CONTRACT DOCUMENTS

AND

SPECIFICATIONS

FOR

TOWN OF VESTAL

MEMORIAL POOL RENOVATIONS

CONTRACT NO. 1A – GENERAL CONSTRUCTION CONTRACT NO. 1B – MECHANICAL CONSTRUCTION CONTRACT NO. 1C – PLUMBING CONSTRUCTION CONTRACT NO. 1D – ELECTRICAL CONSTRUCTION

MAY 2023



PREPARED BY:

BARTON & LOGUIDICE, D.P.C. 443 ELECTRONICS PARKWAY LIVERPOOL, NEW YORK 13088

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SECTION 00 00 20

ADVERTISEMENT FOR BIDS

Sealed bids for the furnishing of all labor and material necessary for the Town of Vestal Memorial Pool Renovations will be received by the Town of Vestal Clerk, Town Hall, 605 Vestal Parkway West, Vestal, New York 13850, until 2:00 P.M. local time Tuesday, June 6, 2023, at which time and place they will be publicly opened and read aloud.

Bids will be received for the following Contracts:

Contract No. 1A – General Construction: This work shall include providing all labor, materials, machinery, tools, equipment, and other means of construction necessary and incidental to the completion of the Memorial Pool Renovations. The project includes the work shown on the Plans, and described in these Specifications consisting of general construction. General construction includes, but is not limited to, the following: Demolition of the existing main pool and wading pool, pool deck, bathhouse, pump house and accessories buildings, including all fixtures, piping, domestic hot water heating system, interior and exterior walls and partitions, roof, pool filtration and treatment equipment, asbestos containing materials and other related items. Work shall also include new main pool with supply and drainage system, pool filtration and treatment equipment, pool deck, pool accessories, splash pad with associated controls, piping and drainage system, perimeter fence, shade canopies, new asphalt parking, concrete sidewalks, lawn areas, and other related items. Work shall also include new bathhouse with metal roofing, cmu block walls, interior partitions and finishes, flooring, ceilings, ADA compliant bathrooms, overhead door, man doors, windows, and new pump house with overhead door and man doors, flooring, sump areas, and storage to accommodate the new pool filtration and treatment system, and all other related items.

Contract No. 1B – Mechanical Construction: This work shall include providing all labor, materials, machinery, tools, equipment, and other means of construction necessary and incidental to the completion of the Memorial Pool Renovations. The project includes the work shown on the Plans, and described in these Specifications consisting of mechanical construction. Mechanical Construction includes, but is not limited to, the following: Demolition of existing natural gas service, new HVAC ventilation system for the bathhouse and pump house, and other related items.

Contract No. 1C – Plumbing Construction: This work shall include providing all labor, materials, machinery, tools, equipment, and other means of construction necessary and incidental to the completion of the Memorial Pool Renovations. The project includes the work shown on the Plans, and described in these Specifications consisting of plumbing construction. Plumbing Construction includes, but is not limited to, the following: New plumbing fixtures, fixture rough-in, domestic water service, distribution piping, insulation, valves, domestic hot water heater, sanitary and vent system, and other related items.

Contract No. 1D – Electrical Construction: This work shall include providing all labor, materials, machinery, tools, equipment, and other means of construction necessary and incidental to the completion of the Memorial Pool Renovations. The project includes the work shown on the Plans, and described in these Specifications consisting of electrical construction. Electrical Construction includes, but it not limited to, the following: Demolition of existing electrical service, electrical pole, interior and exterior lighting, outlets, miscellaneous circuits and other related demolition items; and installation of new electrical service, new interior and site lighting, outlets, circuiting, fire alarm, associated circuiting, and other related items.

Additive Bid Items:

Also included is one additive bid item under Contract No. 1A. Refer to Section 00 01 60, "Additional Instructions".

Contract Documents, including Advertisement For Bids, Information For Bidders, Labor and Employment, Additional Instructions, Bid Documents, Agreement, General Conditions, General Requirements, Specifications, Contract Drawings and any Addenda, may be obtained from Barton & Loguidice, D.P.C., by providing contact information to jfelber@bartonandloguidice.com. Download instructions will be provided upon notification.

Each bid must be accompanied by security in an amount not less than five percentum (5%) of the amount of the bid in the form and subject to the conditions provided in the Information for Bidders. No Bidder may withdraw his bid within forty-five (45) days after the actual date of opening thereof.

This is an exempt capital improvement project, and Bidders shall not include in their bid sales and compensating use taxes on the cost of materials which are to be incorporated into the work and which are to be separately sold by the Contractor to the Town of Vestal prior to incorporation into the work of the Contracts.

A Pre-Bid Meeting will be held at the site (209 Clayton Avenue, Vestal, NY) at 11:00 A.M. local time on Tuesday, May 23, 2023. This meeting is optional but all prospective Bidders are urged to attend.

The attention of Bidders is particularly called to the requirements as to conditions of employment to be observed and minimum wage rates to be paid under the Contracts.

The right is reserved to waive any informalities in the Bid and to reject any or all Bids.

END OF SECTION

SECTION 00 01 00

INFORMATION FOR BIDDERS

00 01 00.01 LOCATION OF THE WORK

A. The work under Contract No. 1A, 1B, 1C, and 1D for Town of Vestal Memorial Pool Renovations is located 209 Clayton Avenue, Vestal, New York 13850.

00 01 00.02 DESCRIPTION OF THE WORK

A. The items of work include, but are not necessarily limited to the following:

Contract No. 1A – General Construction: This work shall include providing all labor, materials, machinery, tools, equipment, and other means of construction necessary and incidental to the completion of the Memorial Pool Renovations. The project includes the work shown on the Plans, and described in these Specifications consisting of general construction. General construction includes, but is not limited to, the following: Demolition of the existing main pool and wading pool, pool deck, bathhouse, pump house and accessories buildings, including all fixtures, piping, domestic hot water heating system, interior and exterior walls and partitions, roof, pool filtration and treatment equipment, asbestos containing materials and other related items. Work shall also include new main pool with supply and drainage system, pool filtration and treatment equipment, pool deck, pool accessories, splash pad with associated controls, piping and drainage system, perimeter fence, shade canopies, new asphalt parking, concrete sidewalks, lawn areas, and other related items. Work shall also include new bathhouse with metal roofing, cmu block walls, interior partitions and finishes, flooring, ceilings, ADA compliant bathrooms, overhead door, man doors, windows, and new pump house with overhead door and man doors, flooring, sump areas, and storage to accommodate the new pool filtration and treatment system, and all other related items.

