.
    d. Initial torque, as a percentage of the nominal motor torque.
    e. Adjusting torque limit, as a percentage of the nominal motor torque.
    f. Adjusting maximum start time, in seconds.
    g. Adjusting voltage boost, as a percentage of the nominal supply voltage.
    h. Selecting stopping mode, and adjusting parameters.
    i. Selecting motor thermal overload protection class between 5 and 30.
    j. Activating and de-activating protection modes.
    k. Selecting or activating communication modes.

12. Digital display, front accessible; for showing motor, controller, and fault status; shall be manufacturer's standard and include not less than the following:

    a. Controller Condition: Ready, starting, running, stopping.
    b. Motor Condition: Amperes, voltage, power factor, power, and thermal state.
    c. Fault Conditions: Controller thermal fault, motor overload alarm and trip, motor underload, overcurrent, shorted SCRs, line or phase loss, phase reversal, and line frequency over or under normal.
    d. .

13. Controller Diagnostics and Protection:

    a. Microprocessor-based thermal protection system for monitoring SCR and motor thermal characteristics, and providing controller overtemperature and motor-overload alarm and trip; settings selectable via the keypad.
    b. Protection from line-side reverse phasing; line-side and motor-side phase loss; motor jam, stall, and underload conditions; and line frequency over or under normal.

c. Input isolation contactor that opens when the controller diagnostics detect a faulted solid-state component or when the motor is stopped.
d. Shunt trip that opens the disconnecting means when the controller diagnostics detect a faulted solid-state component.

14. Remote Output Features:

a. All outputs prewired to terminal blocks.
b. Form C status contacts that change state when controller is running.
c. Form C alarm contacts that change state when a fault condition occurs.

15. Optional Features:

a. Analog output for field-selectable assignment of motor operating characteristics; 0 to 10-V dc.
b. Additional field-assignable Form C contacts, as indicated, for alarm outputs.
c. Surge suppressors in solid-state power circuits providing three-phase protection against damage from supply voltage surges 10 percent or more above nominal line voltage.

d. Solid-State Overload Relay:

1) Switch or dial selectable for motor running overload protection.
2) Sensors in each phase.
3) Class 10/20 selectable tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
4) Class II ground-fault protection, with start and run delays to prevent nuisance trip on starting.
5) Analog communication module.

e. N.O., isolated overload alarm contact.
f. External overload reset push button.

C. Combination Reduced-Voltage Solid-State Controller: Factory-assembled combination of reduced-voltage solid-state controller, OCPD, and disconnecting means.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Eaton.
b. Rockwell Automation, Inc.
c. Square D; by Schneider Electric.

2. Fusible Disconnecting Means:

a. NEMA KS 1, heavy-duty, horsepower-rated, fusible switch with clips or bolt pads to accommodate Class L fuses.
b. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.

c. Auxiliary Contacts: N.O./N.C., arranged to activate before switch blades open.

2.3 ENCLOSURES

A. Enclosed Controllers: NEMA ICS 6, to comply with environmental conditions at installed location.
1. Wash Bay: Type 4X.
2. Mechanical Room: Type 4.

2.4 ACCESSORIES

A. General Requirements for Control Circuit and Pilot Devices: NEMA ICS 5; factory installed in controller enclosure cover unless otherwise indicated.

1. Push Buttons, Pilot Lights, and Selector Switches: Heavy-duty, type.

a. Push Buttons: Covered types; momentary as indicated.
b. Pilot Lights: LED types; colors as indicated.

B. Reversible N.C./N.O. auxiliary contact(s).

C. Control Relays: Auxiliary and adjustable solid-state time-delay relays.

D. Phase-Failure, Phase-Reversal, and Undervoltage and Overvoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connections. Provide adjustable undervoltage, overvoltage, and time-delay settings.

E. Breather and drain assemblies, to maintain interior pressure and release condensation in Type 4 enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.

F. Sun shields installed on fronts, sides, and tops of enclosures installed outdoors and subject to direct and extended sun exposure.

G. Cover gaskets for Type 1 enclosures.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and surfaces to receive enclosed controllers, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine enclosed controllers before installation. Reject enclosed controllers that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Wall-Mounted Controllers: Install enclosed controllers on walls with tops at uniform height unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems."

B. Install fuses in each fusible-switch enclosed controller.

C. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.

D. Comply with NECA 1.

3.3 IDENTIFICATION

A. Identify enclosed controllers, components, and control wiring.

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved nameplate.
3. Label each enclosure-mounted control and pilot device.

3.4 CONTROL WIRING INSTALLATION

A. Install wiring between enclosed controllers and remote devices.

B. Bundle, train, and support wiring in enclosures.

C. Connect selector switches and other automatic-control selection devices where applicable.

1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switch is in manual-control position.
2. Connect selector switches with enclosed-controller circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed controller, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

D. Tests and Inspections:

1. Inspect controllers, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
2. Test insulation resistance for each enclosed-controller element, component, connecting motor supply, feeder, and control circuits.
3. Test continuity of each circuit.
4. Verify that voltages at controller locations are within plus or minus 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Owner before starting the motor(s).
5. Test each motor for proper phase rotation.
6. Perform each electrical test and visual and mechanical inspection stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
8. Perform the following infrared (thermographic) scan tests and inspections and prepare reports:

   a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each multi-pole enclosed controller. Remove front panels so joints and connections are accessible to portable scanner.

9. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

E. Enclosed controllers will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports including a certified report that identifies enclosed controllers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.6 ADJUSTING

A. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.

B. Adjust overload-relay heaters or settings if power factor correction capacitors are connected to the load side of the overload relays.

C. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable instantaneous trip elements. Initially adjust to six times the motor nameplate full-load ampere ratings and attempt to start motors several times, allowing for motor cooldown between starts. If

tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight 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 Owner before increasing settings.

D. Set the taps on reduced-voltage autotransformer controllers at 50 percent.

E. Set field-adjustable switches and program microprocessors for required start and stop sequences in reduced-voltage solid-state controllers.

3.7 PROTECTION

A. Replace controllers whose interiors have been exposed to water or other liquids prior to Substantial Completion.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain enclosed controllers.

END OF SECTION 262913

ITEM 627.0031 - - 25 – EARTHWORK

TAB 16-34A, D214509
Vehicle Wash Bay Installation at the Henrietta
and Batavia Maintenance Sites, MP 362.4 and 390.1

1. DESCRIPTION:

1.01 Furnish all labor, materials, equipment and services necessary to complete the work as indicated on the Contract Plans and the attached Specification Summary.

1.02 All work shall conform to the requirements specified in Part 1 – General, of the Sections listed.

2. MATERIALS:

2.01 The materials shall be as specified in Part 2 – Products, of the Sections listed.

3. CONSTRUCTION DETAILS:

3.01 The construction details shall be as specified in Part 3 – Execution, of the Sections listed.

4. METHOD OF MEASUREMENT:

4.01 This item shall be measured for payment on a lump sum basis for the work completed in accordance with the Contract Documents and as directed by the Engineer.

5. BASIS OF PAYMENT:

5.01 Payment for this item shall be made at the lump sum bid price bid. The lump sum price bid shall include cost of furnishing all labor, material, equipment and appliances necessary to complete the work as indicated on the Contract Plans and as specified herein in the Sections listed.

5.02 Detailed Estimate:

A. Before the first certificate of payment is issued for the work under this item, submit a detailed estimate of quantities and prices for all materials, labor, and other items included under this item, which shall aggregate the contract lump sum price bid for this item. Prepare the detailed estimate in the same sequence as the Sections listed.

B. The detailed estimate shall be supported by such evidence, including certified copies of subcontracts, as the Engineer may require.

C. The detailed estimate must be approved by the Engineer who may revise it as, in his/her reasonable judgment, is necessary to make the various item conform to their true values. The value of each certificate of payment will be based on the approved detailed estimate.

5.03 Monthly payments will be made for this item in proportion to the total amount of work completed.

1. SPECIFICATION SUMMARY

1.01 This item includes the following specification:

A. Section 312000 – EARTH MOVING

SECTION 312000 - EARTH MOVING

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. Excavating and filling for rough grading the Site.
2. Preparing subgrades for slabs-on-grade, walks, pavements, turf and grasses, and plants.
3. Excavating and backfilling for buildings and structures.
4. Drainage course for concrete slabs-on-grade.
5. Subbase course for concrete walks and pavements.
6. Subbase course for asphalt paving.
7. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Requirements:
1. Section 033000 "Cast-in-Place Concrete" for granular course if placed over vapor retarder and beneath the slab-on-grade.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

C. Borrow Soil: Suitable soil imported from off-site for use as fill or backfill.

D. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.

3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.

E. Fill: Soil materials used to raise existing grades.

F. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Equipment for Footing, Trench, and Pit Excavation: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch-maximum-width, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom.
2. Equipment for Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket.

G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

H. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

I. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

J. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

K. NYSDOTSS: New York State Department of Transportation Standard Specifications, Construction and Materials, Office of Engineering, May 1, 2016, including all current addenda.

1.4 SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Geotextiles.
2. Warning tapes.

B. Samples for Verification: For the following products, in sizes indicated below:

1. Geotextile: 12 by 12 inches.
2. Warning Tape: 12 inches long; of each color.

C. Qualification Data: For qualified testing agency.

D. Material Test Reports: For each borrow soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D 2487.
2. Modified Proctor Moisture Density Relationship (ASTM D-1557) 1 test per 4,000 cubic yards or no less than 1 test per each material type. A maximum/minimum density relationship (ASTM D-4253 and ASTM D-4254) may be an appropriate substitute for ASTM D-1557 depending on material gradation.
3. Moisture content (ASTM D-2216) - 1 test per 2,500 cubic yards or no less than 2 tests per each material type.
4. Grain Size Analysis (ASTM D-422) - 1 test per 2,500 cubic yards or no less than 2 tests per each material type.
5. Liquid and Plastic Limits (ASTM D-4318) 1 test per 2,500 cubic yards or no less than 2 tests per each material type. Liquid and Plastic Limit testing is necessary only if appropriate, based on material composition (i.e. clayey or silty soils).
6. These minimum frequencies are based on generally uniform material properties and placement conditions. Should material properties vary or conditions at the time of placement vary (i.e. moisture content, placement and compaction, procedures or equipment, etc.) then additional testing may be conducted by the owner.

E. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins. Contractor shall examine and verify, in the field all conditions and dimensions. If field conditions and dimensions differ from those shown on plan, the Contractor shall contact the Owner. The Contractor shall perform all work with care so that any materials which are to remain shall not be damaged. If the Contractor damages any materials which are to remain in place or which are to remain the property of the Owner, the damaged material shall be repaired or replaced in a manner satisfactory to the Owner at the Contactor's expense.

1.5 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

1.6 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient Suitable soil materials are not available from excavations.

B. Suitable Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsuitable Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.

1. Unsuitable soils also include Suitable soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; New York State Department of Transportation Standard Specifications (NYSDOTSS) Item No. 304.12, Subbase Course, Type 2. Recycled material such as Recycled Asphalt Pavement (RAP) or Recycled Portland Cement Concrete Aggregate (RPCCA) shall not be used.

E. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; New York State Department of Transportation Standard Specifications (NYSDOTSS) Course Aggregate 703-02, Table 703-4, Size Designation 1.

F. Underdrain Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; New York State Department of Transportation Standard Specifications (NYSDOTSS) Item No. 605.0901, Underdrain Filter, Type 1.

2.2 GEOTEXTILES

A. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 247 lbf; ASTM D 4632.
3. Sewn Seam Strength: 222 lbf; ASTM D 4632.
4. Tear Strength: 90 lbf; ASTM D 4533.
5. Puncture Strength: 90 lbf; ASTM D 4833.
6. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
7. Permittivity: 0.02 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.

B. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. 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.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsuitable soil materials and rock, replace with Suitable soil materials.
2. 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. 6 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.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work. Refer to Structural drawings and technical specifications for details.
2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

3.6 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches each side of pipe or conduit.

C. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.7 SUBGRADE INSPECTION

A. When excavating, if Engineer determines that unsuitable soil is present, continue excavation and replace with compacted backfill or fill material as directed.

B. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Excavate soft spots, unsuitable soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.

C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.8 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Engineer.

3.9 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations.

B. The contractor shall limit the staging of materials to the work limits indicated, as directed or defined at the Pre-Construction Meeting.

3.10 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring, bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.11 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with Suitable soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 033000 "Cast-in-Place Concrete."

D. Trenches under Roadways: Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Section 033000 "Cast-in-Place Concrete."

E. Backfill voids with Suitable soil while removing shoring and bracing.

F. Place and compact initial backfill of bedding course material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

G. Place and compact final backfill in maximum 8 inch lifts to final subgrade elevation. Use select backfill material for entire depth under roadways and pavements and Suitable soil in unpaved areas.

H. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.12 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use suitable soil material.
2. Under walks and pavements, use subbase soil material.
3. Under steps and ramps, use subbase.
4. Under building slabs, use subbase.
5. Under footings and foundations, use subbase.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.13 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise suitable soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.15 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks/Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.16 SUBBASE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place subbase course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact course under cast-in-place concrete slabs-on-grade as follows:

1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place course 6 inches or less in compacted thickness in a single layer.
3. Place course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
4. Compact each layer of course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.17 FIELD QUALITY CONTROL

A. Special Inspections: Owner may engage a qualified special inspector to perform the following special inspections:

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material classification and maximum lift thickness comply with requirements.
3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab but in no case fewer than three tests.
2. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 50 feet or less of trench length but no fewer than two tests.

D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.18 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus Suitable soil and waste materials, including unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

ITEM 697.0203--25 - FIELD CHANGE ORDER (THRUWAY)

1.0 DESCRIPTION

1.1 General. The Field Change Order (FCO) provides a contract contingency allowance for the timely payment of authorized additional work that is necessary to fulfill the intent of the plans and specifications.

1.2 Eligible Work. FCO payments shall be limited to work that is: (1) within the scope of the contract; (2) a quantity variation of existing contract pay items, or; (3) a new contract pay item introduced as a result of minor field adjustments in the details of the project. All eligible items of work shall have a known unit price, either through use of a contract bid price or through an Agreed Price.

2.0 MATERIALS. None specified.

3.0 CONSTRUCTION DETAILS. None specified.

4.0 METHOD OF MEASUREMENT

4.1 This item will be measured for payment on a dollars-cents pay unit basis.

4.2 Bid Price. The unit price shown in the proposal for this item will be considered as the price bid, and shall not be altered in any manner. Should the amount shown be altered, the new figure will be disregarded and the original bid price will be used to determine the total amount bid for the contract.

4.3 Payments. Work for which FCO payments are processed will be measured in accordance with the specifications governing the work.

5.0 BASIS OF PAYMENT

5.1 All work to be paid under the FCO item must be authorized in conformance with §104-02 – *Changes, Contingencies, Extra Work and Deductions*. Disputed work, force account work, work associated with §104-10 – *Value Engineering Change Proposals*, or payments for time related provisions are not eligible for FCO payment.

5.2 FCO payments will be determined from the quantities and unit prices of eligible work that has been completed in conformance with applicable Specifications. Work for which FCO payments are processed will be paid in accordance with the specifications governing the work.

5.3 Prior to processing the final agreement, the FCO payments will be reconciled through a final Order-on-Contract, such that the amount of FCO payments are converted to the corresponding quantities of the pertinent contract pay items. When payments are transferred to the appropriate items, the remaining amount of FCO funds will be deleted.

ITEM 699.04----25 - MOBILIZATION

1. DESCRIPTION:

1.01 Under this item the work the Contractor shall be generally compensated for expenses which are incurred before significant contract work occurs. The three (3) milestones identified by the NYSTA for successful Contractor completion of mobilization to begin this public works contract are:

a. **Start of Work:**

Provide the necessary bonds, insurance, and prefinancing.

Set up the necessary general plant, including shops, storage areas, offices for itself and the Owner's Engineer and such sanitary and other facilities as are required by local or state law or regulation, and staff the project with equipment.

b. **Schedule of Operations:**

Submit, and if necessary, revise and resubmit, a complete "Critical Path format Schedule of Operations" as described in §108-01, of the TA Addendum.

c. **Minority and Women's Business Enterprise Participation Program:**

Provide a M/WBE participation program meeting the M/WBE goals of the Contract as described in **§109-06 CONTRACT PAYMENTS** and in accordance with **§102-12 D/M/WBE UTILIZATION**.

2. MATERIALS:

2.01 Unless otherwise specified, materials required for mobilization, but not installed as part of the completed contract, shall be as determined by the Contractor, except they shall conform to any pertinent local, State or Federal laws, regulations or codes.

3. CONSTRUCTION DETAILS:

3.01 The work required to provide the above facilities, services, and equipment for mobilization shall be done in a safe and workmanlike manner and shall conform with any pertinent local, State or Federal Law, regulation or code. Good housekeeping consistent with safety and other requirements of this contract shall be maintained.

4. METHOD OF MEASUREMENT:

4.01 Payment for mobilization will be made on a lump sum basis in the next estimate after the acceptable completion of all three (3) mobilization milestones, as documented by the Engineer:

a. Milestone 1 is submission of required bonds, insurance, and refinancing.
b. Milestone 2 is acceptance of a CPM Schedule of Operations for the project in accordance with §108-01 of the TA Addendum.

ITEM 699.04----25 - MOBILIZATION

4. METHOD OF MEASUREMENT: (cont'd)

4.01 (cont'd)

c. Milestone 3 is acceptance of the Contractor's program to comply with the M/WBE goals of the Contract in accordance with **§102-12 D/M/WBE UTILIZATION**.

5. BASIS OF PAYMENT:

5.01 The amount bid for mobilization shall not exceed four percent (4%) of the total contract bid price, excluding the bid price for mobilization.

The amount bid shall constitute only general compensation for the furnishing and maintenance of the services and facilities delineated in Section 1. Description, to the extent and at the time the Contractor deems them necessary for his operations, consistent with the requirements of this work and the contract.

The amount bid shall be payable to the Contractor with the first progress estimate made for other contract work following acceptable completion of all three (3) milestones defining completion of the work of this Item. The first progress estimate shall be made after the value of contract work, excluding the value of this item, meets the requirements set forth in **§109-06 – Contract Payments**.

Payment will be made under:

ITEM NO.	DESCRIPTION	PAY UNIT
699.04 25	Mobilization	Lump Sum

SPECIAL NOTES

CONFIDENTIAL INFORMATION

1. **Confidential Information:** "Confidential Information" means any information not generally known to the public, whether oral or written, that the Authority claims is confidential and discloses to Contractor for the purposes of performing work on the Project. Confidential Information may include, but is not limited to, operational and infrastructure information relating to: bid documents, plans, drawings, specifications, reports, product information and data, business and security processes and procedures; personnel and organizational data, and financial statements; information system IP addresses, passwords, security controls, architectures and designs; and such other data, information and images that the authority deems confidential. The Authority will identify written Confidential Information by marking it with the word "Confidential" and will identify oral Confidential Information as confidential at the time of disclosure to the Contractor.

2. **Exempt Materials:** Confidential Information does not include information which, at the time of the Authority disclosure to Contractor; (a) is already in the public domain or becomes publicly known through no act of Contractor; (b) is already known by Contractor free of any confidentiality obligations; (c) is information that the Authority has approved in writing for disclosure; or (d) is required to be disclosed by Contractor pursuant to law so long as Contractor provides the Authority with notice of such disclosure requirement and an opportunity to defend prior to any such disclosure.

3. **Permitted Use:** Contractor may use Confidential Information solely for the purposes of performing work on the Project. Contractor may share Confidential Information with its employees, consultants, sub-consultants, sub-contractors, suppliers, and agents that are necessary to perform work on the Project ("Authorized Personnel"), but must ensure that such Authorized Personnel execute a Confidentiality and Non-Disclosure Agreement as set forth in the Minimum requirements for the Handling and Treatment of confidential Information. The Authority's disclosure of Confidential Information to Contractor shall not convey to Contractor any right to or interest in such Confidential Information and the Authority shall retain all right and title to such Confidential Information at all times.

4. **Protections:** Contractor shall hold Confidential Information confidential to the maximum extent permitted by law. Contractor shall safeguard Confidential Information in accordance with the Minimum Requirements for the Handling and Treatment of Confidential Information.