Contract No. 1B – Mechanical Construction: This work shall include providing all labor, materials, machinery, tools, equipment, and other means of construction necessary and incidental to the completion of the Memorial Pool Renovations. The project includes the work shown on the Plans, and described in these Specifications consisting of mechanical construction. Mechanical Construction includes, but is not limited to, the following: Demolition of existing natural gas service, new HVAC ventilation system for the bathhouse and pump house, and other related items.

00 01 00.02 DESCRIPTION OF THE WORK - Continued

Contract No. 1C – Plumbing Construction: This work shall include providing all labor, materials, machinery, tools, equipment, and other means of construction necessary and incidental to the completion of the Memorial Pool Renovations. The project includes the work shown on the Plans, and described in these Specifications consisting of plumbing construction. Plumbing Construction includes, but is not limited to, the following: New plumbing fixtures, fixture rough-in, domestic water service, distribution piping, insulation, valves, domestic hot water heater, sanitary and vent system, and other related items.

Contract No. 1D – Electrical Construction: This work shall include providing all labor, materials, machinery, tools, equipment, and other means of construction necessary and incidental to the completion of the Memorial Pool Renovations. The project includes the work shown on the Plans, and described in these Specifications consisting of electrical construction. Electrical Construction includes, but it not limited to, the following: Demolition of existing electrical service, electrical pole, interior and exterior lighting, outlets, miscellaneous circuits and other related demolition items; and installation of new electrical service, new interior and site lighting, outlets, circuiting, fire alarm, associated circuiting, and other related items.

B. Additive Bid Items:

Also included is one additive bid item under Contract No. 1A. Refer to Section 00 01 60, "Additional Instructions".

00 01 00.03 COMMENCEMENT AND COMPLETION OF THE WORK

- A. Upon execution of the Contract including delivery of the Performance Bond, Labor & Materials Payment Bond and insurance policies and certificates by the Contractor to the Owner and the approval thereof by the Owner's attorney, the Contractor will be notified to proceed with the work. Such notification will be in the form of a letter to proceed from the Engineer.
- B. The Contractor shall give the Engineer at least five (5) days written notice of the date he intends to start work at the site.
- C. All work items of the Contracts shall be substantially completed no later than May 3, 2024, with the work unless such period is extended by the Owner as provided herein.

00 01 00.04 COLLATERAL WORK AND CONDITIONS OF WORK

- A. Each Bidder shall inform himself fully of the conditions relating to the construction of the Project and the employment of labor thereon. Failure to do so will not relieve a successful Bidder, as Contractor, of his obligation to furnish all material and labor necessary to carry out the provisions of his Contract. Insofar as possible, the Contractor, in carrying out the work, shall employ such methods or means as will not cause any interruption of or interference with the work of any other Contractor. (See also Section 00 10 12.01.)
- B. Each Contractor will be required to coordinate his work with the work of other Contracts. Each Contractor will be required to adjust his schedule accordingly.

00 01 00.05 RECEIPT & OPENING OF BIDS

A. The Town of Vestal (herein called the Owner) invites Bids on the attached forms. Bids will be received by the Owner until the time and at the place stated in the attached Advertisement For Bids. Bids must be sealed in envelopes addressed to Town of Vestal Clerk, Town Hall, 605 Vestal Parkway West, Vestal, New York 13850. The outside of the envelope shall bear the name and address of the Bidder and shall be labeled to clearly show the Contract designation for which the Bid is submitted.

00 01 00.06 INFORMALITIES, WAIVERS AND WITHDRAWALS

- A. The Owner may consider informal any Bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities in or reject any or all Bids. Bids which do not contain a price for every numbered item contained in the Bid form will not be accepted.
- B. Any Bid may be withdrawn prior to the scheduled deadline for receipt of Bids or authorized postponement thereof, but no Bid may be withdrawn within forty-five (45) days after the actual date of the opening thereof. Any Bid received after the time and date specified will not be considered, and will be returned unopened.

00 01 00.07 BID PREPARATION

- A. Unless otherwise noted thereon, all blanks on the Bid forms must be appropriately filled in with ink and with both words and figures, and the Bid must be properly executed.
- B. A separate digital file of the Bid forms is provided. Proposers shall print this file in its entirety. Proposers shall complete and submit the Bid forms with the required certifications, State of Surety's Intent and Bid Security. Successful Bidders shall have the Bid Forms inserted into the Contract Documents where appropriate at the time of Contract award.

00 01 00.08 ADDENDA AND INTERPRETATIONS

- A. No verbal interpretation of the intent of any of the Contract Documents will be made before receipt of Bids. Requests for interpretations prior to receipt of Bids must be presented in writing to the Engineer, Barton & Loguidice, D.P.C., 443 Electronics Parkway, Liverpool, New York 13088, and to be given consideration must be received by the Engineer at least seven (7) days prior to the date set for the opening of Bids.
- B. Any interpretation, and any additional information or instruction will, if issued, be in the form of a written Addendum or Addenda distributed to all holders of Contract Documents by the same method that the original documents were distributed, at least five (5) days prior to the date of the opening of Bids.
- C. Failure of any Bidder to receive any such Addendum or interpretation shall not relieve such Bidder from any obligation under this Bid as submitted. All Addenda so issued shall become a part of the Contract Documents.

00 01 00.09 QUALIFICATIONS OF BIDDERS

- A. The Owner reserves the right to make such investigation as he may deem necessary or advisable to determine any Bidder's ability to do the work, and the Bidder shall furnish to the Owner on request all data and information pertinent thereto. The Owner reserves the right to reject any Bid if such investigation fails to satisfy the Owner that the Bidder is fully qualified to do the work.
- B. Conditional Bids will be considered informal and will be rejected.
- C. Immediately following the Canvass of Bids the Low Bidder, if so requested, shall furnish the Owner a sworn and notarized financial statement, and a statement of his qualifications and experience.