5. **Return of Confidential Information:** Upon the written request of the Authority, Contractor shall return all written Confidential Information to the Authority.

EXTERNAL CONNECTIONS

If in order to perform work on the Project, Contractor must make an external connection to the Authority's data communications infrastructure and/or access Authority information systems, Contractor shall in all respects comply with all Authority policies and procedures regarding such connections and information systems access and undertake whatever actions are necessary in the discretion of the Authority to ensure such compliance. Contractor shall be responsible for all costs associated with ensuring that its own network security measures comply with all Authority policies and procedures regarding external connections.

MINIMUM REQUIREMENTS FOR THE HANDLING AND TREATMENT OF CONFIDENTIAL INFORMATION

Contractor shall meet the following minimum requirements relative to project information that is identified as **CONFIDENTIAL.**

Authorized Personnel:

Contractor shall require that all authorized individuals or entities (e.g., employees, consultants, sub-consultants, sub-contractors, suppliers and agents) ("Authorized Personnel") to which it discloses **CONFIDENTIAL** information sign a Confidentiality and Nondisclosure Agreement ("Agreement"). Such Agreement shall provide that Authorized Personnel: are personally responsible at all times for protecting **CONFIDENTIAL** information that is in their possession or control; must always use proper precautions to safeguard against the unauthorized access and disclosure of **CONFIDENTIAL** information; must notify Contractor of any known or suspected instances of loss or theft of, or unauthorized access to, **CONFIDENTIAL** information; and must return all **CONFIDENTIAL** information to Contractor upon completion of the project. Contractor shall be responsible for enforcing the provisions of such Agreement through personal observation and supervision of Authorized Personnel and utilization of appropriate processes.

Contractor shall maintain a list of all Authorized Personnel which have access to **CONFIDENTIAL** information and must provide the Authority with such list upon the Authority's request. Contractor shall update such list monthly and notify the Authority of any changes in such list.

Inventory Control:

Contractor shall create and maintain an inventory of all **CONFIDENTIAL** information that it provides to Authorized Personnel. Upon completion of the project, Contractor shall check all **CONFIDENTIAL** information returned from Authorized Personnel against the inventory. Contractor shall provide a copy of the checked inventory to the Authority.

Use and Storage:

Contractor shall implement reasonable processes during normal working hours to prohibit unauthorized individuals from gaining access to **CONFIDENTIAL** information that is within the Contractor's custody and control. At times other than normal working hours, Contractor shall store **CONFIDENTIAL** information in a secure area, such as a fire-proof safe, locked desk, cabinet or other secure storage facility, where access can be controlled. Contractor shall control the access that Authorized Personnel have to **CONFIDENTIAL** information stored in such secure areas through the use of manual or automated locks and keys. Contractor shall maintain a list of Authorized Personnel who have access to such secure areas and the specific **CONFIDENTIAL** information therein.

Reproduction:

Contractor may reproduce **CONFIDENTIAL** information only to the extent necessary to carry out contract performance. Contractor must stamp/mark all **CONFIDENTIAL** information that is reproduced with the word **CONFIDENTIAL** and protect it in the same manner as the original.

Transportation:

To the extent feasible and reasonable, Contractor shall hand deliver **CONFIDENTIAL** information with instructions that only the addressee is allowed to open or view it. Contractor may send **CONFIDENTIAL** information that cannot be hand delivered via the U.S. Postal Service or express mail services (e.g., FEDEX) provided: it is packaged and sealed in a way that does not disclose its contents or the fact that it is **CONFIDENTIAL** information, and a signature from the recipient is required.

Under no circumstances shall a transportation method be used that cannot guarantee that **CONFIDENTIAL** information is accessed only by the intended recipient.

Disposal:

Contractor shall dispose of all **CONFIDENTIAL** information, regardless of its form or format, using a destruction method that prevents its unauthorized retrieval (e.g., crosscut or micro shredding, degaussing).

Loss, Theft or Unauthorized Access:

Contractor shall provide timely notice to the Authority upon discovery of any incident involving the loss or theft of, or unauthorized access to, **CONFIDENTIAL** information.

SPECIAL NOTE:
CONTROL OF MATERIALS

The Contractor's attention is directed to the TA Addendum, Section 106 – CONTROL OF MATERIAL, located elsewhere in this Proposal. The Contractor understands and agrees that some or all of the off-site inspection and approval of material such as precast concrete items, structural steel, bridge bearings, concrete structural elements and/or their components to be used on this project will be done by the New York State Department of Transportation (NYSDOT) as the Authority's agent.

The Contractor agrees to the following conditions:

1. Whenever the Contractor receives direction from the NYSDOT regarding the approval/rejection of material that direction constitutes direction by the Authority under the contract, and shall be final and accepted as such by the Contractor.

2. The Contractor will not allow off-site materials subject to inspection and approval of NYSDOT to be shipped to the project site without direct authorization from the NYSDOT.

3. At the Pre-Award Meeting or as soon as practicable, but in any case before the Pre-Construction Conference, the Contractor will provide the following information to the Thruway Authority's Director, Office of Construction Management, for transmittal to NYSDOT to arrange off-site inspections:

   A. The name and address of each Manufacturer of all materials, and portions thereof, requiring off-site quality assurance to be incorporated into this highway project.

   B. The name and address of each Fabricator fabricating each steel item or any portion thereof to be incorporated into this highway project.

   C. The name and address of each Fabricator manufacturing structural pre-cast/pre-stressed items or any portion thereof to be incorporated into this highway project.

4. The Contractor agrees that it and its Subcontractors and Suppliers will acquire all materials to be incorporated into this Thruway/Canal project **only** through Manufacturing, Batching and Fabrication facilities approved by NYSDOT.

AVAILABILITY OF ELECTRONIC BID DATA

1. SUMMARY:

The New York State Thruway Authority (NYSTA) uses Trns•port Expedite Software for electronic bidding. Expedite is a product of the American Association of State Highway and Transportation Officials (AASHTO) that is currently used by the majority of State Departments of Transportation. It is provided free of charge, and can be used on almost any Windows-compatible PC. It integrates with many existing electronic bid preparation software, and has import/export capability for use with database and spreadsheet systems. Expedite allows bidders to receive electronic proposal bid item information from the New York State Thruway Authority (NYSTA) internet web site and to produce both an electronic and a paper-based bid.

For additional information and downloads, see the NYSTA website at:
http://www.nysthruway.gov/business/contractors/expedite/index.html.

2. PARTICIPATION AND RELATIONSHIP TO PAPER DOCUMENTS:

Electronic bidding neither replaces paper bids nor forces any Contractor to bid electronically. Rather, participation is voluntary and **electronic bidders must submit paper documents that match the electronic file**. Expedite prints a check code on every bid page that must match the check code in the computer file. As the check code changes every time the electronic file is modified, matching the codes verifies that the data on the printed bid is the same as in the electronic file. **In case of discrepancy, paper bids always prevail and are the primary legal document.**

3. THIRD-PARTY SOFTWARE:

The NYSTA endorses no particular product but expects all such vendors and individuals to voluntarily keep pace with changes in NYSTA specifications.

4. PROPOSAL NOTES AND CHANGES BY AMENDMENT:

Contractors are solely responsible for recognizing and properly responding to any and all special notes and circumstances printed in the Contract Proposal and any and all changes by amendment from the amendment documents and/or notices communicated to them by the NYSTA Contracts Unit. Amendments are posted online at: http://www.thruway.ny.gov/business/contractors/documents/index.shtml. If an amendment involves changes to item bid date, an amended Expedite file will be posted to the NYSTA website, and this file must be applied to your electronic bid. However, not all amendments will involve changes to item bid data. Do not bid without carefully reviewing the printed proposal and any and all changes by amendment. Proposal notes and circumstances include, but are not limited to, printed information on alternate, fixed and/or limited cost items and/or special circumstances regarding item placement and use.

SPECIAL NOTE:

REQUIREMENTS FOR CONTRACTOR'S UTILIZATION OF AREAS OUTSIDE OF THE RIGHT-OF-WAY

1. Before the contractor can utilize any area outside of the NYS Thruway Authority or NYS Canal Corporation (NYSTA/CC) Right of Way (or outside of a temporary easement obtained for the project by the NYSTA/CC), for any work associated with this project, written approval to do so shall be obtained from the NYS Thruway Authority through the Project Engineer. The contractor's request for approval shall be in writing and the Authority shall be allowed 2 weeks to review the request and respond.

2. This requirement applies to areas such as, but not limited to: borrow areas, spoil areas, equipment and/or material storage areas, haul roads, batching areas, water points, shop areas, and all similar areas. This requirement does not apply to the Contractor's established and permanent headquarters, commercial borrow sources, commercial gravel pits, commercial quarries, and all similar areas.

3. The contractor's written request for approval shall include a letter report prepared by an Environmental Professional, acceptable to the Authority, documenting the investigation of the proposed site. The expectation is that an Environmental Professional visits the site, performs an assessment of the proposed use against all applicable environmental requirements, and then documents their findings and recommendations. The letter report shall include the following unless otherwise authorized by the Authority:

   a) A written description of the activities the contractor wishes to perform at the proposed site, including timeframes.

   b) Maps showing Federal and State regulated wetlands. The area proposed for use shall be depicted on each map.

   c) A site location map which accurately shows the area proposed for use, adjacent property boundaries/owners, the location of all wetland boundaries observed, and any required erosion and sediment control measures. If present, wetlands shall be delineated in the field by the Environmental Professional with stakes and ribbon, and wetland delineation data forms shall be completed.

   d) A written statement prepared by the Environmental Professional regarding the presence of any rare animals or plants or significant natural communities. The Environmental Professional shall use the NYSDEC Environmental Resource Mapper to make this determination. If any rare species are identified, then determine if the rare species are listed as endangered or threatened and whether the NYSDEC determines the proposed use may be harmful to the species or their habitat. If so, address to the satisfaction of the NYSDEC.

   e) A copy of the applicable SPDES permit and any local municipal permits related to use of the site.

   f) A listing of other Environmental Permits which were obtained by the Authority for the project. These are referenced in the contract proposal.

   g) A completed NYSTA Property Release form. The form is available through the Project Engineer.

   h) A plan showing all restoration work. This includes, but is not limited to, plans for grading, surface restoration details, and erosion and sediment control.

4. This requirement does not waive other provisions of the contract related to use of lands outside the Right of Way. Rather, it shall be viewed as supplementary. The following contract provisions still remain in effect:

   §107-08 Protection and Restoration of Property and Landscape, Subsection B. Outside the Right of Way
   §107-10 Managing Surplus Material and Waste

COMPLIANCE WITH SPDES REGULATIONS

The Contractor is advised that the NYS Thruway Authority has evaluated Stormwater requirements for this project and has determined that coverage is not warranted under NYS Department of Environmental Conservation's SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002). The Contractor shall read and understand the requirements of GP-0-15-002. In the event the Contractor's operations, e.g., clearing and grubbing, expanded staging area; will cause an increase in ground disturbance beyond the amount identified in the Contract Documents, coverage under GP-0-15-002 may be required. Prior to commencing these operations, the Contractor should immediately advise the Project Engineer, who will in turn discuss the request with the Project Designer and Division Environmental Specialist or Environmental Point of Contact.

- In the event coverage is required under GP-0-15-002 as a result of these operations, the Contractor will be required to prepare a Stormwater Pollution Prevention Plan (SWPPP) and submit a Notice of Intent (NOI) with the NYS Department of Environmental Conservation.

- In the event coverage is required under GP-0-15-002 as a result of changes made by the Authority/Corporation, the Authority/Corporation will be required to prepare a SWPPP and submit a NOI.

In either case, the Contractor will not be allowed to proceed until verification of coverage under GP-0-15-002 has been provided to the Project Engineer. The Contractor shall make no claim against the Authority/Corporation for delays resulting from preparing a SWPPP, filing a NOI, and seeking verification of permit coverage.

SPECIAL NOTE

DIESEL EMISSION REDUCTION ACT (DERA) REGULATORY COMPLIANCE

All Authority/Corporation Contractors are made aware that Environmental Conservation Law (ECL) 19-0323 and the New York State Department of Environmental Conservation (NYSDEC) regulation 6 NYCRR Part 248 *Use of Ultra Low Sulfur Diesel (ULSD) Fuel and Best Available Retrofit Technology (BART) for Heavy Duty Vehicles* requires retrofit of all regulated heavy duty diesel vehicles working on all State awarded contracts. Current statute sets December 31, 2015 as the date when all regulated vehicles must be retrofitted with BART. A link to NYSDEC's enforcement discretion which states the current deadline is located at: http://www.dec.ny.gov/chemical/74288.html. The New York State Thruway Authority/Canal Corporation (NYSTA/CC) and its Contractors are responsible for annual reporting.

All Authority/Corporation Contractors shall make determinations of regulatory applicability for vehicles in their inventory used on active Authority/Corporation contracts during each calendar year. These determinations shall be based on the definition of Heavy Duty Vehicle (HDV) including on and off road diesel vehicles having gross vehicle weights in excess of 8,500 pounds, excluding vehicles that are exempt as defined in 6 NYCRR 248-1.1(b)(14). Contractors shall also quantify ULSD fuel used by regulated vehicles in active contract work during the calendar year.

An electronic copy of 6 NYCRR Part 248 can be accessed at http://www.dec.ny.gov/regs/2492.html. Electronic copies of the Regulated Entity Vehicle Inventory Form and the Regulated Entity and Contractors Annual Report Form can be accessed under Part 248 – Use of Ultra Low Sulfur Diesel Fuel and Best Available Retrofit Technology for Heavy Duty Vehicles at the following link: www.dec.ny.gov/chemical/4754.html.

To allow for required reports to be submitted to NYSDEC by the regulatory deadline of November 1, each year, DERA annual reporting by Authority/Corporation Contractors shall be submitted to NYSTA/CC by October 1, of every year reporting the required information from the previous calendar year (i.e., all 2014 information to NYSTA/CC by October 1, 2015, etc.).

Electronic mail submissions can be sent to dieselreport@thruway.ny.gov

SPECIAL NOTES

GREEN CONSTRUCTION REQUIREMENTS

ULTRA LOW SULFUR DIESEL FUEL

In order to reduce diesel emissions, the Contractor shall use Ultra Low Sulfur Diesel (ULSD) fuel to operate all diesel engines used to complete the work that will operate for 10 hours or more on the contract site. ULSD fuel requirements shall apply to:

- All diesel engines/equipment.
- Stationary and mobile equipment.
- Owned, leased and rented equipment.

The hours the piece of equipment is used to complete the work is defined as the actual time the engine is running. The time may be continuous or discontinuous and includes warm-up periods idling, in traffic periods, etc.

The Contractor shall repair deficiencies when any diesel powered construction equipment is in non-compliance. When non-compliance items are identified by NYSTA/CC, the Contractor will be notified for correction within a 24-hour period.

SPECIAL NOTES

GREEN CONSTRUCTION REQUIREMENTS

CONTROLLING EXPOSURE TO DIESEL EXHAUST

The Contractor shall exercise measures to protect "Sensitive Receptors" from the impacts of diesel exhaust fumes. Sensitive Receptors include, but are not limited to: hospitals, schools, daycare facilities, building fresh air or ventilation intakes, elderly housing or convalescent facilities. The Contractor shall ensure that diesel powered engines are located away from building air conditioners and windows.

The goal is to minimize exposure of Sensitive Receptors in close proximity to diesel exhaust, in terms of both concentration and time. In general, close proximity is defined as within 15 meters of a Sensitive Receptor. Mitigation techniques include positioning stationary equipment exhausts greater than 15 meters from Sensitive Receptors, extension of equipment exhausts through the use of flexible tubing; protecting building air intakes; and the use of moving operations.

Idling time for diesel powered equipment shall be limited to three consecutive minutes for delivery and dump trucks and all other diesel powered equipment except as follows:

- When a "mobile source" (vehicle) is forced to remain motionless because of traffic conditions or mechanical difficulties over which the operator has no control.
- When it is necessary to operate a loading, unloading or processing device.
- When the outdoor temperature is less than - 3°C (27°F).
- When the "mobile source" is being repaired.

Arrow panels and portable variable message signs shall be solar powered wherever possible or practical.

Whenever possible and practicable, the Contractor shall establish staging areas for diesel powered vehicles waiting to load or unload materials at the work site. Such areas shall be located where diesel emissions have the least impact on Sensitive Receptors and the general public.

SPECIAL NOTES

GREEN CONSTRUCTION REQUIREMENTS

DUST CONTROL

The Contractor shall minimize dust from disturbed soil surfaces or other materials that can cause off-site damage, health hazards and traffic safety problems. Dusty conditions resulting from the Contractor's operations shall be corrected at no additional cost to the State. Buffer areas of vegetation should be left where practical. Water quality shall be considered when selecting materials for dust control. An approved dust palliative may be used in conformance with applicable conditions placed on its use. A list of acceptable dust palliatives is available at: www.nysdot.gov/divisions/engineering/technical-services/geotechnical-engineering-bureau/dust-palliatives .

For areas not subject to traffic, products and materials may be applied or placed on soil surfaces to prevent airborne migration of soil particles, including:

- Vegetative Cover –provides the most practical method of dust control.
- Mulch (including rolled erosion control products) –provides a fast, effective method of dust control.
- Spray Adhesives –Generally composed of polymers in a liquid or solid form mixed with water to form an emulsion that is sprayed on the soil surface. The mixing ratios and application rates will be in accordance with the manufacturer's recommendations for the specific soils on the site. Adhesives shall not be applied to wet soils or if there is a probability of precipitation within 48 hours.

For areas subject to traffic (traveling public or construction traffic) products and materials may be applied or placed on soil surfaces to prevent airborne migration of soil particles, including:

- Water Sprinkling – The site may be sprayed with water until the surface is wet. This is especially effective on haul roads and access routes.
- Polymer Additives –Polymers shall be mixed with water and applied to the driving surface using mixing ratios and application rates in accordance with the manufacturer's recommendations. No application of the polymer will be made if there is a probability of precipitation within 48 hours of its proposed use. Any polymers must be used in accordance with the NYSDEC issued "Conditions for Use" and "Application Instructions." This information can be obtained from the NYSDEC website.
- Barriers – Woven geotextiles or stone can be placed on the driving surface to effectively reduce dust throw and particle migration on haul roads.
- Windbreak – A silt fence or similar barrier can control air currents at horizontal intervals equal to ten times the barrier height. Preserve existing vegetation that acts as a wind barrier as much as practical.
- Wheel Washing – Mechanical or manual wet-method cleaning of on-road construction vehicle tires prior to leaving site.

SPECIAL NOTE

GENERATOR KNOWLEDGE FOR DISPOSAL OF TREATED WOOD

The U.S. Environmental Protection Agency (EPA) and New York State Department of Environmental Conservation (NYSDEC) technique for evaluating whether a material is hazardous for toxicity is the Toxicity Characteristic Leaching Procedure (TCLP). TCLP testing of pentachlorophenol ("penta") and creosote treated wood by the Electric Power Research Institute, Association of American Railroads, and others has conclusively demonstrated that treated wood products are not a hazardous waste. Under EPA's and NYSDEC's rules, such "generator knowledge" can be utilized in place of testing to determine that a waste is not hazardous. This information can be used as evidence that treated wood products can be disposed as non-hazardous waste, based on generator knowledge, in lieu of physical testing.

Generator knowledge information, obtained from the American Wood Preservers Institute (AWPI) can be viewed at their web site located at www.awpi.org . AWPI's information comes from studies conducted by the Electric Power Research Institute (EPRI), the Washington Public Ports Association (WPPA), and the Association of American Railroads (AAR). EPRI test results are for both penta-treated and creosote-treated wood. WPPA and AAR test results are for creosote-treated wood.

NOTE: Arsenically-treated (*e.g.,* chromated copper arsenate [CCA]) wood products disposed by the end user are exempt from classification as a federal hazardous waste regardless of the TCLP results for specified constituents from any individual sample. Also, wood products treated with preservatives that contain no TCLP constituents (*e.g.,* Kodiak Preserved Wood containing Copper Dimethyldithiocarbamate) are not hazardous waste.