00 01 00.10 OBLIGATIONS OF BIDDERS

A. At the time of the opening of Bids, each Bidder will be presumed to have inspected the Site, to have informed himself fully of the conditions relating to the work and labor required for the work, and to have read and acquainted himself with all the Contract Documents. Failure to do so will not relieve the Bidder who is awarded the Contract of his obligation to complete the work for the price or prices bid, or of any other obligation under the Contract. The failure or omission of any Bidder to receive or examine any Contract Documents shall in no way relieve him from any obligation in respect to his Bid.

00 01 00.11 BID SECURITY

- A. Each Bid must be accompanied by cash in United States currency or a certified check of the Bidder in an amount not less than five percent (5%) of the Bid. A Bid Bond, fully executed by the Bidder as principal, and having as surety thereon a surety company approved by the Owner and authorized to do business in New York State, will be accepted in lieu of cash or certified check. Checks should be made payable to the Owner.
- B. Such cash, checks or Bid Bonds will be returned to all except the three lowest Bidders within three working days after the opening of Bids. The remaining deposits will be returned to the three lowest Bidders within three working days after execution of the Contract, or, if no Contract is executed within 45 calendar days after opening of Bids, upon demand of the Bidder at any time thereafter so long as he has not been notified of the acceptance of his Bid.

00 01 00.12 LIQUIDATED DAMAGES FOR FAILURE TO EXECUTE CONTRACT

A. Should the successful Bidder refuse or fail to execute the Contract and Bond within five (5) working days after receipt of notice of the acceptance of his Bid, the security deposited with his Bid shall be forfeited to the Owner as liquidated damages for such refusal or failure.

00 01 00.13 DISCREPANCY IN BIDS

A. In the event a discrepancy exists in any Bid between the prices written in words and the prices written in figures, the prices written in words shall govern. If a discrepancy exists in any Bid between unit prices and the extended totals therefor, the unit prices shall govern. In either of the above cases, the extended totals, and the total of all extensions, shall be corrected, if necessary, and the Bid may not be considered informal.

00 01 00.14 LOWEST BIDDER

A. Bids will be compared on the basis of the Base Bid for each Contract, corrected as necessary in conformance with Article 00 01 00.13, exclusive of any additive bid items. The Owner reserves the right to accept any combination or all of the Additive Bid Items, in addition to the Base Bid, the total of which for each bid will be used in comparison to the other bids received.

00 01 00.15 AWARD OF CONTRACT

- A. The Contract will be awarded to that responsible Bidder whose Base Bid, after corrections and adjustments in addition to none or some of the Additive Bid Items, totals the least number of dollars.
- B. The Owner reserves the right to reject any and all Bids.

END OF SECTION

SECTION 00 01 50

LABOR AND EMPLOYMENT

00 01 50.01 GENERAL

A. The Contractor and every Subcontractor on public works contracts shall comply with Article 8 of the State Labor Law, as amended.

00 01 50.02 POSTING MINIMUM WAGE RATES & KEEPING RECORDS

- A. The Contractor and every Subcontractor on public works contracts shall post in a prominent and accessible place on the Site a legible statement of all wage rates and supplements as specified in the Contract to be paid or provided, all redeterminations of such schedules as the case may be, for the various classes of mechanics, workmen and laborers employed on the work. Other notices to be posted are the Workers' Compensation Law Section 51 notice, the Department of Labor notice that this project is a public work project on which each worker is entitled to receive the prevailing rate of wages and supplements for the occupation at which he or she is working, and all other notices required by law to be posted at the site. The Contractor shall maintain such notices in a legible manner, written in plain English in lettering no smaller than two inches in height and two inches in width, weatherproof, and shall replace any notice or schedule which is damaged, defaced, illegible or removed for any reason.
- B. The Contractor and every Subcontractor shall keep original payrolls or verified transcripts thereof showing the hours and days worked by each workman, mechanic or laborer, the occupation at which he worked, the hourly wage rate paid and the supplements paid or provided, on the Site, when the Contractor or Subcontractor maintains no regular place of business in New York State and where the amount of the Contract is in excess of \$25,000. All other Contractors and Subcontractors shall produce within five days on the Site and upon formal order of the Commissioner of Labor or his designated representative such original payrolls or verified transcripts thereof, as may be deemed necessary to adequately enforce the provisions of this Section.
- C. Notwithstanding the aforementioned requirements, every Contractor and Subcontractor shall submit to the Owner within thirty days after issuance of its first payroll, and every thirty days thereafter, a transcript of the original payroll record, as provided by Article 8 of the Labor Law, subscribed and affirmed as true under penalties of perjury. The original payrolls or transcripts shall be preserved for three years from the completion of the work.

00 01 50.03 NON-DISCRIMINATION AND LABOR PRACTICES

- A. In accordance with Section 220-e of Article 8 of the State Labor Law, the Contractor agrees:
 - 1. That in the hiring of employees for the work of this Contract or any Subcontract, neither he nor any Subcontractor, nor any person acting on behalf of the Contractor, or any Subcontractor, shall by reasons of race, creed, color, 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 his employment relates; and
 - 2. That neither the Contractor, nor any Subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under this Contract on account of race, creed, color, sex, disability or national origin; and
 - 3. That there may be deducted from the amount payable to the Contractor by the Owner, a penalty of Fifty Dollars for each person for each calendar day during which such person was discriminated against or intimidated in violation of the provisions of this Contract; and
 - 4. That this Contract may be cancelled or terminated by the Owner, and all monies due or to become due hereunder may be forfeited, for a second or any subsequent violation of the terms or conditions of this Section of the Contract; and
 - 5. That the aforesaid provisions of this Section covering contracts for the manufacture, sale or distribution of materials, equipment or supplies shall be limited to operations performed within the territorial limits of the State of New York.
 - 6. During the performance of this Contract, the Contractor agrees as follows:
 - a. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, sex, color, disability or national origin, and will take affirmative action to insure that they are afforded equal employment opportunities without discrimination because of race, creed, sex, color or national origin. Such action shall be taken with reference, but not be limited to: recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff or termination, rates of pay or other forms of compensation, and selection for training or retraining, including apprenticeship and on-the-job training.