SPECIAL NOTES
FOREST INSECT DISEASE CONTROL

MOVEMENT OF WOOD MATERIALS FROM PROJECT SITES

Pursuant to New York State Department of Environmental Conservation (NYSDEC) Regulations, 6NYCRR, part 192.5, *Firewood Restrictions to Protect Forests from Invasive Species,* it is unlawful to transport any firewood material more than 50 miles from its point of origin to limit the spread of invasive insect species. "Firewood" shall mean all wood of any species, cut or not cut, split or not split, regardless of length which is (a) in a form and size appropriate for use as a fuel, or (b) which is destined for use as a fuel. Firewood shall not include kiln-dried dimensional lumber, wood that has been chipped to a maximum piece size that is no greater than 1-inch in two dimensions, or logs or wood being transported to sawmills or other manufacturing facilities for use in their primary operations. All Thruway Authority/Canal Corporation (TA/CC) projects are subject to this requirement. Additional information can be found at the following link: http://www.dec.ny.gov/regs/4079.html

If firewood is to be moved within 50 miles of its point of origin a "Self-Issued Certificate of Origin for Transport and Possession of Untreated Firewood" must be completed. This form can be found at the following link: http://www.dec.ny.gov/docs/lands_forests_pdf/selfisscert.pdf

INVASIVE SPECIES AND QUARANTINE MATERIALS MOVEMENT

NYSDEC Regulations, 6NYCRR, part 192.6, *Quarantine Orders,* No person shall fail to comply with the provisions of any quarantine order issued by the Department pursuant to Environmental Conservation Law (ECL) section 9-1303. To the extent the provisions of section 192.5 *Firewood Restrictions to Protect Forests from Invasive Species* and such quarantine order are in conflict, the more restrictive provision shall apply. TA/CC is under New York State and Federal ash quarantines where it is unlawful to transport any ash material outside of several counties (see quarantine maps at http://www.agriculture.ny.gov/PI/eab/emerald_ash_borer_quarantine.pdf and http://www.dec.ny.gov/animals/47761.html). Therefore, any parts of ash trees, including leaves, bark, stumps, limbs, branches, roots, and ash logs of any length, and firewood (see above for definition of firewood) from ***ANY*** tree species, are all considered regulated articles and must be handled properly. Tree-felling, clearing and grubbing operations at project sites may result in the contractor's need to handle materials from ash tree species and/or firewood or chips from ***ANY*** tree species. To the greatest extent possible in areas of clearing and grubbing, ash trees should be pre-identified and marked prior to commencement of construction to promote the proper handling of these materials.

Un-infested ash materials in any form may be moved offsite, but only within the quarantine zone. Firewood from ***ANY*** tree species may never be moved more than 50 miles and never from the quarantine area, into non-quarantine areas. Transport of any wood needs the required transport certificate: http://www.dec.ny.gov/docs/lands_forests_pdf/selfisscert.pdf

Note: According to the quarantine maps, several parts of the Thruway are the boundary between the quarantine area (south) and the non-quarantine area (north). Therefore, transport of any wood material would be prohibited across the roadway from south to north, but acceptable from north to south.

Note: Any ash materials that are known or suspected to be infested with live emerald ash borer pests in any life stage must be reported immediately to the EIC and/or designee for further appropriate action and coordination with regulatory agencies.

SPECIAL NOTES
FOREST INSECT DISEASE CONTROL

Any ash materials chipped to a size no greater than 1-inch in at least two dimensions is considered safe to be transported outside the quarantine zone, but only in accordance with a Chip/Mulch Agreement and Transport Agreement received from the NYS Department of Agriculture and Markets (NYSDAM). If any regulated ash materials must be moved outside of the currently quarantined area, a certification from the NYS Department of Agriculture and Markets (NYSDAM) or USDA Animal & Plant Health Inspection Service (APHIS) must be obtained. For further information see the following links:
http://www.dec.ny.gov/animals/47761.html
http://www.agriculture.ny.gov/PI/eab.html

MARKER RELOCATION DURING CONSTRUCTION
EXISTING MILE MARKERS AND TENTH-MILE MARKERS AND DELINEATORS

All Mile Markers and Tenth-Mile Markers are to be maintained during construction of this project. The Contractor will be allowed to temporarily relocate them to avoid damage to them or for constructability purposes. The Mile Markers and Tenth-Mile Markers can be moved but the new location must be visible to traffic and be reasonably close to their original location. The Mile Markers must be returned to their original location upon completion of construction at that location. Cost for this work shall be included in the bid price for the various pay items in the Project, unless the work is specifically called for in the Contract Documents.

If the Contract calls for replacement of existing Milemarkers and/or Tenth-Milemarkers, they shall remain in place, or reset to a location reasonably close to their original location, until the new markers are installed.

REINFORCEMENT FOR CEMENT CONCRETE

Bar reinforcement and wire fabric specified in the Contract Documents shall be in accordance with the following:

Bar Reinforcement used on this project shall meet the requirements of Section 709-01 *Bar Reinforcement, Grade 60,* or Section 709-14 *Bar Reinforcement, Grade 75,* as detailed on the plans. No substitutions will be allowed. Bar reinforcement (for the items listed below) shall be galvanized and fabricated in accordance with ASTM A767 and meet the requirements of Section 709-11 *Galvanized Bar Reinforcement*. The requirements of ASTM A767 Section 4.3 (Chromating) will not be waived.

Wire Fabric Reinforcement used on this project (for the items listed below) shall meet the requirements of Section 709-02 *Wire Fabric for Concrete Reinforcement*. Any Wire Fabric Reinforcement required for the items listed below shall be galvanized in accordance with Section 719-01 *Galvanized Coatings and Repair Methods*, Type I. Galvanized Wire Fabric Reinforcement shall be fabricated and galvanized in accordance with ASTM A123 and ASTM A767. The requirements of ASTM A767 Section 4.3 (Chromating) will not be waived.

Item Numbers that require the use of **Galvanized Bar Reinforcement** and/or **Galvanized Wire Fabric Reinforcement** on this project are as follows:

627.0003 25
627.0004 25

Reinforcement for Reinforced Concrete Pipe and Related Drainage Structures shall meet the requirements of Section 706 – *Concrete, Clay, and Plastic Pipe.*

AFFIRMATIVE ACTION REQUIREMENTS

GOALS FOR DISADVANTAGED/MINORITY/WOMEN'S BUSINESS ENTERPRISE (D/M/WBE) PARTICIPATION

The Department has established the following utilization goal(s) for this contract, expressed as a percentage of the total contract bid amount. For clarification of Disadvantaged Business Enterprise (DBE) Utilization, Minority Business Enterprise (MBE) Utilization or Women's Business Enterprise (WBE) Utilization requirements refer to §102-12 *D/M/WBE Utilization* of the Standard Specifications.

Disadvantaged Business Enterprise (DBE) Utilization Goal	_____% (Federal-Aid Only)
Minority Business Enterprise (MBE) Utilization Goal	__**8**__% (Non-Federal-Aid Only)
Women's Business Enterprise (WBE) Utilization Goal	__**7**__% (Non-Federal Aid Only)

Directories and/or Information related to the current certification status of Disadvantaged Business Enterprises can be obtained from the NYS Unified Certification Program website at: http://biznet.nysucp.net

Direct questions concerning Disadvantaged Business Enterprise Utilization to:

NYS Department of Transportation
Office of Construction
50 Wolf Road Pod 51
Albany, New York 12232
(518) 457-6472

Direct questions concerning Disadvantaged Business Enterprise Certification to:

NYS Department of Transportation
Contract Audit Bureau
DBE Certification
50 Wolf Road, 1st Floor South
Albany, New York 12232
(518) 457-3180

Directories and/or information related to the current certification status of Minority and Women's Business Enterprises can be obtained by contacting:

Empire State Development Corporation
Office of Minority and Women's Business Development
625 Broadway
Albany, New York 12207
(518) 292-5100
https://ny.newnycontracts.com/

EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS – STATE

1. **REQUIREMENTS** – During the performance of this contract, the Contractor agrees to comply with the Equal Employment Opportunity (EEO) requirements specified herein.

2. **DEFINITIONS –** As used in these requirements, the following definitions will apply:

   A. "Covered Area" means the geographical area described in the solicitation from which this contract resulted or the geographic area within which this contract will be performed.

   B. "Authority" means the New York State Thruway Authority.

   C. "Executive Director" means the Executive Director of the New York State Thruway Authority, or his/her duly authorized representative.

   D. "Compliance Unit of Contracts and Construction Management" means the Thruway Authority's Compliance Unit or his/her duly authorized representative.

   E. "Employer Identification Number" means the Federal Social Security Number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department form 941.

   F. "Minority" includes:

      (i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

      (ii) Hispanic (a person of Mexican, Puerto Rican, Dominican, Cuban, Central or South American descent of either Indian or Hispanic origin, regardless of race;

      (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast, Asia, the Indian Subcontinent, or the Pacific Islands); and

      (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification. Identification may be made by any suitable authority in the community such as an educational institution, religious organization, or a state agency).

3. **NON-DISCRIMINATION CLAUSE** – The Contractor will ensure equal employment opportunity by not discriminating against any applicant for employment because of race, color, religion, sex, national origin, age, disability, or marital status, regarding, (among other things) the following: upgrading, demotion, transfer, recruitment, recruitment advertising, layoff, termination, rates of pay or other forms of compensation and selection for training, including apprenticeship.

4. **MINORITY AND WOMEN EMPLOYMENT GOALS –** The Contractor shall make a good-faith effort to ensure equal employment opportunity by taking the affirmative action's set forth in paragraph 6A through P of these requirements. The Contractor's success in achieving or bettering the goals set forth herein shall be a substantial factor in any determination of whether the Contractor has complied with its obligation to ensure equal employment opportunity in the performance of this contract. The goals are expressed as percentages of the total hours of employment and training that the Contractor should reasonably be able to give to female or minority employees in a certain covered area. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade. These goals were established from materials published by the NYS Department of Economic Development based on appropriate workforce, demographic or other relevant data or labor force developed by the Division of Minority & Women's Business Development utilizing the 1990 Census Data.

EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS – STATE

5. **TRAINING SPECIAL PROVISION –** If the contract proposal includes the Training Special Provision, the Contractor is required to comply with that provision as part of these Equal Employment Opportunity Requirements. The Training Special Provision requires the Contractor to provide training to at least one minority or woman indentured apprentice or trainee. If the Contractor fails to meet the employment goals for minorities or women specified herein, additional training of minorities and women will be required to satisfy the employment goals.

6. **AFFIRMATIVE ACTION STEPS** – The Contractor shall implement affirmative action steps at least as extensive as the following:

   A. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of a carry out of the Contractor's obligation to maintain such a working environment, with specific attention to minority and female individuals working as such sites or in such facilities.

   B. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

   C. Maintain a current file of the name, address, and telephone number of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of the action which was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union, or if referred, not employed by the Contractor, this shall be documented in writing to the Compliance Unit and noted in the file with the reasons therefore, along with whatever additional actions the Contractor may have taken.

   D. Provide immediate written notification to the Compliance Unit when the Contractor has information that the union referral process has impeded the Contractor's efforts to meet its obligation.

   E. Develop on-the-job training opportunities and/or participation in training programs which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the United States Department of Labor, the New York State Department of Labor, or the New York State Thruway Authority and appropriate for utilization on New York State Thruway Authority projects. The Contractor shall provide notice of these programs to the sources complied under 6.B. above. If the Contractor fails to develop or participate in such apprentice or training programs, its failure to meet the goal set forth herein will be presumed to be noncompliance with these requirements.

   F. Disseminate the Contractor's equal employment opportunity policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its equal employment opportunity obligations, by including it in any policy annual and collective bargaining agreement, by publicizing it in the company newspaper, annual report, and other similar items, by specific review of the policy with all management personnel and with all minority and female at least once a year, and by posting the Contractor's equal employment opportunity policy on bulletin boards accessible to all employees at each location where work under this contract is performed.

EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS – STATE

G. Review, at least annually, the Contractor's equal employment opportunity policy and affirmative action obligations under this requirement with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decision, including specific review of these items with on-site supervisory personnel such as superintendents, general forepersons, etc., prior to the initiation of work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

H. Disseminate the Contractor's equal employment opportunity policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to, and discussing the Contractor's equal employment opportunity policy with, other Contractors and subcontractors with whom the Contractor does or anticipates doing business.

I. Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students, and to minority and female students, and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above describing the openings, screening procedures, and tests to be used in the selection process.

J. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of the Contractor's workforce.

K. State in all solicitations or advertisements for employees placed by or on behalf of the Contractor that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, age, disability, or marital status.

L. Conduct, at least annually, an inventory and evaluation of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for such opportunities through appropriate training or other similar activities.

M. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the equal employment opportunity policy and the Contractor's obligations under this requirement are being carried out.

N. Ensure that all facilities and company activities are non-segregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

O. Send to each labor union or representative of workers with which the Contractor has a collective bargaining agreement or other contract or understanding, a notice advising the said labor union or workers' representative of the Contractor's commitments under this requirement and post copies of the notice in conspicuous places available to employees and applicants for employment.

P. Conduct a review, at least annually, of all supervisors' adherence to, and performance under, the Contractor's equal employment opportunity policies and affirmative action obligations.

EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS – STATE

7. **CONTRACTOR ASSOCIATIONS –** Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative actions obligations. The efforts of a Contractor association**,** joint Contractor union, Contractor community, or other similar group of which the Contractor is a member and participant, may be asserted as fulfilling one or more of its obligations under this requirement provided that the Contractor actively participates in the group, makes every effort to ensure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's non-compliance.

8. **TRANSFER OF MINORITY OR FEMALE EMPLOYEES –** Through implementing the affirmative action's set forth above and the Contractor's other efforts to ensure equal employment opportunity, the Contractor must have made a commitment to employ minorities and women throughout the life of the contract. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be violation of the contract.

9. **CREDITING NON-WORKING TRAINING HOURS TOWARD EMPLOYMRNT GOALS –** In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the United States Department of Labor, the New York State Department of Labor or the New York State Thruway Authority and appropriate for utilization on the New York State Thruway Authority projects.

10. **REQUIRED RECORDS**

    A. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the Contractor's equal employment opportunity policy is being carried out and to keep records. The records shall include the names, address, telephone number, construction trade, union affiliation, if any, employee identification number when assigned, social security number, race, sex, status (e.g. mechanic, apprentice, trainee, helper or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay and locations at which the work was performed for each employee. Records shall be maintained in an understandable and retrievable form. To the extent that records kept by the Contractor for other purposes satisfy the requirements of this paragraph, the Contractor need not maintain separate records.

    B. The Contractor shall submit on a monthly basis "Employment Utilization Report" (TA-W1017-9) to the Engineer and the Compliance Unit. Records of the total employee utilization from the start of the contract up to and including the month being reported shall be submitted on these monthly reports. For the purpose of these reports, the hours of female employment and training and the hours of minority employment and training shall be separately calculated. All females, whether minority or non-minority, shall be calculated within the hours of female employment and minority females shall not be used in the calculation of hours of minority employment.

    C. For the purpose of the reports required above, the employment and training hours worked by each person may only be used once in any one month and the Contractor is cautioned that it may not discriminate against minority females in connection with attaining its affirmative action goals under these requirements.

EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS – STATE

D. All records required by this Section must be retained for a period of three years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the Authority or the Compliance Unit.

11. GOALS NOT TO BE USED TO DISCRIMINATE – The Contractor shall not use the goals or affirmative action requirements to discriminate against any person because of race, color, religion, sex, national origin, age disability, or marital status.

12. NEW YORK STATE DEPARTMENT OF ECONOMIC DEVELOPMENT DIVISION OF MINORITY AND WOMEN'S BUSINESS DEVELOPMENT – The Contractor will comply with any procedures and guidelines established by the Director of the Office of Contract Compliance and Minority and Women-Owned Business Enterprise (hereinafter the Director of the Office of the Office of Contract Compliance) under the authority of New York State Governor's Executive Order 21, issued August 3, 1983 (hereinafter Executive Order 21) and will comply with any rules, regulations and orders of the Executive Director as may be promulgated pursuant to or under the authority of Executive Order 21, or other applicable law or order.

13. AVAILABILITY OF CONTRACTOR'S RECORDS – The Contractor will furnish all information and reports as may be required by the Director of the Office of Contract Compliance under the authority of Executive Order 21, or by rules, regulations and orders of the Executive Director as may be promulgated under or pursuant to Executive Order 21, and will permit access to its books, records and accounts by the Authority or the Compliance Unit for purposes of investigating compliance with these requirements and such rules, regulations, orders, procedures and guidelines.

14. ENFORCEMENT – In order to determine whether the Contractor has complied with the requirements, the Authority may proceed by order to show cause, compliance conference, hearing or any other lawful procedure upon due notice in writing to the Contractor. In the event the Authority finds that the Contractor has filed to comply with these requirements, this contract may be canceled, terminated, or suspended in whole or in part in accordance with the procedures authorized in Section 312 of Executive Law 15-A, Section 102-17 of the New York State Standard Construction Specifications and Section 40 of the Highway Law, and the Contractor may be declared ineligible for further New York State government contract or construction contracts, and such other sanctions may be imposed and remedies invoked as provided under the authority of Executive Order 21 or by rule, regulation, or order of the Executive Director, or as otherwise provided by law.

15. CONTRACTOR'S RESPONSIBILITY REGARDING COLLECTIVE BARGAINING AGREEMENT– Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement to refer either minorities or women shall excuse the Contractor's obligations under these requirements, any rules, regulations, procedures and guidelines promulgated or established pursuant to Executive Order 21.

16. APPLICABILITY TO SUBCONTRACT – As per Section 312 of Executive Law 15-A the Contractor will physically include this document, Equal Employment Opportunity Requirements, as part of every subcontract or purchase order unless exempted by rules, regulations, or orders of the Executive Director, pursuant to Executive Order 21, and such requirements shall be binding upon each subcontractor, service provider, or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the Authority may direct as a means of enforcing such provisions, including sanctions for noncompliance; PROVIDED, HOWEVER, that in the event the Contractor becomes involved in or is threatened with litigation with a subcontractor or vendor as a result of any provision or direction issued pursuant to these requirements or by the Authority, the Contractor may request the State of New York to enter into such litigation or dispute to protect the interests of the State of New York.

EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS – STATE

17. **EQUAL EMPLOYMENT OPPORTUNITY OFFICER –** The Contractor will designate and make known to the Department of Equal Employment Opportunity Officer (EEO Officer) who will have the responsibility for and must be capable of effectively administering and promoting an active Contractor program of equal employment opportunity and who must be assigned adequate authority and responsibility to do so.

18. **COMPLAINTS OF ALLEGED DISCRIMINATION/SEXUAL HARASSMENT –** The Contractor will promptly investigate all complaints of alleged discrimination/sexual harassment made to the Contractor in connection with his/her obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination/sexual harassment may affect persons other that the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the Contractor will inform every complainant of all of his or her avenues of appeal. (Division of Human Rights, Equal Employment Opportunity Commission).

    The Contractor shall inform the Compliance Unit (within 24 hours) in writing of any formal or informal, complaint, incident or any issue of discrimination/sexual harassment. Results of investigation must be submitted to the Compliance Unit within ten (10) days of the complaint.

EMPLOYMENT GOALS FOR MINORITY AND WOMEN PARTICIPATION BY COUNTY

COUNTY	MINORITY %	WOMEN %
Albany	6.56	4.67
Alleghany	1.00	5.08
Bronx	56.41	4.72
Broome	4.15	6.24
Cattaraugus	5.00	3.76
Cayuga	1.38	4.47
Chautauqua	3.47	4.83
Chemung	3.44	4.96
Chenango	2.07	6.67
Clinton	1.22	5.63
Columbia	3.81	3.16
Cortland	2.05	6.89
Delaware	2.36	5.59
Dutchess	7.63	3.24
Erie	9.66	3.32
Essex	0.33	5.33
Franklin	6.77	5.69
Fulton	1.00	4.07
Genesee	5.47	5.18
Green	2.88	4.09
Hamilton	0.76	6.11
Herkimer	1.00	4.22
Jefferson	2.12	3.65
Kings	56.41	4.72
Lewis	0.87	4.82
Livingston	1.54	4.14
Madison	1.52	4.52
Monroe	14.20	5.81
Montgomery	2.39	3.74
Nassau	16.09	3.24
New York	56.41	4.72

EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS – STATE

EMPLOYMENT GOALS FOR MINORITY AND WOMEN PARTICIPATION BY COUNTY

COUNTY	MINORITY %	WOMEN %
Niagara	6.00	4.12
Oneida	3.75	3.98
Onondaga	8.27	5.36
Ontario	1.62	3.79
Orange	10.00	3.46
Orleans	5.74	4.14
Oswego	1.25	4.03
Otsego	0.86	4.91
Putnam	2.42	2.79
Queens	56.41	4.72
Rensselaer	3.46	3.01
Richmond	12.81	2.46
Rockland	18.37	3.80
St. Lawrence	1.78	4.86
Saratoga	1.10	5.25
Schenectady	6.05	2.85
Schoharie	1.36	2.99
Schuyler	0.49	4.67
Seneca	2.22	5.45
Steuben	1.39	4.84
Suffolk	11.73	4.10
Sullivan	8.16	3.60
Tioga	0.53	8.90
Tompkins	4.19	4.99
Ulster	5.93	4.29
Warren	2.13	3.41
Washington	1.91	3.56
Wayne	3.66	4.77
Westchester	24.50	3.38
Wyoming	0.33	4.30
Yates	1.67	2.68

TRAINING SPECIAL PROVISIONS – STATE FUNDED

This work shall consist of the employment and meaningful and effective training of minority and women in NYS Thruway Authority approved training programs leading to their qualification as journeyworkers in the skilled trades required in highway construction. This Training Special Provision supplements the Equal Employment Opportunity requirements included elsewhere in this Proposal entitled "Equal Employment Opportunity (EEO) Requirements". Each of the fore-going prescribed specific percentage goals for utilization of minorities and women in the performance of work for the geographic location of the contract.

GENERAL: The primary objective of this Training Special Provision is to provide training opportunities to minorities and women in construction trades for two purposes:

1. To maintain a pool of qualified minorities and women to replace those journeyworkers who, in the natural course of events, will leave the workforce; and

2. To provide minorities and women as indentured apprentices or trainees in those geographic areas where shortages in minorities and women journeyworkers are recognized because of the Contractor's inability to meet the EEO goals set fourth in this contract.

Each contract which contains this Training Special Provision shall require the training of at least one minority or woman indentured apprentice or trainee. Such individual shall be approved by the Authority. Other then this initial training obligation, to be undertaken and provided by the Contractor, no additional training obligations will exist under this Training Special Provision unless the goals for minority and women employment and training in the skilled workforce (exclusive of laborers) are not continuously met on the contract and generally distributed amongst the trades. In the five counties of New York City, the goals specified for each trade are applicable and must be met. Whenever the goals are not met, additional minorities and/or women indentured apprentices and/or trainees will be assigned or approved in numbers necessary to meet the goals. Data necessary to determine if goals are being met will be provided on Contractor and Subcontractor Employment Utilization Reports (Form TA-1017-9). The data will be verified by the visual observance of the Project Engineer, or designated project inspectors, and hours of employment reported on Contractor or Subcontractor certified weekly payrolls.

The number of minorities and women indentured apprentices and trainees required to be trained under this item shall not exceed 12% of the total journeyworker workforce on the contract, i.e. no more than 1 in of the skilled workforce is required to be a minority or woman indentured apprentice or trainee. This limitation applies regardless of minority and women representation in the trades. However, this limit on required training in no way absolves the Contractor of the responsibility to comply with the EEO requirements.

PRE-AWARD MEETING: Before the Contractor will be allowed to begin work, the Contractor shall attend a Pre-award Meeting and shall submit for Authority use and acceptance, a Workforce and Training Utilization Schedule (TA-1024) which shall be correlated to the Contractor's contract work schedule. The Schedule shall include at least the following information:

1. A work schedule for the entire contract,

2. An estimate of the work force required to conform to the work schedule on a monthly basis including an estimate of the workforce in each trade and/or work classification projected to be used including Subcontractors,

3. Separate estimates of the number of minorities and women indentured apprentices or trainees that would be required in each skilled trade to meet the contract EEO employment goals for that trade assuming no minorities or women journeyworkers in the workforce,

4. The proposed training programs to be used and the starting dates for training in each trade and/or work classification,

5. An estimate of the availability of minorities and women journeyworkers in numbers sufficient to meet the EEO contract goals, and

6. Any proposal by the Contractor to use trainees or indentured apprentices to make up for anticipated EEO goal shortfalls. Such proposals shall include the name and craft of any individual proposed by the Contractor as the required trainee or indentured apprentice. In the case of an indentured apprentice, evidence of indentureship and registration of the approved apprenticeship program must be included.

No contract work may be undertaken until the Authority has accepted the Schedule. The Contractor shall submit a revised Workforce and Training Utilization Schedule at such times as major changes in the contract work schedule occur which substantially affect the previously submitted schedule.

RECRUITMENT: Although the training requirements of this Training Special Provision are not intended, and shall not be used to discriminate against any applicant for training, whether a member of a protected class or not, it is recognized that non-minority males have traditionally been and continue to be trained, either formally or on-the-job in an informal manner, for work in the trades utilized in construction work. Therefore, until such time that representative numbers of minorities and women complete training and their utilization as journeyworkers is demonstrated to the extent of the participation goals as set forth in the Authority's construction contract, training required under this Training Special Provisions will be primarily limited to minorities and women. Thus, the Contractor shall demonstrate compliance with the intent of this Training Special Provision by affording the Authority the opportunity to:

1. First, approve the use of a minority or woman indentured apprentice known to the Contractor through an existing Joint Apprenticeship Training program, or

2. Second, provide a partially trained minority or woman trainee who is currently enrolled in a New York State Department of Labor approved training program, or

3. Third, work cooperatively with the Contractor in recruitment of new minorities or women trainees, when needed.

In conformance with the foregoing, the Authority's Form TA-1018(Request for Personnel), should be submitted to the Authority's Affirmative Action Administrator identified to the Contractor at the Preconstruction Meeting. The Contractor shall allow reasonable time for the Authority's Compliance Specialist to ensure on-the-job orientation for approved apprentices or assigned trainees within their first month of employment.

WORK HISTORY: No individual shall be employed as a trainee in any trade and/or work classification in which such person has successfully completed a training course providing journeyworker status in the same trade or work classification, or in which such person has been gainfully employed as a journeyworker by virtue of informal on-the-job training. Detection of individuals in the above categories may be accomplished by including appropriate questions on employee application forms, inquiries to the Authority's Compliance Specialist, checking personal references, or by other suitable means. Regardless of the method used, the Contractor shall document the finding for each indentured apprentice or trainee provided training under this requirement. A copy of the finding shall be given to the Authority's Compliance Specialist. In the case of indentured apprentices, evidence of indentureship in a registered approved apprenticeship program shall also be submitted.

SUBCONTRACTING: In the event the Contractor subcontracts a portion of the contract work, the Contractor shall ensure the requirements of this Training Special Provision are physically incorporated in such subcontracts to ensure the workforce utilization by the Subcontractor meets the goals for minorities and women employment and training, either independently or in combination with the prime Contractor's workforce. The Contractor must determine the hours of training, if any, and in which trade or work classification, minorities or women indentured apprentices or trainees are to be trained by the Subcontractor(s). However, the Contractor shall retain the primary responsibility for meeting the training requirements of this Training Special Provision. Subcontractors are herewith advised that disregard of these requirements may result in the Authority either rescinding approval of or disapproving their use on subsequent Authority contracts.

TRAINING PROGRAMS: The minimum length, type of training, and rate of pay for the trade or the work classification of the trade will be specified in the training program approved or sanctioned by the New York State Department of Labor.

Where training is to be provided under this Training Special Provision, the Contractor shall obtain acceptance or approval of the training program to be used, and the starting time for training, prior to commencing training. The Contractor shall provide on-the-job training directed toward developing journeyworkers in the trade, or work classification(s) of the trade, involved. To the extent the work involved on the contract permits, such training should include all phases and facets of a trade, or work classification of a trade, to satisfy usual construction industry requirements for continued or future employment therein.

It is the intent of this Training Special Provision that training will be provided in construction trades rather than clerical type positions. Training may be permitted, in unique circumstances, in lower level management positions such as office engineers, where the training is oriented toward construction related activities. Some off-site training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of an overall training program. Both off-site and lower level management training are subject to the Authority's approval.

TRAINEE WAGES: An employee on any New York State Public Works Contract must be paid the full journeyperson prevailing wage unless such employee is individually registered in an approved and registered New York State Department of Labor Apprenticeship Program.

It is the responsibility of the Contractor to ascertain the status of any employee utilized to satisfy the trainee requirements under this contract, and to ensure that all New York State Department of Labor apprenticeship requirements are met.

Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyworker wage rate on the wage determination which provides for less than full benefits for apprentices.

DURATION OF TRAINING: Once an indentured apprentice is approved or a trainee is assigned to the contract under the Training Special Provision, that individual shall be trained in the designed trade throughout the duration of the contract whenever such trade is in use on the contract until the trainee or apprentice has completed the approved training program. Where training is provided under a multiphase apprenticeship or training program, it is expected that training will be provided continually through all phases to the extent that opportunities for such training exist in the work under contract. Upon satisfactory completion of a phase of training under a multiphase training program, if further appropriate and required training is not available and work in the work classification of the completed phase is available, the minority or woman indentured apprentice or trainee shall continue employment, and be compensated at the prevailing journeyworker wage rate for such work. Hours of employment as a journeyworker described above will not be credited toward training hours required by the approved training or apprenticeship program.

If an indentured apprentice or trainee is terminated before completion of the contract for any reason other than seasonal lay-off or completion of work in that trade, the Contractor shall hold a counseling session with the Authority's Compliance Specialist and the individual to explain the reasons for termination. Documentation that the counseling session was held and the reasons for termination shall be given to the Authority's Compliance Specialist.

REQUIRED RECORDS: The Contractor shall provide each minority or woman trained under this provision with a certification showing the type and length of training satisfactorily completed. In addition, the Contractor shall keep records on the job sit indicating the nature and hours of training provided to each trainee or indentured apprentice and furnish weekly reports documenting performance under this Training Special Provision to the Project Engineer.

No measurement will be made of training provided to indentured apprentices or trainees for whom no work history has been provided to the Project Engineer. In addition, no measurement will be made of training provided to apprentices for whom no evidence of indentureship in a registered apprenticeship program has been provided to the Project Engineer.

NO PAYMENT FOR TRAINING: No payment will be made for the training required of the Contractor under this Training Special Provision. The required training is labor cost which is included in the lump sum bid by the Contractor for the items of work comprising the contract.

(1) Journeyworker means a person who is capable of performing all the duties within a trade or a given work classification of a trade.

TRAINEE/APPRENTICESHIP NOTICE

Notwithstanding any of the provisions under the contract section entitled TRAINING SPECIAL PROVISION, especially subsections entitled Training Programs and Trainee Wages, dealing with approved and/or sanctioned programs and graduated percentage wages, the Contractor is advised that all requirements for Apprenticeships (including all manner and form of traineeships and skill programs) are under the exclusive jurisdiction of the New York State Department of Labor, Job Service and Training Division, Albany Apprentice Training Central Office, Bldg. 12, Room 586, State Office Building Campus, Albany, NY 12240.

An employee on any New York State Public Works Contract must be paid the full, journeyperson prevailing wage unless such employee is individually registered in an approved and registered NYS Department of Labor Apprenticeship Program.

This law is applicable even on Federal-aided contracts as long as any State money is involved, and even if an employee might otherwise be acceptable as a trainee in an approved and sanctioned New York State Department of Transportation and/or Federal Highway Administration training program.

It is the responsibility of the Contractor to ascertain the status of any employee utilized to satisfy the trainee requirements under this contract, and to ensure that all New York State Department of Labor Apprenticeship requirements are met.

It is the responsibility of the Contractor to ascertain the status of any employee utilized to satisfy the trainee requirements under this contract, and to ensure that all New York State Department of Labor Apprenticeship requirements are met.

Unless such employees are individually registered in a New York State Department of Labor approved and registered Apprenticeship Program, they must be paid the full, prevailing journeyperson wage, not the graduated, trainee wage set forth in the section TRAINING SPECIAL PROVISIONS of the contract.

NON-FA AFFIRMATIVE ACTION REQUIREMENTS

Special Equal Employment Opportunity Responsibilities

1. GENERAL

a. Equal employment opportunity requirements that take affirmative action to assure equal employment opportunity as required by Executive Order 11246 and Executive Order 11375 are set forth in Required Contract Provisions (Form PR-1273 or PR-1316, as appropriate) and these Special Provisions which are imposed pursuant to Section 140 of Title 23, U.S.C., as established by Section 22 of the Federal-Aid Highway Act of 1968. The requirements set forth in these Special Provisions shall constitute the specific affirmative action requirements for project activities under this contract and supplement the equal employment opportunity requirements set forth in the Required Contract Provisions.

b. The Contractor will work with the New York State Thruway Authority, New York State Department of Transportation and the Federal Government in carrying out equal employment opportunity obligations and in their review of his/her activities under the contract.

2. EQUAL EMPLOYMENT OPPORTUNITY POLICY

The Contractor will accept as operating policy the following statement which is designed to further the provision of equal opportunity to all persons without regard to their race, color, religion, sex, or national origin, and to promote the full realization of equal employment opportunity through a positive continuing program.

It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, or national origin. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship and/or on-the-job training.

3. EQUAL EMPLOYMENT OPPORTUNITY OFFICER

The Contractor will designate and make known to the New York State Thruway Authority contracting officers an Equal Employment Opportunity Officer (hereinafter referred to as the EEO Officer) who will have the responsibility for and must be capable of effectively administering and promoting an active Contractor program of equal employment opportunity and who must be assigned adequate authority and responsibility to do so.

4. DISSEMINATION OF POLICY

a. All members of the Contractor's staff who are authorized to hire, supervise, promote and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the Contractor's equal employment opportunity policy and contractual responsibilities to provide equal employment opportunity in each grade and classification of employment. To insure that the above agreement will be met, the following actions will be taken as a minimum:

(1) Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less than once every six months, at which time the Contractor's equal employment opportunity policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer or other knowledgeable company official.

NON-FA AFFIRMATIVE ACTION REQUIREMENTS

(2) All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer or other knowledgeable company official covering all major aspects of the Contractor's equal employment opportunity obligations within thirty days following their reporting for duty with the Contractor.

(3) All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer or appropriate company official in the Contractor's procedures for locating and hiring minority group employees.

b. In order to make the Contractor's equal employment opportunity policy known to all employees, prospective employees and potential sources of employees, i.e., schools, employment agencies, labor units (where appropriate), college placement officers, etc., the Contractor will take the following actions:

(1) Notices and posters setting forth the Contractor's equal employment opportunity policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

(2) The Contractor's equal employment opportunity policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

5. RECRUITMENT

a. When advertising for employees, the Contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be published in newspapers or other publications having a large circulation among minority groups in the area from which the project work force would normally be derived.

b. The Contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minority group applicants, including, but not limited to, State employment agencies, schools, colleges and minority group organizations. To meet this requirement, the Contractor's EEO Officer will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority group applicants may be referred to the Contractor for employment consideration.

In the event the Contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the Contractor is expected to observe the provisions of that agreement to the extent that the system permits the Contractor's compliance with equal employment opportunity contract provisions. (The U.S. Department of Labor has held that where implementation of such agreements have the effect of discriminating against minorities or women, or obligates the Contractor to do the same, such implementation violates Executive Order 11246, as amended.)

c. The Contractor will encourage present employees to refer minority group applicants for employment by posting appropriate notices or bulletins in areas accessible to all such employees. In addition, information and procedures with regard to referring minority group applicants will be discussed with employees.

NON-FA AFFIRMATIVE ACTION REQUIREMENTS

6. PERSONNEL ACTIONS

Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, or national origin. The following procedures shall be followed:

a. The Contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The Contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory practices.

c. The Contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. When evidence is found, the Contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The Contractor will promptly investigate all complaints of alleged discrimination made to the Contractor in connection with obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the Contractor will inform every complainant of all of his/her avenues of appeal.

7. TRAINING AND PROMOTION

a. The Contractor will assist in locating, qualifying and increasing the skills of minority group and women employees, and applicants for employment.

b. Consistent with the Contractor's work force requirements and as permissible under Federal and State regulations, the Contractor shall make full use of training programs; i.e., apprenticeship and on-the-job training programs for the geographical area of contract performance. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. In the event the Training Special Provision is provided under this contract, this subparagraph is superseded thereby.

c. The Contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The Contractor will periodically review the training and promotion potential of minority groups and women employees and will encourage eligible employees to apply for such training and promotion.

8. UNIONS

If the Contractor relies in whole or in part upon unions as a source of employees, the Contractor will use his/her best efforts to obtain the cooperation of such unions to increase opportunities for minority groups and women within the unions, and to effect referrals by such unions of minority and female employees. Actions by the Contractor, either directly or through a Contractor's association acting as agent, will include the procedures set forth below:

NON-FA AFFIRMATIVE ACTION REQUIREMENTS

a. The Contractor will use his/her best efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minority group members and women for membership in the unions and increasing the skills of minority group employees and women so that they may qualify for higher paying employment.

b. The Contractor will use his/her best efforts to incorporate an equal employment opportunity clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex or national origin.

c. The Contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union or such labor union refuses to furnish such information to the Contractor, the Contractor shall so certify to the New York State Thruway Authority and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the Contractor with a reasonable flow of minority and women referrals within the time limit set forth in the collective bargaining agreement, the Contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, or national origin, making full efforts to obtain qualified and/or qualifiable minority group persons and women. (The U.S. Department of Labor has held that it shall be no excuse that the union with which the Contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority employees.) In the event the union referral practice prevents the Contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such Contractor shall immediately notify the New York State Thruway Authority.

9. SUBCONTRACTING

a. The Contractor will use his/her best efforts to solicit bids from and to utilize minority group subcontractors or subcontractors with meaningful minority group and female representation among their employees. Contractors shall obtain lists of minority-owned construction firms from Empire State Development, Division of Minority and Women Business Development.

b. The Contractor will use his/her best efforts to ensure Subcontractor compliance with their equal employment opportunity obligations.

10. RECORDS AND REPORTS

a. The Contractor will keep such records as are necessary to determine compliance with the Contractor's equal employment opportunity obligations. The records kept by the Contractor will be designed to indicate:

(1) The number of minority and non-minority group members and women employed in each work classification on the project.

(2) The progress and efforts being made in cooperation with unions to increase employment opportunities for minorities and women (applicable only to Contractors who rely in whole or in part on unions as a source of their work force).

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees.

NON-FA AFFIRMATIVE ACTION REQUIREMENTS

(4) The progress and efforts being made in securing the services of minority group Subcontractors with meaningful minority and female representation among their employees.

b. All such records must be retained for a period of three years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the New York State Thruway Authority, New York State Department of Transportation and the Federal Highway Administration.

c. The Contractor will submit to the New York State Thruway Authority, a monthly report for the first three months after construction begins, thereafter upon request, and each month of July for the duration of the project indicating the number of minority, women and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form PR-1391, Federal-Aid Highway Construction Contractor's Monthly EEO Report. If on-the-job training is being required by "Training Special Provisions," the Contractor will be required to furnish Form FHWA-1409, Federal-Aid Highway Construction Contractor's Quarterly Training Report.

PROGRESS PAYMENTS - OEOC REPORTS

Processing of progress payments is contingent upon Contractor documentation of compliance with **all** contract requirements, including EEO/MWBE Program (Equal Employment Opportunity/Minority and Women Business Enterprise Program) reports, in accordance with the brochure entitled "Minority and Women Business Enterprise Program, Information on Completing Program Reports", which is sent to all low bidders by the NYSTA Office of Contracts and Construction Management.

Forms listed below may be required and shall cover the period since the last reporting period. Specific forms and schedule will be stipulated at the EEO/MWBE Program pre-award meeting.