- b. The Contractor will send to each labor union or representative of workers with which he has or is bound by a collective bargaining or other agreement or understanding, a notice to be provided by the State Division of Human Rights, advising such labor union or representative of the Contractor's agreement under subparagraphs (1) through (7) (hereinafter called "non-discrimination clauses"). If the Contractor was directed to do so by the contracting agency as part of the Bid or negotiation of this Contract, the Contractor shall request such labor union or representative to furnish him with a written statement that such labor union or representative either will affirmatively cooperate, within the limits of its legal and contractual authority, in the implementation of the policy and provisions of these non-discrimination clauses or that it consents and agrees that recruitment, employment and the terms and conditions of employment under this Contract shall be in accordance with the purposes and provisions of these nondiscrimination clauses. If such labor union or representative fails or refuses to comply with such a request that it furnish such a statement, the Contractor shall promptly notify the State Division of Human Rights of such failure or refusal.
- c. The Contractor will post and keep posted in conspicuous places, available to employees and applicants for employment, notices to be provided by the State Division of Human Rights setting forth the substance of the provisions of subparagraphs (1) and (2) and such provisions of the State's laws against discrimination as the State Commissioner of Human Rights shall determine.
- d. The Contractor will state, in all solicitations, or advertisements for employees placed by or on behalf of the Contractor, that all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, sex, color, disability or national origin.
- e. The Contractor will comply with the provisions of Sections 291-299 of the Executive Law and the Civil Rights Law, will furnish all information and reports deemed necessary by the State Commissioner of Human Rights under these non-discrimination clauses and such sections of the Executive Law, and will permit access to his books, records and accounts by the State Commissioner of Human Rights, the Attorney General and the Commissioner of Labor for purposes of investigation to ascertain compliance with these non-discrimination clauses and such sections of the Executive Law and Civil Rights Law.

- f. This Contract may be forthwith cancelled, terminated or suspended, in whole or in part, by the contracting agency upon the basis of a finding made by the State Commissioner of Human Rights that the Contractor has not complied with these nondiscrimination clauses, and the Contractor may be declared ineligible for future contracts made by or on behalf of the State or a public authority or agency of the State, until he satisfies the State Commissioner of Human Rights that he has established and is carrying out a program in conformity with the provisions of these non-discrimination clauses. Such finding shall be made by the State Commissioner of Human Rights after conciliation efforts by the State Division of Human Rights have failed to achieve compliance with these non-discrimination clauses and after verified complaint has been filed with the State Division of Human Rights, notice thereof has been given to the Contractor and an opportunity has been afforded him to be heard publicly before the State Commissioner of Human Rights or his designee. Such sanctions may be imposed and remedies otherwise provided by law.
- g. The Contractor will include the provisions of sub-paragraph (1) through (7) of this paragraph A and in every Subcontract or purchase order in such a manner that such provisions will be binding upon each Subcontractor or vendor as to operations to be performed within the State of New York. The Contractor will take such action in enforcing such provisions of such Subcontract or purchase order as the contracting agency may direct, including sanctions or remedies for non-compliance. If the Contractor becomes involved in or is threatened with litigation with a Subcontractor or vendor as a result of such direction by the contracting agency, the Contractor shall promptly so notify the Attorney General, requesting him to intervene and protect the interest of the State of New York.
- 7. It is hereby agreed that all applicable provisions of the Labor Law of the State of New York shall be carried out in the performance of this Contract.
- 8. This agreement shall be void and of no effect unless the Contractor shall secure compensation insurance for the benefit of, and keep insured during the life of this agreement, such employees engaged therein as are required to be insured by the provisions of the Worker's Compensation Law of the State of New York.

00 01 50.04 LEGAL DAY'S WORK

A. In accordance with Section 220 (2) of Article 8 of the State Labor Law, no laborer, workman or mechanic employed by the Contractor, a Subcontractor or other person doing or contracting to do any part of the work shall be permitted or required to work more than eight hours in any one calendar day or more than five days in any week except in cases of extraordinary emergency including fire, flood or danger to life or property, or in case of national emergency when so proclaimed by the President of the United States.

00 01 50.05 WAGE RATES

- A. In accordance with Section 220 of Article 8 of the State Labor Law, the wages to be paid for a legal day's work, as hereinbefore defined, to laborers, workmen or mechanics employed by the Contractor or Subcontractors, shall be not less than the prevailing rate of wages as hereinafter defined. Each laborer, workman or mechanic employed by the Contractor, Subcontractors, or other person upon or about the work, shall be paid not less than the wages and supplements herein provided.
- B. Any person or corporation that willfully pays or provides less than the stipulated wage scale or supplements shall be guilty of a misdemeanor and upon conviction shall be punished as provided by law.
- C. It shall be the duty of the Commissioner of Labor, or, if the Owner is a city, the comptroller or other analogous officer of such city, to make a determination of the schedule of wages to be paid all laborers, workmen and mechanics employed on the project (if it is a public works project) including supplements for welfare, pension, vacation and other benefits. These supplements include hospital, surgical or medical insurance or benefits, life insurance or death benefits, accidental death or dismemberment insurance, and pension or retirement benefits. If the amount of supplements provided by the employer is less than the total supplements shown on the wage schedule, the difference shall be paid in cash to employees.
- D. The supplements to be provided shall be in accordance with prevailing practices in the locality. The amount for wages and for supplements listed in the schedule in these Contract Documents does not necessarily include all types of prevailing wages and supplements in the locality, and a future determination by the Commissioner of Labor may require the Contractor to pay increased wages or provide additional supplements.

00 01 50.06 VERIFICATION OF AMOUNTS DUE FOR WAGES AND SUPPLEMENTS

- A. In accordance with Section 220-a of Article 8 of the State Labor Law, the New York State schedule of prevailing wages and supplements, as included in this Contract or as subsequently redetermined by the New York State Department of Labor, shall be specifically included in each and every Subcontract, regardless of tier, awarded by the Contractor or his Subcontractors.
- B. Subcontractors, regardless of tier, shall provide to the Contractor a verified statement attesting that the Subcontractor has received and reviewed the prevailing wage rate and supplement schedule and agreeing that it will pay its employees the applicable wages and will pay or provide the supplements specified therein. The Contractor shall submit to the Owner copies of all such verified statements.
- C. The Owner will not make final payment to the Contractor unless and until the Contractor submits the following:
 - 1. verified statements as described in the preceding paragraph
 - 2. certification to the amounts then due from the Contractor to any and all laborers for wages or supplements on account of labor performed upon the work under the Contract
 - 3. certification to the amounts then due from any Subcontractor, regardless of tier, for wages and supplements, on account of labor performed upon the work under the Contract, or shall certify that the Contractor has no knowledge of such amounts owing to or on behalf of any laborers of its Subcontractors.
- D. In the event it is determined by the New York State Commissioner of Labor that the wages and/or supplements of any employees of the Contractor's Subcontractors, regardless of tier, have not been paid or provided pursuant to the appropriate schedule of wages and supplements, the Contractor shall be responsible for payment of such wages or supplements.

00 01 50.07 MINIMUM RATES

- A. New York State Department of Labor wage rates will be in effect on this Project.
- B. The minimum wage rates designated by the Commissioner of Labor of the State of New York are attached. These minimum rates and supplements may be modified during the life of the Contract. If the prevailing wage rates should subsequently be legally modified or increased by any means other than by the action of the Owner, the Contractor shall assume full responsibility for the payment of said increases without recourse to the Owner.

END OF SECTION



Kathy Hochul, Governor

Roberta Reardon, Commissioner

Town of Vestal

Susan Weaver, Senior Managing Engineer Barton & Loguidice, DPC 443 Electronics Parkway Liverpool NY 13088 Schedule Year
Date Requested
PRC#

2022 through 2023 05/10/2023 2023005442

Location Vestal Memorial Pool Facility

Project ID# Contract 1

Project Type Remove existing community pool, bathhouse and filtration system. Replace with new bathhouse, pool, and

filtration system, including site work, utilities and new splash pad

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 2022 through June 2023. 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.ny.gov. 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 "Request for a dispensation to work overtime" form (PW30) and "4 Day / 10 Hour Work Schedule" form (PW 30.1).

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.ny.gov.

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.nv.gov.

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.ny.gov.

Payrolls and Payroll Records

Every contractor and subcontractor MUST keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. As per Article 6 of the Labor law, contractors and subcontractors are required to establish, maintain, and preserve for not less than six (6) years, contemperaneous, true, and accurate payroll records. 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.

The filing of payrolls to the Department of Jurisdiction is a condition of payment. 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, but 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.

Kathy Hochul, Governor

Town of Vestal

Susan Weaver, Senior Managing Engineer Barton & Loguidice, DPC 443 Electronics Parkway Liverpool NY 13088 Schedule Year Date Requested PRC#

2022 through 2023 05/10/2023 2023005442

Roberta Reardon, Commissioner

Location Vestal Memorial Pool Facility

Project ID# Contract 1

Project Type Remove existing community pool, bathhouse and filtration system. Replace with new bathhouse, pool, and

filtration system, including site work, utilities and new splash pad

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 InformationAll information must be supplied

Federal Employer Identification Number:						
Name:						
City: Amount of Contract: Approximate Starting Date: Approximate Completion Date:	State:	Zip: 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

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' concern regarding 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. This change does not affect the Department's ability to request and receive the entire social security number from employers during its public work/ prevailing wage investigations.

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, https://dol.ny.gov/public-work-and-prevailing-wage

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.ny.gov.

Worker Notification: (Labor Law §220, paragraph a of subdivision 3-a)

Effective June 23, 2020

This provision is an addition to the existing 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 and supplement 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 job classification. The required notification will be provided with each wage schedule, may be downloaded from our website *www.labor.ny.gov* or be made available upon request by contacting the Bureau of Public Work at 518-457-5589. *In the event the required information will not fit on the pay stub, an accompanying sheet or attachment of the information will suffice.

(12.20)

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

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.



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. These include:

- Unemployment Insurance benefits, if you are 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 and Unemployment Insurance contributions required by New York State and Federal Law.

Penalties for paying workers 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 or 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 (866) 435-1499 or send an email to dol.misclassified@labor.ny.gov. All complaints of fraud and violations are taken seriously. You can remain anonymous.

Employer Name:

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:

https://dol.ny.gov/public-work-and-prevailing-wage

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:		

Requirements for OSHA 10 Compliance

Article 8 §220-h requires that when the advertised specifications, for every contract for public work, is \$250,000.00 or more the contract 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 518-457-5589.

WICKS

Public work projects are subject to the Wicks Law requiring separate specifications and bidding for the plumbing, heating and electrical work, when the total project's threshold is \$3 million in Bronx, Kings, New York, Queens and, Richmond counties; \$1.5 million in Nassau, Suffolk and Westchester counties; and \$500,000 in all other counties.

For projects below the monetary threshold, bidders must submit a sealed list naming each subcontractor for the plumbing, HVAC and electrical and the amount to be paid to each. The list may not be changed unless the public owner finds a legitimate construction need, including a change in specifications or costs or the use of a Project Labor Agreement (PLA), and must be open to public inspection.

Allows the state and local agencies and authorities to waive the Wicks Law and use a PLA if it will provide the best work at the lowest possible price. If a PLA is used, all contractors shall participate in apprentice training programs in the trades of work it employs that have been approved by the Department of Labor (DOL) for not less than three years. They shall also have at least one graduate in the last three years and use affirmative efforts to retain minority apprentices. PLA's would be exempt from Wicks, but deemed to be public work subject to prevailing wage enforcement.

The Commissioner of Labor shall have the power to enforce separate specification requirement s on projects, and may issue stop-bid orders against public owners for non-compliance.

Other new monetary thresholds, and similar sealed bidding for non-Wicks projects, would apply to certain public authorities including municipal housing authorities, NYC Construction Fund, Yonkers Educational Construction Fund, NYC Municipal Water Finance Authority, Buffalo Municipal Water Finance Authority, Westchester County Health Care Association, Nassau County Health Care Corp., Clifton-Fine Health Care Corp., Erie County Medical Center Corp., NYC Solid Waste Management Facilities, and the Dormitory Authority.

Contractors must pay subcontractors within a 7 days period.

(07.19)

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.

Payrolls and Payroll Records

Contractors and subcontractors are required to establish, maintain, and preserve for not less that six (6) years, contemporaneous, true, and accurate payroll records.

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.

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. Although in most cases the payment or provision of supplements is straight time for all hours worked, some classifications require the payment or provision of supplements, or a portion of the supplements, to be paid or provided at a premium rate for premium hours worked. Supplements may also be required to be paid or provided on paid holidays, regardless of whether the day is worked. The Overtime Codes and Notes listed on the particular wage classification will indicate these conditions as required.