TA-W1017-9	Monthly Employment Utilization
TA-W1023-9	Payments to D/M/WBE Subcontracting Firms
TA-W1046-9	Weekly Training Progress Report

In addition, the following shall reflect up-to-date status:

TA-W1022-9	Utilization Plan for All Subcontractors
TA-W1024-9	Workforce and Training Utilization Schedule
TA-W1041-9	Training Report
TA-W1064-9	Construction Contractors Annual EEO Report

New York State Thruway Authority • New York State Canal Corporation
P.O. Box 189
Albany, NY 12201-0189
COMPLIANCE UNIT/OFFICE OF CONTRACTS AND CONSTRUCTION MANAGEMENT

UTILIZATION PLAN FOR ALL SUBCONTRACTORS

☐ **Proposed** ☐ **Actual** (Formerly TA-1058-9)

Contractor Name and Address	Date Submitted	County(ies) of Project	Contract Numbers TA No. D No.
Total Bid Price $	Revised Project Dollar Value (If Applicable) $		Contractor Federal ID No.

List all Subcontractor Firms	D/M/WBE Certification Status (check all that apply)	Work to be Done Services to be Provided	Bond Required?	Agreement Dollar Value Proposed or Actual
Name Address Telephone No. ( ) - Federal ID No.	☐ DBE ☐ MBE ☐ WBE		☐ Yes ☐ No	$
Name Address Telephone No. ( ) - Federal ID No.	☐ DBE ☐ MBE ☐ WBE		☐ Yes ☐ No	$
Name Address Telephone No. ( ) - Federal ID No.	☐ DBE ☐ MBE ☐ WBE		☐ Yes ☐ No	$
Name Address Telephone No. ( ) - Federal ID No.	☐ DBE ☐ MBE ☐ WBE		☐ Yes ☐ No	$

Prepared by:		
Signature	( ) - Telephone No.	Sub Total From Page 2 $
Title	Date	Grand Total $

Instructions: *Submit this report no later than 10 days after being contacted by the Compliance Unit (address above).*
To search for an M/W/BE certified company, go to the Internet at: http://biznet.nysucp.net/
To search for the DOT registry go to the Internet at: http://www.nylovesmwbe.ny.gov/

UTILIZATION PLAN FOR ALL SUBCONTRACTORS

List all Subcontractor Firms	D/M/WBE Certification Status (check all that apply)	Work to be Done Services to be Provided	Bond Required?	Agreement Dollar Value Proposed or Actual
Name Address Telephone No. ( ) - Federal ID No.	☐ DBE ☐ MBE ☐ WBE		☐ Yes ☐ No	$
Name Address Telephone No. ( ) - Federal ID No.	☐ DBE ☐ MBE ☐ WBE		☐ Yes ☐ No	$
Name Address Telephone No. ( ) - Federal ID No.	☐ DBE ☐ MBE ☐ WBE		☐ Yes ☐ No	$
Name Address Telephone No. ( ) - Federal ID No.	☐ DBE ☐ MBE ☐ WBE		☐ Yes ☐ No	$
Name Address Telephone No. ( ) - Federal ID No.	☐ DBE ☐ MBE ☐ WBE		☐ Yes ☐ No	$
Name Address Telephone No. ( ) - Federal ID No.	☐ DBE ☐ MBE ☐ WBE		☐ Yes ☐ No	$
Compliance Unit Comments:			Sub Total	$

INSTRUCTIONS FOR THE MANUAL COMPLETION OF THE EMPLOYMENT UTILIZATION REPORT – TA-W1017-9

PURPOSE

The Employment Utilization Report is prepared by contractors and subcontractors to document their performance in attempting to meet the goals for equal employment opportunity included in the contract. The report covers all hourly workers, including crew chiefs, assigned to the construction project; it does not cover salaried personnel such as superintendents. The completed reports are used by the Thruway to monitor the contractor's and subcontractor's compliance with the contract's equal employment opportunity requirements.

SUBMISSION

The Employment Utilization Report is to be completed by both prime and subcontractors and signed by the designated EEO Officer or authorized representative of the Contractor or Subcontractors. The prime contractor shall: complete a report for its own workforce, and prepare a summary report for the entire combined contract workforce. All the reports are to be submitted to the Engineer-In-Charge (EIC) each calendar month during the term of the contract. They shall include the total work hours for all employees in each trade or work category for all payrolls completed in the entire reporting period. This report is required by Article 15-A of the Executive Law of New York State Section 312, and 23 U.S.C., Section 140(a).

GENERAL

1. Check YES or NO as appropriate to indicate whether or not this particular TA-W1017-9 filing will be your last TA-W1017-9 filing for the entire contract.
2. Contract Number
3. Name of County or Counties in which the contract is located.
4. Enter Zip Code
5. Minority and Female Goals for the County of the project address from the contract EEO requirements.
6. The Month and Year covered by the report.
7. Prime Contractor's Name and Federal Employer Identification Number, only if form is being completed by the Contractor.
8. Date Work Began: Enter the month and year work began on this contract.
9. Work Completed to Date: Estimate the percent of contract work completed at this time.

JOB OR TRADE CATEGORIES

There are 9 standard job or trade categories printed on the TA-W1017-9. They include the trades commonly used in highway and bridge construction. These categories are intended to be general in nature and may include several job titles, depending on local custom. (For example, all laborers whether "skilled" or "unskilled" are to be included in the laborer category; journeyworker mechanics employed to operate equipment on the job site such as compressors would be included in the equipment operator category.) In some rare cases, trades other than those identified on the TA-W1017-9 may be required to perform the contract work; for example a plumber might be utilized in the construction of a rest area. All work performed by trades other than those printed on the form should be combined in the "Other" category. Work level designations of Journeyworker (J), Apprentice (A), or Trainee (T), are included as separate entries for each standard job category. All entries of hours worked must be recorded opposite the appropriate work level for those categories. No separate identification of work level is required for "other" crafts or job categories. Crew chiefs and other hourly supervisors should be counted as journeyworkers in their appropriate job or trade categories.

WORK HOURS OF EMPLOYMENT (This Reporting Period)

10-14 Report the work hours of employment provided in each Job or Trade category during the reporting month. Include all employment covered by payrolls issued during the reporting month. Unless otherwise noted, the Hours of Employment provided to Males (M) and Females (F) are reported separately. Where separate work designations

are shown for a single trade, i.e., work designations are shown for a single trade, i.e., report these work hours accordingly.

10. Total hours of work for all employees regardless of their ethnicity.
11. Black (not of Hispanic origin): All persons having origins in any of the Black racial groups.
12. Hispanic: All persons of Mexican, Puerto Rican, Dominican, Cuban, Central or South American descent of either Indian or Hispanic origin, regardless of race.
13. Asian or Pacific Islander.
14. Native American or Alaskan Native.
15. Minority Percentage: the sum of all minority male employment for a category divided by the total work force employment for that category, i.e. (11M + 12M + 13M + 14M) + (10M + 10F). Journeyworkers, Apprentices, and Trainees are combined Apprentices, and Trainees are combined when computing this percentage.

16. Female Percentage: the female employment of all employees for a category divided by the total employment of all employees for that category, i.e. (10F) + (10M + 10F). Journeyworkers, Apprentices, and Trainees are combined when computing this percentage.

NUMBER OF EMPLOYEES

17-18 Record the number of people employed during the reporting period. The numbers of Male (M) and Female (F) employees in each column are reported separately.

17. The total number of people employed regardless of ethnicity.
18. The total number of minority persons employed.

TOTAL WORK HOURS OF EMPLOYMENT TO DATE (Cumulative)

This section provides a current total of the employment provided throughout the life of the contract to date. The total employment to date is calculated by adding the work hours of employment reported this period to the previous month's reported total work hours of employment to date.

19. Total hours of work for all employees regardless of their ethnicity (cumulative - include non-minorities minorities).

20-23 The sum of the corresponding entry for EMPLOYMENT THIS REPORTING PERIOD and the previous period's TOTAL WORK HOURS OF EMPLOYMENT TO DATE for each combination of job category, ethnicity, and sex.

24. Minority Percentage = (20M + 21M + 22M + 23M) + (19M + 19F).
25. Female Percentage = (19F) + (19M + 19F)

GRAND TOTAL

26. Enter the cumulative total of each column.

OFFICIAL OF PRIME CONTRACTOR/SUBCONTRACTOR

27. Signature and Title of the company official completing the report.
28. Date signed.

TA-W1017-9
(06/10/05)

NEW YORK STATE THRUWAY AUTHORITY • CANAL CORPORATION
MONTHLY EMPLOYMENT UTILIZATION

1. FINAL REPORT ○ YES ◉ NO	2. CONTRACT TA #	3.COUNTY	4. ZIP CODE	
5. CONTRACT GOALS %	MINORITY	FEMALE	6. REPORT (MONTH & YEAR)	
7. CONTRACTOR NAME		EMPLOYER FEDERAL ID NO.	Select Report Type Below: ◉ PRIME ○ COMPOSITE ○ SUBCONTRACTOR	
8. PROJECT START DATE *(Month & Year)*		9. Percent of Work Completed to Date:		

WORK HOURS OF EMPLOYMENT THIS MONTH

JOB OR TRADE CATEGORY JOURNEYWORKER, APPRENTICE, OR TRAINEE		10. TOTAL ALL EMPLOYEES BY TRADE (NON-MINORITIES & MINORITIES)		11. BLACK (NOT OF HISPANIC ORIGIN)		12. HISPANIC		13. ASIAN OR PACIFIC ISLANDERS		14. AMERICAN INDIAN OR ALASKAN NATIVE		15 MINORITY %	16. FEMALE %	17. TOTAL NUMBER OF EMPLOYEES		18. TOTAL # OF MINORITY EMPLOYEES	
		M	F	M	F	M	F	M	F	M	F			M	F	M	F
LABORER	J																
	A																
	T																
EQUIPMENT OPERATOR	J																
	A																
	T																
SURVEYOR	J																
	A																
	T																
TRUCK DRIVER	J																
	A																
	T																
IRON WORKER	J																
	A																
	T																
CARPENTER	J																
	A																
	T																
MASON	J																
	A																
	T																
PAINTER	J																
	A																
	T																
ELECTRICIAN	J																
	A																
	T																
OTHER																	
TOTAL																	

TOTAL WORK HOURS OF EMPLOYMENT TO DATE (Cumulative)

JOB OR TRADE CATEGORY JOURNEYWORKER, APPRENTICE, OR TRAINEE		19. TOTAL ALL EMPLOYEES BY TRADE (NON-MINORITIES & MINORITIES)		20. BLACK (NOT OF HISPANIC ORIGIN)		21. HISPANIC		22. ASIAN OR PACIFIC ISLANDERS		23. AMERICAN INDIAN OR ALASKAN NATIVE		24. MINORITY %	25. FEMALE %
		M	F	M	F	M	F	M	F	M	F		
LABORER	J												
	A												
	T												
EQUIPMENT OPERATOR	J												
	A												
	T												
SURVEYOR	J												
	A												
	T												
TRUCK DRIVER	J												
	A												
	T												
IRON WORKER	J												
	A												
	T												
CARPENTER	J												
	A												
	T												
MASON	J												
	A												
	T												
PAINTER	J												
	A												
	T												
ELECTRICIAN	J												
	A												
	T												
OTHER													
26. GRAND TOTAL													

27. Official of Prime Contractor/ Subcontractor *(Title and Signature)*	28. Date Signed

TA-W1023-9 (06/10/05)

New York State Thruway Authority - New York State Canal Corporation
COMPLIANCE UNIT/ OFFICE OF CONTRACTS AND CONSTRUCTION MANAGEMENT
P.O. BOX 189, Albany, New York 12201-0189
DISADVANTAGED/MINORITY/WOMEN'S BUSINESS ENTERPRISE PROGRAM
PAYMENTS TO D/M/WBE SUBCONTRACTING FIRMS

MONTH AND YEAR REPORTING

CONTRACTOR/ SUPPLIER NAME:	CONTRACT TA#:	CONTRACT D#:

COUNTY AND ZIP CODE: (OF WORK LOCATION)	PERCENTAGE OF OVERALL WORK COMPLETED TO DATE: (Based on Dollars)	

THE SUBCONTRACTORS/ SUPPLIERS LISTED BELOW ARE BONA FIDE D/M/WBE's. PAYMENTS MADE TO THEM (AS SHOWN) ARE IN CONJUNCTION WITH THE CONTRACT DOCUMENTS FOR THE ABOVE NUMBERED CONTRACT.

LIST ALL D/M/WBE SUBCONTRACTORS FROM START OF PROJECT		ORIGINAL GOAL DOLLAR AMOUNT	PAYMENTS THIS MONTH ONLY	PREVIOUS PAYMENTS FROM START OF PROJECT	TOTAL PAYMENTS TO DATE	PERCENTAGE OF WORK COMPLETED TO DATE (Based On Dollars)
PART 1 - LIST THE NAMES OF ALL D/MBE SUBCONTRACTORS AND FEDERAL ID NUMBERS						
NAME: FED ID #						
NAME: FED ID #						
NAME: FED ID #						
NAME: FED ID #						
PART 2 - LIST THE NAMES OF ALL D/WBE SUBCONTRACTORS AND FEDERAL ID NUMBERS						
NAME: FED ID #						
NAME: FED ID #						
NAME: FED ID #						
NAME: FED ID #						
GRAND TOTAL AMOUNTS FOR ALL D/M/WBE SUBCONTRACTORS/ SUPPLIERS						

NOTE: D/M/WBE GOALS ARE APPLICABLE TO ALL ORDER ON CONTRACTS.

ARE YOU SCHEDULED TO MEET THE D/M/WBE GOALS PER THE ORIGINAL CONTRACT?

◯ YES ◯ NO

CONTRACTOR/ SUPPLIER *(PRINT AND SIGN NAME)*		DATE	

INSTRUCTIONS: Please complete this report and return to the address above by the 15th of each month. or not payment has been made to the subcontractors/ suppliers this month. The percentage of work completed for each subcontractors/ suppliers must be reported.

STATE
WAGE RATE
INFORMATION

WAGE RATES

The New York State Thruway Authority does not represent or warrant that the accompanying schedule of wages with the classification of workmen, mechanics and laborers, as required by Section 220 of the Labor Law, is complete and it reserves the right to revise such schedule when required.

In the event that revisions are made before the letting date, an amendment will be issued by the Department of purchasers of plans. In the event that the current wage rate schedule should expire before the contract for this project becomes effective the said wage rate schedule will be recertified and the Contractor will be bound by such revised schedule as recertified.

Labor classifications not appearing on this rate sheet can be used only with the consent of the Chief Engineer of the Authority and then the rate to be paid will be given by the Chief Engineer of the Authority after consulting with the State Department of Labor.

All requests for minimum wage rates for additional occupations shall be directed through the Chief Engineer, Thruway Authority.

By legislation effective August 9, 1975, if the prevailing rate of wages or the prevailing practices for supplements as determined by the State Labor Department changes after the contract is let, the Thruway Authority shall request of the State Labor Department a redetermination of the schedules of wages and supplements and such revised wage rates and supplements shall be annexed to and form a part of the contract for the work. The prevailing wage rates and supplemental benefits to be paid are those in effect at the time the work is being performed. The bidder shall take into account in his bid prices all changes in wage rates and supplements that may be forthcoming during the time the contract is in force.

The bidder shall take into account in his bid prices all changes in wage rates and supplements that may be forthcoming during the time the contract is in force.

Pursuant to Section 220-A of the New York State Labor law, the prime Contractor must provide each approved subcontractor with a copy of the schedule of wages and any supplements as specified in this Contract.

The prime Contractor must immediately obtain from each approved subcontractor a certification (TA-44105) of their receipt of, and agreement to pay the applicable prevailing wages as specified in this contract. The prime Contractor shall retain all Subcontractor certifications and provide these certifications to the Authority prior to the processing of the final payment.

The prime Contractor must submit an affidavit (TA-44115) verifying the proper payment of wages to its own employees prior to the processing of the final payment. All completed certifications and affidavits must be originals and be properly signed and notarized.

SPECIAL NOTICE TO BIDDERS IN RELATION TO OVERTIME DISPENSATION

All bidders, in submitting their bids, should base their bids and work progression on the assumption that Overtime Dispensation pursuant to Article 8 of the New York State Labor Law, for any workmen, laborers and mechanics to work more than 8 hours in any one calendar day or more than five days in any one week will not be granted for any operation for the contract duration. Subsequent to award, where the contract documents have imposed specific scheduling and/or phasing requirements or where it is determined by the Authority to be in the best interest of the public, the Authority may process, for approval by the new York State Department of Labor, requests for Overtime Dispensation on certain specific operations and, in the event approval is granted, there shall be no adjustments therefore in any bid prices.

SPECIAL NOTE
STATE PREVAILING WAGE RATES

The Contractor shall ensure that workers are paid the appropriate wages and supplemental (fringe) benefits. Throughout the contract, the Contractor shall obtain and pay workers in accordance with periodic wage rate schedule updates from the NYS Department of Labor (NYSDOL). Wage rate amendments and supplements are available on the NYSDOL web site at **www.labor.state.ny.us.** All changes or clarification of labor classification(s) and applicability of prevailing wage rates shall be obtained in writing from the Office of the Director, NYSDOL Bureau of Public Work.

The NYSDOL prevailing wage rate schedule for this contract has been determined and is available on the internet. The prevailing wage rate schedule is accessed by visiting the NYSDOL web site, navigating to the appropriate web page, and entering the Prevailing Rate Case No. (PRC#). The PRC# is provided on NYSDOL Form PW-200 included in this contract Proposal.

A copy of the project specific prevailing wage rate schedule will be provided to the successful bidder upon award of the contract. Upon written request, the schedule will be provided by the Thruway Authority to prospective bidders without internet access.

Andrew M. Cuomo, Governor

Roberta Reardon, Commissioner

NYS Thruway Authority

Leo Gallagher, Civiol Engineer 1
200 Southern Boulvard
Albany NY 12209-2098

Schedule Year	2016
Date Requested	07/06/2016
PRC#	2016006738

Location	Henrietta and Batavia Maint Se
Project ID#	D214509
Project Type	TAB 16-34A/D214509 Wash Bay Installation at vehicle storage buildings at West Henrietta and Batavia Maintenance Sites, Interchanges 46 and 48, M.P. 362.4 and M.P. 390.13 in Buffalo Division in Monroe

PREVAILING WAGE SCHEDULE FOR ARTICLE 8 PUBLIC WORK PROJECT

Attached is the current schedule(s) of the prevailing wage rates and prevailing hourly supplements for the project referenced above. A unique Prevailing Wage Case Number (PRC#) has been assigned to the schedule(s) for your project.

The schedule is effective from July 2016 through June 2017. All updates, corrections, posted on the 1st business day of each month, and future copies of the annual determination are available on the Department's website www.labor.state.ny.us. Updated PDF copies of your schedule can be accessed by entering your assigned PRC# at the proper location on the website.

It is the responsibility of the contracting agency or its agent to annex and make part, the attached schedule, to the specifications for this project, when it is advertised for bids and /or to forward said schedules to the successful bidder(s), immediately upon receipt, in order to insure the proper payment of wages.

Please refer to the "General Provisions of Laws Covering Workers on Public Work Contracts" provided with this schedule, for the specific details relating to other responsibilities of the Department of Jurisdiction.

Upon completion or cancellation of this project, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

NOTICE OF COMPLETION / CANCELLATION OF PROJECT

Date Completed: _____ Date Cancelled: _____

Name & Title of Representative: _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

General Provisions of Laws Covering Workers on Article 8 Public Work Contracts

Introduction

The Labor Law requires public work contractors and subcontractors to pay laborers, workers, or mechanics employed in the performance of a public work contract not less than the prevailing rate of wage and supplements (fringe benefits) in the locality where the work is performed.

Responsibilities of the Department of Jurisdiction

A Department of Jurisdiction (Contracting Agency) includes a state department, agency, board or commission: a county, city, town or village; a school district, board of education or board of cooperative educational services; a sewer, water, fire, improvement and other district corporation; a public benefit corporation; and a public authority awarding a public work contract.

The Department of Jurisdiction (Contracting Agency) awarding a public work contract MUST obtain a Prevailing Rate Schedule listing the hourly rates of wages and supplements due the workers to be employed on a public work project. This schedule may be obtained by completing and forwarding a "Request for wage and Supplement Information" form (PW 39) to the Bureau of Public Work. The Prevailing Rate Schedule MUST be included in the specifications for the contract to be awarded and is deemed part of the public work contract.