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.ny.gov) 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

Broome County General Construction

Boilermaker 05/01/2023

JOB DESCRIPTION Boilermaker

DISTRICT 1

ENTIRE COUNTIES

Albany, Broome, Chenango, Columbia, Delaware, Essex, Fulton, Greene, Hamilton, Herkimer, Montgomery, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Tioga, Warren, Washington

WAGES

Per hour

07/01/2022 01/01/2023 01/01/2024 Additional \$ 39.34 \$ 40.09 + \$1.30

SUPPLEMENTAL BENEFITS

Per hour

Boilermaker

Journeyperson \$ 25.65 \$25.95 + 1.24* + 1.49*

OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 15, 25) on HOLIDAY PAGE

Note: When a holiday falls on Sunday, the day observed by the State or Nation shall be observed, and when Christmas Day and New Year's fall on Saturday, Friday will be observed as the holiday.

REGISTERED APPRENTICES

Wages per hour

(1/2) year terms at the following percentage of Journeyman's wage.

1st	2nd	3rd	4th	5th	6th	7th	8th	
65%	65%	70%	75%	80%	85%	90%	95%	
Supplement	al Benefits per	hour						
07/01/2022	1st	2nd	3rd	4th	5th	6th	7th	8th
0770 172022	19.15	19.15	20.08	21.00	21.93	22.87	23.79	24.72
	+1.24*	+1.24*	+1.24*	+1.24*	+1.24*	+1.24*	+1.24*	+1.24*
01/01/2023								
	19.35	19.35	20.29	21.23	22.17	23.13	24.06	25.01
	+1.49*	+1.49*	+1 49*	+1 49*	+1 49*	+1 49*	+1 49*	+1 49*

^{*} This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

1-197

Carpenter - Building 05/01/2023

JOB DESCRIPTION Carpenter - Building

DISTRICT 2

ENTIRE COUNTIES

WAGES

Broome, Tioga

WAGES				
Per hour:	07/01/2022	07/01/2023	07/01/2024	07/01/2025
		Additional	Additional	Additional
Carpenter	\$ 29.30	\$ 1.30	\$ 1.30	\$ 1.30
Floor Coverer	29.30	1.30	1.30	1.30
Carpet Layer	29.30	1.30	1.30	1.30
Dry-Wall	29.30	1.30	1.30	1.30
Diver-Wet Day	36.25	0.00	0.00	0.00
Diver -Dry Day	30.30	1.30	1.30	1.30
Diver Tender	30.30	1.30	1.30	1.30

NOTE ADDITIONAL AMOUNTS PAID FOR THE FOLLOWING WORK LISTED BELOW (per hour worked):

^{*} This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

⁻ Pile Drivers/Dock Builders shall receive \$0.25 per hour over the journeyman's rate of pay when performing piledriving/dock building work.

- Certified welders shall receive \$1.00 per hour over the journeyman's rate of pay when the employee is required to be certified and performs DOT or ABS specified welding work
- When an employee performs work within a contaminated area on a State and/or Federally designated hazardous waste site, and where relevant State and/or Federal regulations require employees to be furnished and use or wear required forms of personal protection, then the employee shall receive his regular hourly rate plus \$1.50 per hour.
- Depth pay for Divers based upon deepest depth on the day of the dive (per diem payment):

0' to 80' no additional fee

81'to 100' additional \$.50 per foot 101'to 150' additional \$0.75 per foot 151'and deeper additional \$1.25 per foot

- Penetration pay for Divers based upon deepest penetration on the day of the dive (per diem payment):

0' to 50' no additional fee

51' to 100' additional \$.75 per foot

101' and deeper additional \$1.00 per foot

- Diver rates applies to all hours worked on dive day.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 20.56

OVERTIME PAY

See (B, E, *E2, Q) on OVERTIME PAGE

* Note - Saturday is also payable at straight time if the employee misses work, except where a doctor's or hospital verification of illness is produced Monday through Friday when work was available to the employee.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

Note: Any holiday which occurs on Sunday shall be observed the following Monday. If Christmas falls on a Saturday, it shall be observed on the prior Friday.

REGISTERED APPRENTICES

CARPENTER APPRENTICES

Wages per hour (1040 hour terms at the following percentage of journeyman's base wage):

 1st
 2nd
 3rd
 4th
 5th

 55%
 60%
 65%
 70%
 80%

Supplemental Benefits per hour:

\$ 12.40 \$ 12.40 \$ 15.05 \$ 15.05

PILEDRIVER/DOCK BUILDER APPRENTICES

Wages per hour (1300 hour terms at the following percentage of journeyman's base wage):

1st 2nd 3rd 4th 55%* 60%* 70%* 80%*

*Pile Driver/Dock Builder apprentices shall receive an additional \$0.25 per hour worked when performing piledriving/dock building work.

Supplemental Benefits per hour:

\$ 12.40 \$ 12.40 \$ 15.05 \$ 15.05

LINOLEUM, RESILIENT TILE, AND CARPET LAYER APPRENTICES

Wages per hour (1300 hour terms at the following percentage of journeyman's base wage):

1st 2nd 3rd 4th 55% 60% 70% 80%

Supplemental Benefits per hour:

\$ 12.40 \$ 12.40 \$ 15.05 \$ 15.05

ADDITIONAL AMOUNTS PAID PER HOUR WORKED TO APPRENTICES FOR SPECIFIC TYPES OF WORK PERFORMED:

- Certified welders shall receive \$1.00 per hour over the apprentices rate of pay when the apprentice is required to be certified and performs DOT or ABS specified welding work
- When an apprentice performs work within a contaminated area on a State and/or Federally designated hazardous waste site, and where relevant State and/or Federal regulations require the apprentice to be furnished and use or wear required forms of personal protection, then the apprentice shall receive his regular hourly rate plus \$1.50 per hour.

2-277B-Bro

05/01/2023

JOB DESCRIPTION Carpenter - Building / Heavy&Highway

DISTRICT 2

DISTRICT 2

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

PARTIAL COUNTIES

Orange: The area lying on Northern side of Orange County demarcated by a line drawn from the Bear Mountain Bridge continuing west to the Bear Mountain Circle, continue North on 9W to the town of Cornwall where County Road 107 (also known as Quaker Rd) crosses under 9W, then east on County Road 107 to Route 32, then north on Route 32 to Orrs Mills Rd, then west on Orrs Mills Rd to Route 94, continue west and south on Route 94 to the Town of Chester, to the intersection of Kings Highway, continue south on Kings Highway to Bellvale Rd, west on Bellvale Rd to Bellvale Lakes Rd, then south on Bellvale Lakes Rd to Kain Rd, southeast on Kain Rd to Route 17A, then north and southeast along Route 17A to Route 210, then follow Route 210 to NJ Border.