Upon the awarding of the contract, the law requires that the Department of Jurisdiction (Contracting Agency) furnish the following information to the Bureau: the name and address of the contractor, the date the contract was let and the approximate dollar value of the contract. To facilitate compliance with this provision of the Labor Law, a copy of the Department's "Notice of Contract Award" form (PW 16) is provided with the original Prevailing Rate Schedule.

The Department of Jurisdiction (Contracting Agency) is required to notify the Bureau of the completion or cancellation of any public work project. The Department's PW 200 form is provided for that purpose.

Both the PW 16 and PW 200 forms are available for completion online.

Hours

No laborer, worker, or mechanic in the employ of a contractor or subcontractor engaged in the performance of any public work project shall be permitted to work more than eight hours in any day or more than five days in any week, except in cases of extraordinary emergency. The contractor and the Department of Jurisdiction (Contracting Agency) may apply to the Bureau of Public Work for a dispensation permitting workers to work additional hours or days per week on a particular public work project.

There are very few exceptions to this rule. Complete information regarding these exceptions is available on the "4 Day / 10 Hour Work Schedule" form (PW 30R).

Wages and Supplements

The wages and supplements to be paid and/or provided to laborers, workers, and mechanics employed on a public work project shall be not less than those listed in the current Prevailing Rate Schedule for the locality where the work is performed. If a prime contractor on a public work project has not been provided with a Prevailing Rate Schedule, the contractor must notify the Department of Jurisdiction (Contracting Agency) who in turn must request an original Prevailing Rate Schedule form the Bureau of Public Work. Requests may be submitted by: mail to NYSDOL, Bureau of Public Work, State Office Bldg. Campus, Bldg. 12, Rm. 130, Albany, NY 12240; Fax to Bureau of Public Work (518) 485-1870; or electronically at the NYSDOL website www.labor.state.ny.us.

Upon receiving the original schedule, the Department of Jurisdiction (Contracting Agency) is REQUIRED to provide complete copies to all prime contractors who in turn MUST, by law, provide copies of all applicable county schedules to each subcontractor and obtain from each subcontractor, an affidavit certifying such schedules were received. If the original schedule expired, the contractor may obtain a copy of the new annual determination from the NYSDOL website www.labor.state.ny.us.

The Commissioner of Labor makes an annual determination of the prevailing rates. This determination is in effect from July 1st through June 30th of the following year. The annual determination is available on the NYSDOL website www.labor.state.ny.us.

Payrolls and Payroll Records

Every contractor and subcontractor MUST keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. Payrolls must be maintained for at least three (3) years from the project's date of completion. At a minimum, payrolls must show the following information for each person employed on a public work project: Name, Address, Last 4 Digits of Social Security Number, Classification(s) in which the worker was employed, Hourly wage rate(s) paid, Supplements paid or provided, and Daily and weekly number of hours worked in each classification.

Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury. The Department of Jurisdiction (Contracting Agency) shall collect, review for facial validity, and maintain such payrolls.

In addition, the Commissioner of Labor may require contractors to furnish, with ten (10) days of a request, payroll records sworn to as their validity and accuracy for public work and private work. Payroll records include, by are not limited to time cards, work description sheets, proof that supplements were provided, cancelled payroll checks and payrolls. Failure to provide the requested information within the allotted ten (10) days will result in the withholding of up to 25% of the contract, not to exceed $100,000.00. If the contractor or subcontractor does not maintain a place of business in New York State and the amount of the contract exceeds $25,000.00, payroll records and certifications must be kept on the project worksite.

The prime contractor is responsible for any underpayments of prevailing wages or supplements by any subcontractor.

All contractors or their subcontractors shall provide to their subcontractors a copy of the Prevailing Rate Schedule specified in the public work contract as well as any subsequently issued schedules. A failure to provide these schedules by a contractor or subcontractor is a violation of Article 8, Section 220-a of the Labor Law.

All subcontractors engaged by a public work project contractor or its subcontractor, upon receipt of the original schedule and any subsequently issued schedules, shall provide to such contractor a verified statement attesting that the subcontractor has received the Prevailing Rate Schedule and will pay or provide the applicable rates of wages and supplements specified therein. (See NYS Labor Laws, Article 8 . Section 220-a).

Determination of Prevailing Wage and Supplement Rate Updates Applicable to All Counties

The wages and supplements contained in the annual determination become effective July 1st whether or not the new determination has been received by a given contractor. Care should be taken to review the rates for obvious errors. Any corrections should be brought to the Department's attention immediately. It is the responsibility of the public work contractor to use the proper rates. If there is a question on the proper classification to be used, please call the district office located nearest the project. Any errors in the annual determination will be corrected and posted to the NYSDOL website on the first business day of each month. Contractors are responsible for paying these updated rates as well, retroactive to July 1st.

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. To the extent possible, the Department posts rates in its possession that cover periods of time beyond the July 1st to June 30th time frame covered by a particular annual determination. Rates that extend beyond that instant time period are informational ONLY and may be updated in future annual determinations that actually cover the then appropriate July 1st to June 30th time period.

Withholding of Payments

When a complaint is filed with the Commissioner of Labor alleging the failure of a contractor or subcontractor to pay or provide the prevailing wages or supplements, or when the Commissioner of Labor believes that unpaid wages or supplements may be due, payments on the public work contract shall be withheld from the prime contractor in a sufficient amount to satisfy the alleged unpaid wages and supplements, including interest and civil penalty, pending a final determination.

When the Bureau of Public Work finds that a contractor or subcontractor on a public work project failed to pay or provide the requisite prevailing wages or supplements, the Bureau is authorized by Sections 220-b and 235.2 of the Labor Law to so notify the financial officer of the Department of Jurisdiction (Contracting Agency) that awarded the public work contract. Such officer MUST then withhold or cause to be withheld from any payment due the prime contractor on account of such contract the amount indicated by the Bureau as sufficient to satisfy the unpaid wages and supplements, including interest and any civil penalty that may be assessed by the Commissioner of Labor. The withholding continues until there is a final determination of the underpayment by the Commissioner of Labor or by the court in the event a legal proceeding is instituted for review of the determination of the Commissioner of Labor.

The Department of Jurisdiction (Contracting Agency) shall comply with this order of the Commissioner of Labor or of the court with respect to the release of the funds so withheld.

Summary of Notice Posting Requirements

The current Prevailing Rate Schedule must be posted in a prominent and accessible place on the site of the public work project. The prevailing wage schedule must be encased in, or constructed of, materials capable of withstanding adverse weather conditions and be titled "PREVAILING RATE OF WAGES" in letters no smaller than two (2) inches by two (2) inches.

The "Public Work Project" notice must be posted at the beginning of the performance of every public work contract, on each job site.

Every employer providing workers. compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers. Compensation Board in a conspicuous place on the jobsite.

Every employer subject to the NYS Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers, notices furnished by the State Division of Human Rights.

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the NYS Department of Labor.

Apprentices

Employees cannot be paid apprentice rates unless they are individually registered in a program registered with the NYS Commissioner of Labor. The allowable ratio of apprentices to journeyworkers in any craft classification can be no greater than the statewide building trade ratios promulgated by the Department of Labor and included with the Prevailing Rate Schedule. An employee listed on a payroll as an apprentice who is not registered as above or is performing work outside the classification of work for which the apprentice is indentured, must be paid the prevailing journeyworker's wage rate for the classification of work the employee is actually performing.

NYSDOL Labor Law, Article 8, Section 220-3, require that only apprentices individually registered with the NYS Department of Labor may be paid apprenticeship rates on a public work project. No other Federal or State Agency of office registers apprentices in New York State.

Persons wishing to verify the apprentice registration of any person must do so in writing by mail, to the NYSDOL Office of Employability Development / Apprenticeship Training, State Office Bldg. Campus, Bldg. 12, Albany, NY 12240 or by Fax to NYSDOL Apprenticeship Training (518) 457-7154. All requests for verification must include the name and social security number of the person for whom the information is requested.

The only conclusive proof of individual apprentice registration is written verification from the NYSDOL Apprenticeship Training Albany Central office. Neither Federal nor State Apprenticeship Training offices outside of Albany can provide conclusive registration information.

It should be noted that the existence of a registered apprenticeship program is not conclusive proof that any person is registered in that program. Furthermore, the existence or possession of wallet cards, identification cards, or copies of state forms is not conclusive proof of the registration of any person as an apprentice.

Interest and Penalties

In the event that an underpayment of wages and/or supplements is found:

- Interest shall be assessed at the rate then in effect as prescribed by the Superintendent of Banks pursuant to section 14-a of the Banking Law, per annum from the date of underpayment to the date restitution is made.
- A Civil Penalty may also be assessed, not to exceed 25% of the total of wages, supplements, and interest due.

Debarment

Any contractor or subcontractor and/or its successor shall be ineligible to submit a bid on or be awarded any public work contract or subcontract with any state, municipal corporation or public body for a period of five (5) years when:

- Two (2) willful determinations have been rendered against that contractor or subcontractor and/or its successor within any consecutive six (6) year period.
- There is any willful determination that involves the falsification of payroll records or the kickback of wages or supplements.

Criminal Sanctions

Willful violations of the Prevailing Wage Law (Article 8 of the Labor Law) may be a felony punishable by fine or imprisonment of up to 15 years, or both.

Discrimination

No employee or applicant for employment may be discriminated against on account of age, race, creed, color, national origin, sex, disability or marital status.

No contractor, subcontractor nor any person acting on its behalf, shall by reason of race, creed, color, disability, sex or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates (NYS Labor Law, Article 8, Section 220-e(a)).

No contractor, subcontractor, nor any person acting on its behalf, shall in any manner, discriminate against or intimidate any employee on account of race, creed, color, disability, sex, or national origin (NYS Labor Law, Article 8, Section 220-e(b)).

The Human Rights Law also prohibits discrimination in employment because of age, marital status, or religion.

There may be deducted from the amount payable to the contractor under the contract a penalty of $50.00 for each calendar day during which such person was discriminated against or intimidated in violation of the provision of the contract (NYS Labor Law, Article 8, Section 220-e(c)).

The contract may be cancelled or terminated by the State or municipality. All monies due or to become due thereunder may be forfeited for a second or any subsequent violation of the terms or conditions of the anti-discrimination sections of the contract (NYS Labor Law, Article 8, Section 220-e(d)).

Every employer subject to the New York State Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers notices furnished by the State Division of Human Rights.

Workers' Compensation

In accordance with Section 142 of the State Finance Law, the contractor shall maintain coverage during the life of the contract for the benefit of such employees as required by the provisions of the New York State Workers' Compensation Law.

A contractor who is awarded a public work contract must provide proof of workers' compensation coverage prior to being allowed to begin work.

The insurance policy must be issued by a company authorized to provide workers' compensation coverage in New York State. Proof of coverage must be on form C-105.2 (Certificate of Workers' Compensation Insurance) and must name this agency as a certificate holder.

If New York State coverage is added to an existing out-of-state policy, it can only be added to a policy from a company authorized to write workers' compensation coverage in this state. The coverage must be listed under item 3A of the information page.

The contractor must maintain proof that subcontractors doing work covered under this contract secured and maintained a workers' compensation policy for all employees working in New York State.

Every employer providing worker's compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers' Compensation Board in a conspicuous place on the jobsite.

Unemployment Insurance

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the New York State Department of Labor.

Andrew M. Cuomo, Governor

Roberta Reardon, Commissioner

NYS Thruway Authority

Leo Gallagher, Civiol Engineer 1
200 Southern Boulvard
Albany NY 12209-2098

Schedule Year	2016
Date Requested	07/06/2016
PRC#	2016006738

Location	Henrietta and Batavia Maint Se
Project ID#	D214509
Project Type	TAB 16-34A/D214509 Wash Bay Installation at vehicle storage buildings at West Henrietta and Batavia Maintenance Sites, Interchanges 46 and 48, M.P. 362.4 and M.P. 390.13 in Buffalo Division in Monroe

Notice of Contract Award

New York State Labor Law, Article 8, Section 220.3a requires that certain information regarding the awarding of public work contracts, be furnished to the Commissioner of Labor. One "Notice of Contract Award" (PW 16, which may be photocopied), **MUST** be completed for **EACH** prime contractor on the above referenced project.

Upon notifying the successful bidder(s) of this contract, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

Contractor Information

All information must be supplied

Federal Employer Identification Number: _____

Name: _____

Address: _____

_____

City: _____ State: _____ Zip: _____

Amount of Contract: $_____

Approximate Starting Date: ____/____/____

Approximate Completion Date: ____/____/____

Contract Type:

[ ] (01) General Construction
[ ] (02) Heating/Ventilation
[ ] (03) Electrical
[ ] (04) Plumbing
[ ] (05) Other : _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

IMPORTANT NOTICE

FOR

CONTRACTORS & CONTRACTING AGENCIES

Social Security Numbers on Certified Payrolls

The Department of Labor is cognizant of the concerns of the potential for misuse or inadvertent disclosure of social security numbers. Identity theft is a growing problem and we are sympathetic to contractors' concerns with regard to inclusion of this information on payrolls if another identifier will suffice.

For these reasons, ***the substitution of the use of the last four digits of the social security number on certified payrolls submitted to contracting agencies on public work projects is now acceptable to the Department of Labor.***

NOTE: This change does not affect the Department's ability to request and receive the entire social security number from employers during the course of its public work / prevailing wage investigations.

To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND

Budget Policy & Reporting Manual

B-610

Public Work Enforcement Fund

effective date December 7, 2005

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1. Purpose and Scope:

This Item describes the Public Work Enforcement Fund (the Fund, PWEF) and its relevance to State agencies and public benefit corporations engaged in construction or reconstruction contracts, maintenance and repair, and announces the recently-enacted increase to the percentage of the dollar value of such contracts that must be deposited into the Fund. This item also describes the roles of the following entities with respect to the Fund:

- New York State Department of Labor (DOL),
- The Office of the State of Comptroller (OSC), and
- State agencies and public benefit corporations.

2. Background and Statutory References:

DOL uses the Fund to enforce the State's Labor Law as it relates to contracts for construction or reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law. State agencies and public benefit corporations participating in such contracts are required to make payments to the Fund.

Chapter 511 of the Laws of 1995 (as amended by Chapter 513 of the Laws of 1997, Chapter 655 of the Laws of 1999, Chapter 376 of the Laws of 2003 and Chapter 407 of the Laws of 2005) established the Fund.

3. Procedures and Agency Responsibilities:

The Fund is supported by transfers and deposits based on the value of contracts for construction and reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law, into which all State agencies and public benefit corporations enter.

Chapter 407 of the Laws of 2005 increased the amount required to be provided to this fund to .10 of one-percent of the total cost of each such contract, to be calculated at the time agencies or public benefit corporations enter into a new contract or if a contract is amended. The provisions of this bill became effective August 2, 2005.

To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND

OSC will report to DOL on all construction-related ("D") contracts approved during the month, including contract amendments, and then DOL will bill agencies the appropriate assessment monthly. An agency may then make a determination if any of the billed contracts are exempt and so note on the bill submitted back to DOL. For any instance where an agency is unsure if a contract is or is not exempt, they can call the Bureau of Public Work at the number noted below for a determination. Payment by check or journal voucher is due to DOL within thirty days from the date of the billing. DOL will verify the amounts and forward them to OSC for processing.

For those contracts which are not approved or administered by the Comptroller, monthly reports and payments for deposit into the Public Work Enforcement Fund must be provided to the Administrative Finance Bureau at the DOL within 30 days of the end of each month or on a payment schedule mutually agreed upon with DOL.

Reports should contain the following information:

- Name and billing address of State agency or public benefit corporation;
- State agency or public benefit corporation contact and phone number;
- Name and address of contractor receiving the award;
- Contract number and effective dates;
- Contract amount and PWEF assessment charge (if contract amount has been amended, reflect increase or decrease to original contract and the adjustment in the PWEF charge); and
- Brief description of the work to be performed under each contract.

Checks and Journal Vouchers, payable to the "New York State Department of Labor" should be sent to:

Department of Labor
Administrative Finance Bureau-PWEF Unit
Building 12, Room 464
State Office Campus
Albany, NY 12240

Any questions regarding billing should be directed to NYSDOL's Administrative Finance Bureau-PWEF Unit at (518) 457-3624 and any questions regarding Public Work Contracts should be directed to the Bureau of Public Work at (518) 457-5589.

Construction Industry
Fair Play Act

Required Posting For Labor Law
Article 25-B § 861-d

Construction industry employers must post the "Construction Industry Fair Play Act" notice in a prominent and accessible place on the job site.

Failure to post the notice can result in penalties of up to $1,500 for a first offense and up to $5,000 for a second offense.

The posting is included as part of this wage schedule. Additional copies may be obtained from the NYS DOL website, www.labor.ny.gov.

If you have any questions concerning the Fair Play Act, please call the State Labor Department toll-free at 1-866-435-1499 or email us at: dol.misclassified@labor.state.ny.us .

New York State Department of Labor
Required Notice under Article 25-B of the Labor Law

ATTENTION ALL EMPLOYEES, CONTRACTORS AND SUBCONTRACTORS:
YOU ARE COVERED BY THE
CONSTRUCTION INDUSTRY FAIR PLAY ACT

The law says that you are an employee unless:

- You are free from direction and control in performing your job AND
- You perform work that is not part of the usual work done by the business that hired you AND
- You have an independently established business

Your employer cannot consider you to be an independent contractor unless all three of these facts apply to your work.

IT IS AGAINST THE LAW FOR AN EMPLOYER TO MISCLASSIFY EMPLOYEES AS INDEPENDENT CONTRACTORS OR PAY EMPLOYEES OFF-THE-BOOKS.

Employee rights. If you are an employee:

- You are entitled to state and federal worker protections such as
  - unemployment benefits, if unemployed through no fault of your own, able to work, and otherwise qualified
  - workers' compensation benefits for on-the-job injuries
  - payment for wages earned, minimum wage, and overtime (under certain conditions)
  - prevailing wages on public work projects
  - the provisions of the National Labor Relations Act and
  - a safe work environment
- It is a violation of this law for employers to retaliate against anyone who asserts their rights under the law. Retaliation subjects an employer to civil penalties, a private lawsuit or both.

Independent Contractors: If you are an independent contractor*:*

- You must pay all taxes required by New York State and Federal Law.

Penalties for paying off-the-books or improperly treating employees as independent contractors:

- **Civil Penalty** — First Offense: up to $2,500 per employee.
  Subsequent Offense(s): up to $5,000 per employee.

- **Criminal Penalty** — First Offense: Misdemeanor - up to 30 days in jail, up to a $25,000 fine and debarment from performing Public Work for up to one year.
  Subsequent Offense(s): Misdemeanor - up to 60 days in jail, up to a $50,000 fine and debarment from performing Public Work for up to 5 years.

If you have questions about your employment status or believe that your employer may have violated your rights and you want to file a complaint, call the Department of Labor at 1(866)435-1499 or send an email to dol.misclassified@labor.state.ny.us. All complaints of fraud and violations are taken seriously and you can remain anonymous.

Employer Name:

IA 999 (09/10)

WORKER NOTIFICATION

(Labor Law §220, paragraph a of subdivision 3-a)

Effective February 24, 2008

This provision is an addition to the existing prevailing wage rate law, Labor Law §220, paragraph a of subdivision 3-a. It requires contractors and subcontractors to provide written notice to all laborers, workers or mechanics of the *prevailing wage rate* for their particular job classification *on each pay stub**. It also requires contractors and subcontractors to *post a notice* at the beginning of the performance of every public work contract *on each job site* that includes the telephone number and address for the Department of Labor and a statement informing laborers, workers or mechanics of their right to contact the Department of Labor if he/she is not receiving the proper prevailing rate of wages and/or supplements for his/her particular job classification. The required notification will be provided with each wage schedule, may be downloaded from our website *www.labor.state.ny.us* or made available upon request by contacting the Bureau of Public Work at 518-457-5589.

* In the event that the required information will not fit on the pay stub, an accompanying sheet or attachment of the information will suffice.

(11.11)

New York State Department of Labor
Bureau of Public Work

Attention Employees

THIS IS A:

PUBLIC WORK PROJECT

If you are employed on this project as a **worker, laborer, or mechanic** you are entitled to receive the **prevailing wage and supplements rate** for the classification at which you are working.