WAGES

Wages per hour:	07/01/2022	07/01/2023	07/01/2024
		Additional	Additional
Carpenter - ONLY for			
Artificial Turf/Synthetic			
Sport Surface	\$ 33.08	\$ 2.25*	\$2.25*

^{*}To be allocated at a later date

Note - Does not include the operation of equipment. Please see Operating Engineers rates.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 25.45

OVERTIME PAY

See (B, E, Q, X) on OVERTIME PAGE

HOLIDAY

Paid: See (5) on HOLIDAY PAGE
Overtime: See (5, 6, 16) on HOLIDAY PAGE

Notes:

When a holiday falls upon a Saturday, it shall be observed on the preceding Friday. Whan a holiday falls upon a Sunday, it shall be observed on the following Monday.

An employee taking an unexcused day off the regularly scheduled day before or after a paid Holiday shall not receive Holiday pay.

REGISTERED APPRENTICES

Wages per hour (1300 hour terms at the following percentage of Journeyman's wage):

 1st
 2nd
 3rd
 4th

 65%
 70%
 75%
 80%

Supplemental Benefits per hour:

 1st term
 \$ 16.97

 2nd term
 17.41

 3rd term
 19.40

 4th term
 19.84

2-42AtSS

Carpenter - Heavy&Highway

05/01/2023

JOB DESCRIPTION Carpenter - Heavy&Highway

ENTIRE COUNTIES

Broome, Cayuga, Chemung, Cortland, Delaware, Jefferson, Lewis, Onondaga, Oswego, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Yates

WAGES

07/01/2022	05/01/2023	05/01/2024
	Additional	Additional
\$ 34.13	\$ 2.50*	\$ 2.75*
34.13	2.50*	2.75*
59.13	2.50*	2.75*
35.13	2.50*	2.75*
35.13	2.50*	2.75*
	\$ 34.13 34.13 59.13 35.13	Additional \$ 34.13

^{*}To be allocated at a later date.

NOTE ADDITIONAL AMOUNTS PAID FOR THE FOLLOWING WORK LISTED BELOW (per hour worked):

- When project owner mandates a single irregular work shift, the employee will receive an additional \$3.00 per hour. A single irregular work shift can start any time from 5:00 p.m. to 1:00 a.m.
- State or Federal designated hazardous site, requiring protective gear shall be an additional \$2.50 per hour.
- Certified welders when required to perform welding work will receive an additional \$2.50 per hour.

ADDITIONAL NOTES PERTAINING TO DIVERS/TENDERS:

- Divers and Tenders shall receive one and one half (1 1/2) times their regular diver and tender rate of pay for Effluent and Slurry diving.
- Divers and tenders being paid at the specified rate for Effluent and Slurry diving shall have all overtime rates based on the specified rate plus the appropriate overtime rates (one and one half or two times the specified rate for Slurry and Effluent divers and tenders).
- The pilot of an ADS or submersible will receive one and one-half (1 1/2) times the Diver-Wet Day Rate for time submerged.
- All crew members aboard a submersible shall receive the Diver-Wet Day rate.
- Depth pay for Divers based upon deepest depth on the day of the dive (per diem payment):

0' to 50' no additional fee

51'to 100' additional \$.50 per foot 101'to 150' additional \$0.75 per foot 151'and deeper additional \$1.25 per foot

- Penetration pay for Divers based upon deepest penetration on the day of the dive (per diem payment):

0' to 50' no additional fee

51' to 100' additional \$.75 per foot

101' and deeper additional \$1.00 per foot

- Diver rates applies to all hours worked on dive day.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Friday, provided the project duration is more than forty (40) hours.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 25.45

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

- In the event a Holiday falls on a Saturday, the Friday before will be observed as a Holiday. If a Holiday falls on a Sunday, then Monday will be observed as a Holiday. Employee must work scheduled work day before and after the Holiday.
- The employee must work their scheduled workday before and their scheduled workday after the holiday to receive holiday pay.

REGISTERED APPRENTICES

CAPRENTER APPRENTICES

Wages per hour (1040 hour terms at the following percentage of journeyman's base wage):

 1st
 2nd
 3rd
 4th
 5th

 65%
 70%
 75%
 80%
 85%

Supplemental Benefits per hour:

\$ 16.97 \$ 17.41 \$ 19.40 \$ 19.84 \$ 20.28

PILEDRIVER/DOCKBUILDER APPRENTICES

Wages per hour (1300 hour terms at the following percentage of journeyman's base wage):

1st 2nd 3rd 4th 65% 70% 80% 85%

Supplemental Benefits per hour:

\$ 16.97 \$ 17.41 \$ 19.84 \$ 20.28

NOTE ADDITIONAL AMOUNTS PAID PER HOUR WORKED TO APPRENTICES FOR SPECIFIC TYPES OF WORK PERFORMED:

- When project owner mandates a single irregular work shift, the employee will receive an additional \$3.00 per hour. A single irregular work shift can start any time from 5:00 p.m. to 1:00 a.m.
- State or Federal designated hazardous site, requiring protective gear shall be an additional \$2.50 per hour.
- Certified welders when required to perform welding work will receive an additional \$2.50 per hour.

2-277HH-Bro

DISTRICT 2

Electrician 05/01/2023

JOB DESCRIPTION Electrician

ENTIRE COUNTIES

Broome

PARTIAL COUNTIES

Chenango: Entire County except the Townships of Columbus, New Berlin and Sherburne.

Delaware: Only the Townships of Davenport, Delhi, Deposit, Franklin, Hamden, Masonville, Meredith, Sidney, Tompkins and Walton

Townships, and that portion of Colchester and Hancock Townships north of the east branch of the Delaware River.

Otsego: Only the Townships of Butternuts, Hartwick, Laurens, Maryland, Milford, Morris, Oneonta, Otego, Unadilla and Westford. Tioga: Only the Townships of Berkshire, Newark Valley, Owego, Richford and Tioga.