Chapter 629 of the Labor Laws of 2007:

These wages are set by law and must be posted at the work site. They can also be found at: www.labor.ny.gov

If you feel that you have not received proper wages or benefits, please call our nearest office.*

Albany	(518) 457-2744	Patchogue	(631) 687-4882
Binghamton	(607) 721-8005	Rochester	(585) 258-4505
Buffalo	(716) 847-7159	Syracuse	(315) 428-4056
Garden City	(516) 228-3915	Utica	(315) 793-2314
New York City	(212) 932-2419	White Plains	(914) 997-9507
Newburgh	(845) 568-5156		

* For New York City government agency construction projects, please contact the Office of the NYC Comptroller at (212) 669-4443, or www.comptroller.nyc.gov – click on Bureau of Labor Law.

Contractor Name: _____

Project Location: _____

OSHA 10-hour Construction

Safety and Health Course – S1537-A

Effective July 18, 2008

This provision is an addition to the existing prevailing wage rate law, Labor Law §220, section 220-h. It requires that on all public work projects of at least $250,000.00, all laborers, workers and mechanics working on the site, be certified as having successfully completed the OSHA 10-hour construction safety and health course. It further requires that the advertised bids and contracts for every public work contract of at least $250,000.00, contain a provision of this requirement.

NOTE: ***The OSHA 10 Legislation only applies to workers on a public work project that are required, under Article 8, to receive the prevailing wage.***

Where to find OSHA 10-hour Construction Course

1. NYS Department of Labor website for scheduled outreach training at:

   www.labor.state.ny.us/workerprotection/safetyhealth/DOSH_ONSITE_CONSULTATION.shtm

2. OSHA Training Institute Education Centers:

   Rochester Institute of Technology OSHA Education Center
   Rochester, NY
   Donna Winter
   Fax (585) 475-6292
   e-mail: dlwtpo@rit.edu
   (866) 385-7470 Ext. 2919
   www.rit.edu/~outreach/course.php3?CourseID=54

   Atlantic OSHA Training Center
   UMDNJ – School of Public Health
   Piscataway, NJ
   Janet Crooks
   Fax (732) 235-9460
   e-mail: crooksje@umdnj.edu
   (732) 235-9455
   https://ophp.umdnj.edu/wconnect/ShowSchedule.awp?~~GROUP~AOTCON~10~

   Atlantic OSHA Training Center
   University at Buffalo
   Buffalo, New York
   Joe Syracuse
   Fax (716) 829-2806
   e-mail:mailto:japs@buffalo.edu
   (716) 829-2125
   http://www.smbs.buffalo.edu/CENTERS/trc/schedule_OSHA.php

   Keene State College
   Manchester, NH
   Leslie Singleton
   e-mail: lsingletin@keene.edu
   (800) 449-6742
   www.keene.edu/courses/print/courses_osha.cfm

3. List of trainers and training schedules for OSHA outreach training at:

   www.OutreachTrainers.org

Requirements for OSHA 10 Compliance

Chapter 282 of the Laws of 2007, codified as Labor Law 220-h took effect on July 18, 2008. The statute provides as follows:

The advertised specifications for every contract for public work of $250,000.00 or more must contain a provision requiring that every worker employed in the performance of a public work contract shall be certified as having completed an OSHA 10 safety training course. The clear intent of this provision is to require that all employees of public work contractors, required to be paid prevailing rates, receive such training "prior to the performing any work on the project."

The Bureau will enforce the statute as follows:

All contractors and sub contractors must attach a copy of proof of completion of the OSHA 10 course to the first certified payroll submitted to the contracting agency and on each succeeding payroll where any new or additional employee is first listed.

Proof of completion may include but is not limited to:

- Copies of bona fide course completion card (*Note: Completion cards do not have an expiration date.*)
- Training roster, attendance record of other documentation from the certified trainer pending the issuance of the card.
- Other valid proof

**A certification by the employer attesting that all employees have completed such a course is not sufficient proof that the course has been completed.

Any questions regarding this statute may be directed to the New York State Department of Labor, Bureau of Public Work at 518-485-5696.

IMPORTANT INFORMATION

Regarding Use of Form PW30R

"Employer Registration for Use of 4 Day / 10 Hour Work Schedule"

To use the '4 Day / 10 Hour Work Schedule':

There MUST be a *Dispensation of Hours (PW30)* in place on the project

AND

You MUST register your intent to work 4 / 10 hour days, by completing the PW30R Form.

REMEMBER…

The '4 Day / 10 Hour Work Schedule' applies ONLY to Job Classifications and Counties listed on the PW30R Form.

Do not write in any additional Classifications or Counties.

(**Please note** : For each Job Classification check the individual wage schedule for specific details regarding their 4/10 hour day posting.)

Instructions for Completing Form PW30R

"Employer Registration for Use of 4 Day / 10 Hour Work Schedule"

Before completing Form PW30R check to be sure …

- There is a *Dispensation of Hours* in place on the project.
- The 4 Day / 10 Hour Work Schedule applies to the Job Classifications you will be using.
- The 4 Day / 10 Hour Work Schedule applies to the County / Counties where the work will take place.

Instructions (Type or Print legibly):

Contractor Information:

- Enter the Legal Name of the business, FEIN, Street Address, City, State, Zip Code; the Company's Phone and Fax numbers; and the Company's email address (if applicable)
- Enter the Name of a Contact Person for the Company along with their Phone and Fax numbers, and the personal email address (if applicable)

Project Information:

- Enter the Prevailing Rate Case number (PRC#) assigned to this project
- Enter the Project Name / Type (i.e. Smithtown CSD – Replacement of HS Roof)
- Enter the Exact Location of Project (i.e. Smithtown HS, 143 County Route #2, Smithtown,NY; Bldgs. 1 & 2)
- If you are a Subcontractor, enter the name of the Prime Contractor for which you work
- On the Checklist of Job Classifications -
  - Go to pages 2 and 3 of the form
  - Place a checkmark in the box to the right of the Job Classification you are choosing
  - Mark all Job Classifications that apply

    ****Do not write in any additional Classifications or Counties.****

Requestor Information:

- Enter the name of the person submitting the registration, their title with the company , and the date the registration is filled out

Return Completed Form:

- **Mail** the completed PW30R form (3 pages) to: NYSDOL Bureau of Public Work, SOBC – Bldg.12 – Rm.130, Albany, NY 12240 -***OR -***
- **Fax** the completed PW30R form (3 pages) to: NYSDOL Bureau of Public Work at (518)485-1870

585

NEW YORK STATE OF OPPORTUNITY. | Department of Labor

Bureau of Public Work
Harriman State Office Campus
Building 12 - Room 130
Albany, New York 12240
Phone - (518) 457-5589 Fax - (518) 485-1870

Employer Registration for Use of 4 Day / 10 Hour Work Schedule

Before completing Form PW30R check to be sure …
There is a *Dispensation of Hours* in place on the project.
The 4 Day / 10 Hour Work Schedule applies to the Job Classifications you will be using.
The 4 Day / 10 Hour Work Schedule applies to the County / Counties where the work will take place.

Please Type or Print the Requested Information

When completed …
Mail to NYSDOL Bureau of Public Work, SOBC, Bldg. 12, Rm.130, Albany, NY 12240
-or-
Fax to NYSDOL Bureau of Public Work at (518) 485-1870

Contractor Information

Company Name: _____ FEIN: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Phone Number _____ Fax Number: _____ Email Address: _____

Contact Person: _____

Phone No: _____ Fax No: _____ Email: _____

Project Information

Project PRC#: _____ Project Name/Type: _____

Exact Location of Project: _____ County: _____

(If you are Subcontractor)
Prime Contractor Name: _____

Job Classification(s) to Work 4/10 Schedule: *(Choose all that apply on Job Classification Checklist - Pages 3 -7)*
**** Do not write in any additional Classifications or Counties****

Requestor Information

Name: _____

Title: _____ Date : _____

Please use the list below with the number assigned to each county as a reference to the corresponding numbers listed in the following pages under "Entire Counties" & "Partial Counties".

1. Albany County
2. Allegany County
3. Bronx County
4. Broome County
5. Cattaraugus County
6. Cayuga County
7. Chautauqua County
8. Chemung County
9. Chenango County
10. Clinton County
11. Columbia County
12. Cortland County
13. Delaware County
14. Dutchess County
15. Erie County
16. Essex County
17. Franklin County
18. Fulton county
19. Genesee County
20. Greene County
21. Hamilton County
22. Herkimer County
23. Jefferson County
24. Kings County (Brooklyn)
25. Lewis County
26. Livingston County
27. Madison County
28. Monroe County
29. Montgomery County
30. Nassau County
31. New York County (Manhattan)
32. Niagara County
33. Oneida County
34. Onondaga County
35. Ontario County
36. Orange County
37. Orleans County
38. Oswego County
39. Otsego County
40. Putnam County
41. Queens County
42. Rensselaer County
43. Richmond County (Staten Island)
44. Rockland County
45. Saint Lawrence County
46. Saratoga County
47. Schenectady County
48. Schoharie County
49. Schuyler County
50. Seneca County
51. Steuben County
52. Suffolk County
53. Sullivan County
54. Tioga County
55. Tompkins County
56. Ulster County
57. Warren county
58. Washington County
59. Wayne County
60. Westchester County
61. Wyoming County
62. Yates County

Job Classification Checklist

(Place a checkmark by all classifications that will be using the 4/10 schedule)

**** Do not write in any additional Classifications or Counties****

Job Classification	Tag #	Entire Counties	Partial Counties	Check Box
Carpenter-Building	276B-All	7	2 ,5	
Carpenter-Building	276B-Cat	15	5	
Carpenter - Building	276-B--LIV	26, 28, 35, 59	61	
Carpenter-Building	276B-Gen	19, 32, 37	61	
Carpenter-Floor Layers	276B-FL-Liv	26, 28, 35, 59	61	
Carpenter-Heavy&Highway	276HH-All	2, 5, 7		
Carpenter-Heavy&Highway	276HH-Erie	15		
Carpenter-Heavy&Highway	276HH- Gen	19, 32, 37, 61		
Carpenter-Heavy&Highway	276HH-Liv	26, 28, 35, 59		
Carpenter-Residential	276R-All	7	2, 5	
Carpenter - Building	277B-Bro	4, 54		
Carpenter - Building	277B-CAY	6, 50, 62		
Carpenter - Building	277B-CS	8, 12, 49, 51, 55	2	
Carpenter - Building	277 JLS	23, 25, 45		
Carpenter - Building	277 omh	22, 27, 33		
Carpenter - Building	277 On	34		
Carpenter - Building	277 Os	38		
Carpenter - Building	277CDO Bldg	9, 13, 39		
Carpenter - Heavy&Highway	277CDO HH	9, 13, 39		
Carpenter - Heavy&Highway	277HH-BRO	4, 6, 8, 12, 49, 50, 51, 54, 55, 62,22, 23, 25, 27, 33, 34, 38, 45		
Carpenter - Building	291B-Alb	1, 18, 20, 29, 42, 47, 48		
Carpenter - Building	291B-Cli	10, 16, 17		
Carpenter - Building	291B-Ham	21, 57, 58		
Carpenter - Building	291B-Sar	46		
Carpenter - Heavy&Highway	291HH-Alb	1, 10, 16, 17,18, 20, 21, 29, 42, 46, 47, 48, 57, 58		
Electrician	25m	30, 52		
Electrician-Teledata Cable Splicer	43	12, 22, 27, 33, 38	6, 9, 34, 39, 55, 59	

Job Classification Checklist

(Place a checkmark by all classifications that will be using the 4/10 schedule)

**** Do not write in any additional Classifications or Counties****

Job Classification	Tag #	Entire Counties	Partial Counties	Check Box
Electrician	86	26, 28	19, 35, 37, 59, 61	☐
Electrician	840Teledata and 840 Z1	62	6, 34, 35, 50, 59	☐
Electrician	910	10, 16, 17, 23, 25, 45		☐
Electrician Lineman	1049Line/Gas	30, 41, 52		☐
Electrician Lineman	1249a	1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 32, 33, 34, 35, 36, 37, 38, 39, 40, 42, 44, 46, 47, 48, 49, 50, 45, 51, 53, 54, 55, 56, 57, 58, 59, 61, 62		☐
Electrical Lineman	1249a West	60		☐
Electrical Lineman	1249a-LT	1, 2, 4, 5, 6, 7, 8, 9, 10, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 32, 33, 34, 35, 37, 38, 39, 42, 46, 47, 48, 49, 50, 45, 51, 53, 54, 55, 57, 58, 59, 61, 62		☐
Electrical Lineman	1249aREG8LT	11, 14, 36, 40, 44, 56		☐
Electrical Lineman	1249aWestLT	60		☐
Elevator Constructor	138	11, 14, 20, 36, 40, 53, 56	13, 44, 60	☐
Elevator Constructor	14	2, 5, 7, 15, 19, 32, 37, 61		☐
Elevator Constructor	27	8, 26, 28, 35, 49, 50, 51, 59, 62		☐
Elevator Constructor	35	1, 10, 16, 18, 21, 22, 29, 39, 42, 46, 47, 48, 57, 58		☐
Elevator Constructor	62.1	4, 6, 9, 12, 23, 25, 27, 33, 34, 38, 45, 54, 55	13	☐
Glazier	201	1, 10, 11, 16, 17, 18, 20, 21, 29, 42, 46, 47, 48, 57, 58		☐
Glazier	660r	2, 5, 7, 15, 19, 32, 37, 61		☐
Glazier	660	2, 5, 7, 15, 19, 32, 37, 61		☐
Glazier	677.1	23, 25, 26, 28, 35, 45, 50, 59, 62		☐
Glazier	677Z-2	6, 12, 22, 27, 33, 34, 38		☐
Glazier	677z3	4, 8, 9, 13, 39, 49, 51, 54, 55		☐
Glazier	677r.2	6, 12, 22, 27, 33, 34, 38		☐
Insulator - Heat & Frost	30-Syracuse	4, 6, 8, 9, 12, 22, 23, 25, 27, 33, 34, 38, 39, 49, 50, 45, 54, 55		☐
Laborers- Tunnel	157	47	18, 29, 46	☐
Laborers- Heavy & Highway	157h/h	47	18, 29, 46	☐

Job Classification Checklist

(Place a checkmark by all classifications that will be using the 4/10 schedule)

**** Do not write in any additional Classifications or Counties****

Job Classification	Tag #	Entire Counties	Partial Counties	Check Box
Laborers- Tunnel	190	1, 42, 58	11, 20, 46	☐
Laborers- Heavy & Highway	190 h/h	1, 42, 58	11, 20, 46	☐
Laborers- Heavy & Highway	35/2h	21, 22, 27, 33	18, 29	☐
Laborers- Tunnel	35T	21, 22, 27, 33	18, 29	☐
Laborers - Building	785(7)	4	9, 13, 54	☐
Laborers - Building	785B-CS	8, 51	49	☐
Laborers- Heavy & Highway	7-785b	12, 55	49, 54	☐
Laborers Heavy & Highway	785(7)	4	9, 13, 54	☐
Laborer - Heavy & Highway	785HH-CS	8, 51	49	☐
Laborer - Building	621b	2, 7	5	☐
Laborer - Residential	621r	2, 7	5	☐
Mason-Building	2TS.1	1, 10,11, 16, 17, 18, 20, 21, 29, 42, 46, 47, 48, 57, 58		☐
Mason-Building	2TS.2	22, 23, 25, 33, 45	27	☐
Mason-Building	2TS.3	6, 34, 38	27	☐
Mason-Building	2b-on	34		☐
Mason-Building	2b.1	1, 11, 18, 20, 21, 29, 42, 46, 47, 48, 58	57	☐
Mason-Building	2b.2	22, 33	25	☐
Mason-Building	2b.3	6, 34	27	☐
Mason-Building	2b.4	38		☐
Mason-Building	2b.5	23	25	☐
Mason-Building	2b.6	45		☐
Mason-Building	2b.8	10, 16, 17	57	☐
Mason-Building	3b-Co-Z2	8, 49, 51	2	☐
Mason-Building	3B-Z1	19, 26, 28, 35, 50, 59, 61, 62		☐
Mason-Building-Residential	3B-Z1R	19, 26, 28, 35, 50, 59, 61, 62		☐
Mason-Building	3B-Bing-Z2	4, 9, 13, 39, 54		☐
Mason-Building	3B-Ith-Z2	12, 55		☐

Job Classification Checklist

(Place a checkmark by all classifications that will be using the 4/10 schedule)

**** Do not write in any additional Classifications or Counties****

Job Classification	Tag #	Entire Counties	Partial Counties	Check Box
Mason-Building	3B-Jam-Z2	7	2, 5	☐
Mason-Building-Residential	3B-Jam-Z2R	2, 4, 8, 7, 9, 12, 39, 13, 49, 51, 54, 55	5	☐
Mason-Building	3B-Z3	15, 32	5	☐
Mason-Building	3B-Z3.Orleans	37		☐
Mason-Residential	3B-Z3R	15, 32	5	☐
Mason-Residential	3B-Z3R.Orleans	37		☐
Mason-Heavy Highway	3h	2, 4, 8, 7, 9, 12, 13, 19, 26, 28, 35, 37, 39, 49, 50, 51, 54, 55, 59, 61, 62	5, 15, 32	☐
Mason-Tile Finisher	3TF-Z1	19, 26, 28, 35, 50, 59, 61, 62		☐
Mason-Tile Finisher	3TF-Z2	2, 4, 8, 7, 9, 12, 13, 39, 49, 51, 54, 55	5	☐
Mason-Tile Finisher	3TF-Z3	15, 32, 37	5	☐
Mason-Tile Finisher	3TF-Z1R	19, 26, 28, 35, 50, 59, 61, 62		☐
Mason-Tile Finisher	3TF-Z2R	2, 4, 7, 9, 12, 13, 39, 49, 51, 54, 55	5	☐
Mason-Tile Finisher	3TF-Z3R	15, 32, 37	5	☐
Mason-Tile Setter	3TS-Z1	19, 26, 28, 35, 50, 59, 61, 62		☐
Mason-Tile Setter Residential	3TS-Z1R	19, 26, 28, 35, 50, 59, 61, 62		☐
Mason-Tile Setter	3TS-Z2	2, 4, 7, 8, 9, 12, 13, 39, 49, 51, 54, 55	5	☐
Mason-Tile Setter Residential	3TS-Z2R	2, 4, 7, 8, 9, 12, 13, 39, 49, 51, 54, 55	5	☐
Mason-Tile Setter Residential	3TS-Z3R	15, 32, 37	5	☐
Mason - Building/Heavy&Highway	780	3, 24, 30, 31, 41, 43, 52		☐
Operating Engineer - Heavy/Highway	137H/H	40, 60	14	☐
Operating Engineer - Heavy& Highway	158-832H	2, 8, 26, 28, 35, 49, 51, 59, 62	19	☐
Operating Engineer - Heavy& Highway	158-H/H	1, 4, 9, 10, 11, 14, 16, 17, 18, 20, 21, 22, 29, 39, 42, 46, 47, 48, 54, 57, 58		☐
Operating Engineer - Heavy& Highway	158-545h	6, 12, 23, 25, 27, 33, 38, 45, 50, 55		☐
Painter	1456-LS	1, 3, 10, 11, 14, 16, 17, 18, 20, 21, 24, 29, 30, 31, 36, 40, 41, 42, 43, 44, 46, 47, 48, 52, 53, 56, 57, 58, 60		☐
Painter	150	28, 59, 62	26, 35	☐

Job Classification Checklist

(Place a checkmark by all classifications that will be using the 4/10 schedule)

**** Do not write in any additional Classifications or Counties****

Job Classification	Tag #	Entire Counties	Partial Counties	Check Box
Painter	178 B	4, 9, 54		☐
Painter	178 E	8, 49	51	☐
Painter	178 I	12, 55		☐
Painter	178 O	13, 39		☐
Painter	31	6, 22, 27, 33, 34, 50	25, 35, 38	☐
Painter	38.O		38	☐
Painter	38.W	23, 45	25	☐
Painter	4-Buf,Nia,Olean	2, 15, 19, 32, 37, 61	5, 7, 26, 51	☐
Painter	4-Jamestown		5, 7	☐
Painter	38.O		38	☐
Painter	38.W	23, 45	25	☐
Painter	4-Buf,Nia,Olean	2, 15, 19, 32, 37, 61	5, 7, 26, 51	☐
Painter	4-Jamestown		5, 7	☐
Sheetmetal Worker	46	26, 28, 35, 50, 59, 62		☐
Sheetmetal Worker	46r	26, 28, 35, 50, 59, 62		☐
Teamsters-Heavy&Highway	294h/h	1, 11, 18, 20, 29, 42, 46, 47, 48, 58	57	☐
Teamsters-Heavy&Highway	317bhh	6, 12, 50, 51, 55, 62	2	☐
Teamsters-Building/Heavy&Highway	456	40, 60		☐

Introduction to the Prevailing Rate Schedule

Information About Prevailing Rate Schedule

This information is provided to assist you in the interpretation of particular requirements for each classification of worker contained in the attached Schedule of Prevailing Rates.

Classification

It is the duty of the Commissioner of Labor to make the proper classification of workers taking into account whether the work is heavy and highway, building, sewer and water, tunnel work, or residential, and to make a determination of wages and supplements to be paid or provided. It is the responsibility of the public work contractor to use the proper rate. If there is a question on the proper classification to be used, please call the district office located nearest the project. District office locations and phone numbers are listed below.

Prevailing Wage Schedules are issued separately for "General Construction Projects" and "Residential Construction Projects" on a county-by-county basis.

General Construction Rates apply to projects such as: Buildings, Heavy & Highway, and Tunnel and Water & Sewer rates.

Residential Construction Rates generally apply to construction, reconstruction, repair, alteration, or demolition of one family, two family, row housing, or rental type units intended for residential use.

Some rates listed in the Residential Construction Rate Schedule have a very limited applicability listed along with the rate. Rates for occupations or locations not shown on the residential schedule must be obtained from the General Construction Rate Schedule. Please contact the local Bureau of Public Work office before using Residential Rate Schedules, to ensure that the project meets the required criteria.

Paid Holidays

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

Overtime

At a minimum, all work performed on a public work project in excess of eight hours in any one day or more than five days in any workweek is overtime. However, the specific overtime requirements for each trade or occupation on a public work project may differ. Specific overtime requirements for each trade or occupation are contained in the prevailing rate schedules.

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays.

The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Supplemental Benefits

Particular attention should be given to the supplemental benefit requirements. In most cases the payment or provision of supplements is for each hour worked (noted in the schedule as 'Per hour worked'). Some classifications require the payment or provision of supplements for each hour paid (noted in the schedule as 'Per hour paid'), which require supplements to be paid or provided at a premium rate for premium hours worked. Some classifications may also require the payment or provision of supplements for paid holidays on which no work is performed.

Effective Dates

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. The rate listed is valid until the next effective rate change or until the new annual determination which takes effect on July 1 of each year. All contractors and subcontractors are required to pay the current prevailing rates of wages and supplements. If you have any questions please contact the Bureau of Public Work or visit the New York State Department of Labor website (www.labor.state.ny.us) for current wage rate information.

Apprentice Training Ratios

The following are the allowable ratios of registered Apprentices to Journey-workers.

For example, the ratio 1:1,1:3 indicates the allowable initial ratio is one Apprentice to one Journeyworker. The Journeyworker must be in place on the project before an Apprentice is allowed. Then three additional Journeyworkers are needed before a second Apprentice is allowed. The last ratio repeats indefinitely. Therefore, three more Journeyworkers must be present before a third Apprentice can be hired, and so on.

Please call Apprentice Training Central Office at (518) 457-6820 if you have any questions.

Title (Trade)	Ratio
Boilermaker (Construction)	1:1,1:4
Boilermaker (Shop)	1:1,1:3
Carpenter (Bldg.,H&H, Pile Driver/Dockbuilder)	1:1,1:4
Carpenter (Residential)	1:1,1:3

Electrical (Outside) Lineman	1:1,1:2
Electrician (Inside)	1:1,1:3
Elevator/Escalator Construction & Modernizer	1:1,1:2
Glazier	1:1,1:3
Insulation & Asbestos Worker	1:1,1:3
Iron Worker	1:1,1:4
Laborer	1:1,1:3
Mason	1:1,1:4
Millwright	1:1,1:4
Op Engineer	1:1,1:5
Painter	1:1,1:3
Plumber & Steamfitter	1:1,1:3
Roofer	1:1,1:2
Sheet Metal Worker	1:1,1:3
Sprinkler Fitter	1:1,1:2

If you have any questions concerning the attached schedule or would like additional information, please contact the nearest BUREAU of PUBLIC WORK District Office or write to:

New York State Department of Labor
Bureau of Public Work
State Office Campus, Bldg. 12
Albany, NY 12240

District Office Locations:	Telephone #	FAX #
Bureau of Public Work - Albany	518-457-2744	518-485-0240
Bureau of Public Work - Binghamton	607-721-8005	607-721-8004
Bureau of Public Work - Buffalo	716-847-7159	716-847-7650
Bureau of Public Work - Garden City	516-228-3915	516-794-3518
Bureau of Public Work - Newburgh	845-568-5287	845-568-5332
Bureau of Public Work - New York City	212-932-2419	212-775-3579
Bureau of Public Work - Patchogue	631-687-4882	631-687-4902
Bureau of Public Work - Rochester	585-258-4505	585-258-4708
Bureau of Public Work - Syracuse	315-428-4056	315-428-4671
Bureau of Public Work - Utica	315-793-2314	315-793-2514
Bureau of Public Work - White Plains	914-997-9507	914-997-9523
Bureau of Public Work - Central Office	518-457-5589	518-485-1870

SAMPLE AGREEMENT

NEW YORK STATE THRUWAY AUTHORITY

SAMPLE AGREEMENT

CONTRACT NO:

This **AGREEMENT**, entered into this _____day of_____ 201___, by the **NEW YORK STATE THRUWAY AUTHORITY** (hereinafter referred to as the "**AUTHORITY**") having its principal office at 200 Southern Boulevard, Albany, NY 12209 in the County of Albany and State of New York and

☐ a corporation organized and existing under the laws of the State of

☐ a partnership, consisting of

☐ an individual conducting business as

the location of whose principal office is

hereinafter called the "**CONTRACTOR**".

WITNESSETH: That the Authority and the Contractor for the consideration hereinafter named agree as follows**:**

ARTICLE 1. WORK TO BE DONE. The Contractor shall (a) furnish all the materials, appliances, tools and labor of every kind required, and construct and complete in the most substantial and skillful manner, the construction, improvement or reconstruction of the project on or before the completion date of as further described in ARTICLE 4, and as generally identified and shown on the plans entitled: in the Division of the New York State Thruway in County(s) which constitutes Contract in accordance with the "Standard Specifications" of the New York State Department of Transportation, which contain the information for bidders; form of proposal, agreement, and bonds; general specifications and conditions or contract; materials of construction; and payment Items; and (b) do everything required by the Contract (Contract Documents) as defined herein. The contract closing date, used to keep the contract open for final processing and payment purposes after the completion date is .

The Contractor agrees that its proposal contained herein is based upon performing all the work of the Contract in accordance with a schedule that will result in the completion of the total works by the Date of Completion of the Contract and all intermediate stage and phase completion requirements of the contract, while adhering to all restrictions set forth in the Schedule and Suspension of Work, the Thruway Traffic Plan, and the General and Special Notes, and that the work will be performed at the unit bid prices, as shown on the contract documents and as detailed in the specifications and notes, utilizing the Labor Force, Qualified Disadvantaged, Women Owned and Minority Owned Subcontractor Entrepreneurs and Methods and Materials of Construction as described in the Contract Documents and any incorporated Addenda thereto, and conduct its operations in accordance with the Vehicle and Traffic Law, the Rules and Regulations of the NYS Thruway Authority, and the Thruway Operating Rules and General and Special Notes that are part of this proposal. The Contractor further agrees its proposal is not based upon the assumption that any specifications, traffic restrictions, scheduling or phasing/staging requirements will be waived, an extension of Contract Completion Date will be granted, a labor dispensation will be granted, substitution of non-approved products, alternatives or claimed functional equivalents for Specified Construction Materials and Methods will be allowed, or any Value Engineering Proposals will be entertained and approved by the New York State Thruway Authority, and any requests for a substitution, equivalent or alternate, which it proposes, will be accompanied by an agreed price analysis establishing an applicable credit or illustrating cost equal to or greater than the bid amount.

ARTICLE 2. DOCUMENTS FORMING THE CONTRACT. The Contract (and Contract Documents) shall be deemed to include the advertisement for proposals; the contractor's proposal; the Schedule for Participation By Disadvantaged Business Enterprise Participation goals; the agreement; the "Standard Specifications" including all addenda thereto referred to above; the plans; any addenda and/or amendments to specifications if the same are issued prior to date of receipt of proposal and all provisions required by law to be inserted in the contract whether actually inserted or not. Appendix A, standard clauses for all N.Y State contracts, is attached hereto and is hereby made a part of this agreement as if set forth fully herein.

ARTICLE 3. EXAMINATION OF DOCUMENTS AND SITE. The Contractor agrees that before making its proposal it carefully examined the contract documents, together with the site of the proposed work, as well as its surrounding territory, and is informed regarding all of the conditions affecting the work to be done and labor and materials to be furnished for the completion of this contract, including the existence of poles, wires, pipes, and other facilities and structures of municipal and other public service corporations on, over or under the site, except latent conditions that meet the requirements of §104-04 and §109-05, and that its information was secured by personal investigation and research.

ARTICLE 4. DATE OF COMPLETION. The Contractor further agrees that it will begin the work herein embraced within ten days of the effective date hereof, unless the consent of the Authority, in writing, is given to begin at a later date, and that it will prosecute the same so that it shall be entirely completed and performed on or before the completion date shown in Article 1.

No extension beyond the date of completion fixed by the terms of this contract shall be effective unless in writing signed by the Authority. Such extension shall be for such time and upon such terms and conditions as shall be fixed by the Authority, which may include the assessment of liquidated damages and a charge for engineering and inspection expenses actually incurred upon the work, including engineering and inspection expenses incurred upon the work by railroad companies on contracts for grade crossing elimination. Notice of application for such extension shall be filed with the Chief Engineer, Department of Engineering of the Authority at least fifteen days prior to the date of completion fixed by the terms of this agreement.

ARTICLE 5. ALTERATIONS AND OMISSIONS. The said work shall be performed in accordance with the true intent and meaning of the contract documents without any further expense of any nature whatsoever to the Authority other than the consideration named in this agreement.

The Authority reserves the right at any time during the progress of the work, to alter the plans or omit any portion of the work as it may deem reasonably necessary for the public interest; making allowances for additions and deductions with compensation made in accordance with the Standard Specifications, for this work without constituting grounds for any claim by the contractor for allowance for damages or for loss of anticipated profits, or for any variations between the approximate quantities and the quantities of the work as done.

ARTICLE 6. NO COLLUSION OR FRAUD. The Contractor hereby agrees that the only person or persons interested as principal or principals in the bid or proposal submitted by the Contractor for this contract are named therein, and that no person other than those mentioned therein has any interest in the above-mentioned proposal or in securing of the award, and that this contract has been secured without any connection with any person or persons other than those named, and that the proposal is in all respects fair and was prepared and the contract was secured without collusion or fraud and that neither any officer nor employee of the New York State Thruway Authority or the State Department of Transportation or either of them has or shall have a financial interest in the performance of the contract or in the supplies, work or business to which it relates, or in any portion of the profits thereof. (See also Section 139-a and 139-b of the State Finance Law referred to in the Standard Specifications, which are made a part of this contract.)

ARTICLE 7. CONTRACT PAYMENTS. As the work progresses in accordance with the contract and in a manner that is satisfactory to the Authority, the Authority hereby agrees to make payments to the Contractor therefor, based upon the proposal attached hereto and made a part hereof, as follows: The Authority shall, once in each month and on such days as it may fix, make an estimate of the quantity of work done and of material which has actually been put in place in accordance with the terms and conditions of the contract, during the preceding month, and compute the value thereof and pay to the Contractor the moneys due in accordance with Public Authorities Law Section 2880, as detailed in 21 NYCRR Part 109 (Prompt Payment). No monthly estimate shall be rendered unless the Contractor has provided acceptable documentation with regard to actions taken to comply with the M/WBE goals of the contract (see also §109-06 Contract Payments) and the value of the work done equals 5% of the contract amount or $1,000, whichever is the lesser. Semi-monthly estimates may be rendered provided (a) the value of the work performed in two successive weeks

is more than $100,000 or (b) the Chairman of the Authority deems it to be for the best interest of the Authority to do so. When a performance bond is approved, 5% shall be retained from each progress payment or estimate until final acceptance of the work.

ARTICLE 8. NO PAYMENT DUE TO CONTRACTOR'S NON-COMPLIANCE. It is further agreed that so long as any lawful or proper direction concerning the work or material given by the Chief Engineer, Department of Engineering of the New York State Thruway Authority, or his/her representative, shall remain uncomplied with, the Contractor shall not be entitled to have any estimate made for the purpose of payment, nor shall any estimate be rendered on account of work done or material furnished until such lawful or proper direction aforesaid has been fully and satisfactorily complied with.

ARTICLE 9. FINAL ACCEPTANCE OF WORK. When in the opinion of the Thruway Division Director, a Contractor has fully performed the work under the contract, the Thruway Division Director shall recommend to the Chief Engineer, Department of Engineering of the New York State Thruway Authority, the acceptance of the work so completed. If the Chief Engineer, Department of Engineering accepts the recommendation of the Thruway Division Director, he/she shall thereupon by letter notify the Contractor of such acceptance, and similarly to Subdivision 7, section 38 of the Highway Law, release up to 70% of the money held as retainage. Copies of such acceptance shall be sent to other interested parties. Prior to final acceptance of the work by the Chief Engineer, Department of Engineering of the New York State Thruway Authority or a designee, the contract work may be inspected, accepted and approved by other agencies and/or municipalities who will have jurisdiction of the work after final acceptance.

Final acceptance shall be final and conclusive except for defects not readily ascertainable by the New York State Thruway Authority, actual or constructive, fraud, gross mistakes amounting to fraud or other errors which the Contractor knew or should have known about as well as the New York State Thruway Authority's rights under any warranty or guarantee. Final acceptance may be revoked by the New York State Thruway Authority at any time prior to the issuance of the final check, upon the New York State Thruway Authority's discovery of such defects, mistakes, fraud or errors in the work.

ARTICLE 10. FINAL PAYMENT. After the final acceptance of the work, the Engineer shall prepare a final agreement of the work performed and the materials placed and shall compute the value of such work and materials under and according to the terms of the contract. This agreement shall be certified, as to its correctness, by the Engineer. Upon approval of such final agreement by the Director, Office of Construction Management, it shall be submitted to the Chief Engineer, Department of Engineering for final approval. The right, however, is hereby reserved to the Chief Engineer, Department of Engineering to reject the whole or any portion of the final agreement, should the said certificate of the Engineer be found or known to be inconsistent with the terms of the agreement or otherwise improperly given. All certificates, upon which partial payments may have been made being merely estimates, shall be subject to correction in the final certificate or final agreement.

ARTICLE 11. RIGHT TO SUSPEND WORK AND CANCEL CONTRACT. It is further mutually agreed that if at any time during the prosecution of the work the Authority shall determine that the work upon the contract is not being performed according to the contract or for the best interest of the Authority, the execution of the work by the Contractor may be temporarily suspended by the Chief Engineer, Department of Engineering, who may then proceed with the work under its own direction in such manner as will accord with the contract specifications and be for the best interests of the Authority; or he/she may terminate the contractor's employment under the contract while it is in progress, and thereupon proceed with the work, in affirmance of the contract, by contract negotiated or publicly let, by the use of its own forces, by calling upon the surety to complete the work in accordance with the plans and specifications or by a combination of any such methods; or he/she may cancel the contract and either readvertise and relet in accordance with the provisions of Section 38 of the Highway Law, or complete the work under its own direction in such manner as will accord with the contract specifications and be for the interests of the Authority; any excess in the cost of completing the contract beyond the price for which it was originally awarded shall be charged to and paid by the Contractor failing to perform the work or its surety; all in pursuance of the provisions of Section 40 of the Highway Law.

Whenever the New York State Thruway Authority determines to suspend or stop work under the contract, a written notice sent by mail to the Contractor at its address and to the sureties at their respective addresses, shall be sufficient notice of its action in the premises.

The Thruway Authority reserves the right to terminate this contract in the event that the certification provided by the Contractor in regard to compliance with New York State Finance Law Section 139-j and 139-k was intentionally false or intentionally incomplete.

ARTICLE 12. DETERMINATION AS TO VARIANCES. In any case of any ambiguity in the plans, specifications or maps, or between any of them, the matter must be immediately submitted to the Chief Engineer, Department of Engineering, who shall adjust the same, and his/her decision in relation thereto shall be final and conclusive upon the parties.

ARTICLE 13. SUCCESSORS AND ASSIGNS. This agreement shall bind the successors, assigns and representatives of the parties hereto.

ARTICLE 14. INTERNATIONAL BOYCOTT PROHIBITION. In accordance with Chapter 406 of the Laws of 1981, the Contractor hereby promises, asserts and represents that neither the Contractor nor any substantially owned or affiliated person, firm, partnership or corporation has participated, is participating or shall participate in an international boycott in violation of the provisions of the United States Export Administration Act of 1969, as amended, or the United States Export Administration Act of 1979, or the effective Regulations of the United States Department of Commerce promulgated under either act.

It is understood further that the Authority in awarding a contract does so in material reliance upon the promise and representation made by the Contractor in the foregoing paragraph and that such contract shall be rendered forfeit and void by the State Comptroller if subsequent to the bid execution date, the Contractor or such owned or affiliated person, firm, partnership or corporation has been convicted of a violation of the aforesaid Acts or Regulations or has been found upon final determination of the United

States Commerce Department or any other appropriate agency of the United States to have violated such Acts or Regulations.

The Contractor agrees to and shall notify the Chief Engineer, Department of Engineering and the Director of the Office of Construction Management and the Director of State Expenditures in the Office of the State Comptroller of any such conviction or final determination of violation within five (5) days thereof.

ARTICLE 15. CERTIFICATION OF STATE FINANCE LAW SECTIONS 139-J AND 139-K. By execution of this agreement the Contractor certifies that all information provided with respect to New York State Finance Law Section 139-j and Section 139-k is complete, true and accurate.

Contract Number:

In addition to the acceptance of this contract, I also certify that original copies of this signature page will be attached to all other exact copies of this contract.

IN-WITNESS WHEREOF, the parties hereto have executed this agreement on the day and year first above written.

By: _____
Chief Engineer

_____
Date

_____
Contractor

Approved as to form

_____
New York State Attorney General

Approved:

Thomas P. DiNapoli
State Comptroller

By: _____

Date: _____

(Acknowledgment by individual contractor)

STATE OF NEW YORK

COUNTY OF _____ ss.:

On this _____ day of _____, 201__,
before me personally came _____ to me known and known to me to be the person described in and who executed the foregoing instrument, and acknowledged that he executed the same.

_____
Notary Public County

(Acknowledgment by co-partnership contractor)

STATE OF NEW YORK

COUNTY OF _____ ss.:

On this _____ day of _____, 201__
before me personally came and appeared _____ to me known and known to me to be the person who executed the above instrument, who, being sworn by me, did for himself depose and say that he is a member of the firm of _____ consisting of himself and _____ and that he executed the foregoing instrument in the firm name of _____ and that he had authority to sign same, and he did duly acknowledge to me that he executed the same as the act and deed of said firm of _____, for the uses and purposes mentioned therein.

_____
Notary Public County

(Acknowledgement of a Corporation)

STATE OF NEW YORK

COUNTY OF _____ ss.:

On this _____day of _____, 201__,
before me personally came _____, to me known and known to me to be the person who executed the above instrument, who being duly sworn by me, did depose and say that he/she resides in _____, that he/she is the _____ of _____, the corporation described in and which executed the above instrument, and that he/she signed his/her name thereto on behalf of said Corporation by order of the Board of Directors of said Corporation.

_____
Notary Public