WAGES

07/01/2022 Per hour:

Electrician (base wage) \$37.29 43.54 Cable Splicer

ADDITIONAL AMOUNTS FOR SPECIFIC TYPES OF JOBSITE CONDITIONS (amount subject to any overtime premiums):

Additional \$ 0.50 per hour when required to work underground, such as in tunnels for roads, railroads, or water.

Additional \$ 0.50 per hour when required to work at a height of 40 feet above the ground or roof level.

SHIFT WORK / SINGLE IRREGULAR WORK SHIFT:

When shift work or a single irregular work shift is mandated in the job specifications or by the contracting agency, the following journeyman hourly rates apply. The starting hours of a shift may be adjusted up to two (2) hours in order to meet the needs of the contracting agency.

Between the hours

of 8:00AM and 4:30PM \$37.29

Between the hours

of 4:30PM and 1:00AM 43.74

Between the hours

of 12:30AM and 9:00AM 49.00

TEMPORARY HEAT:

On any job requiring temporary heat outside the regular working hours, where electrical power is used pertaining to this heat, it shall be manned on a shift work basis by an electrician at the base wage plus 25%.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 28.78 plus

3% of wage

OVERTIME PAY

See (B, *E, Q) on OVERTIME PAGE

*Double time after 8 hours on Saturday.

NOTE: WAGE CAP...Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

See (1) on HOLIDAY PAGE Paid:

Overtime: See (5, 6, *8, 16) on HOLIDAY PAGE

When a dated holiday falls on a Saturday it shall be celebrated on Friday. When a dated holiday falls on a Sunday, it shall be celebrated on Monday.

*Good Friday may be celebrated the following Monday by mutual agreement of Employer and Employees.

REGISTERED APPRENTICES

WAGES: Terms at the following percentages of Journeyman's wage.

1st 2nd 4th 5th

3500-5000 Hrs 0-2000 Hrs 2000-3500 Hrs 5000-6500 Hrs 6500-8000 Hrs

42% 48% 55% 65% 75%

ADDITIONAL AMOUNTS FOR SPECIFIC TYPES OF JOBSITE CONDITIONS (amount subject to any overtime premiums):

Additional \$ 0.50 per hour when required to work underground, such as in tunnels for roads, railroads, or water.

Additional \$ 0.50 per hour when required to work at a height of 40 feet above the ground or roof level.

SUPPLEMENTAL BENEFITS per hour:

07/01/2021

1st term \$9.00 plus 3% of hourly wage 2nd term \$24.12 plus 3% of hourly wage 3rd term \$24.83 plus 3% of hourly wage 4th term \$24.83 plus 3% of hourly wage 5th term \$24.83 plus 3% of hourly wage

2-325

DISTRICT 6

Prevailing Wage Rates for 07/01/2022 - 06/30/2023 Last Published on May 01 2023

JOB DESCRIPTION Elevator Constructor

ENTIRE COUNTIES

Broome, Cayuga, Chenango, Cortland, Franklin, Jefferson, Lewis, Onondaga, Oswego, St. Lawrence, Tioga, Tompkins

PARTIAL COUNTIES

Delaware: Only the towns of: Tompkins, Walton, Masonville, Sidney, Franklin and Deposit.

Madison: Only the towns of: Cazenovia, DeRuyter, Eaton, Fenner, Georgetown, Lebanon, Lenox, Nelson and Sullivan.

Oneida: Only the towns of: Camden, Florence and Vienna.

WAGES

Per hour: 07/01/2022

Elevator Constructor \$ 51.43 Helper 36.00

Four (4), ten (10) hour days may be worked for New Construction and Modernization Work at straight time during a week, Monday thru Thursday, or Tuesday thru Friday

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 36.885*

OVERTIME PAY

See (D, O) on OVERTIME PAGE

HOLIDAY

See (5, 6, 15, 16) on HOLIDAY PAGE Paid: See (5, 6, 15, 16) on HOLIDAY PAGE Overtime:

NOTE: When a paid holiday falls on a Saturday, it shall be observed on Friday. When a paid holiday falls on Sunday, it shall be observed on

Monday.

REGISTERED APPRENTICES

WAGES per hour: 1 year terms at the following percentage of the Elevator Constructor wage.

0-6 6-12 2nd 3rd 4th months months year year year 55% 65% 70% 80% 50%

SUPPLEMENTAL BENEFITS per hour:

0-6 months: 6% of the hourly apprentice rate paid, no additional supplemental benefits.

All other terms: Same as Journeyman.

6-62.1

Glazier 05/01/2023

JOB DESCRIPTION Glazier **DISTRICT** 5

ENTIRE COUNTIES

Broome, Chemung, Chenango, Delaware, Otsego, Schuyler, Steuben, Tioga, Tompkins

WAGES

Per hour: 07/01/2022

Glazier \$ 26.50

** IMPORTANT NOTICE **

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

^{***} Four(4), ten (10) hour days are not permitted for Contract Work/Repair Work

^{*}NOTE - add 6% of regular hourly rate for all hours worked. Add 8% of regular hourly rate if more than 5 years of service.

DISTRICT 6

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 27.60

OVERTIME PAY

See (B, E*, E2, Q**) on OVERTIME PAGE.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

1000 hour terms

Appr. 1st term	\$17.00
Appr. 2nd term	18.00
Appr. 3rd term	19.00
Appr. 4th term	20.00
Appr. 5th term	21.00
Appr. 6th term	22.00
Appr. 7th term	23.00
Appr. 8th term	24.00

Supplemental Benefits per hour:

Appr. 1st term	\$ 12.60
Appr. 2nd term	12.60
Appr. 3rd term	18.60
Appr. 4th term	18.60
Appr. 5th term	19.60
Appr. 6th term	19.60
Appr. 7th term	20.60
Appr. 8th term	20.60

5-677z3

Insulator - Heat & Frost 05/01/2023

JOB DESCRIPTION Insulator - Heat & Frost

ENTIRE COUNTIES

Broome, Cayuga, Chemung, Chenango, Cortland, Herkimer, Jefferson, Lewis, Madison, Oneida, Onondaga, Oswego, Otsego, Schuyler, Seneca, St. Lawrence, Tioga, Tompkins

WAGES

Per hour: 07/01/2022

Asbestos Installer \$37.00

Insulation Installer

(On mechanical systems only)

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED SHIFTS WORKED.

 1ST SHIFT
 \$ 37.00

 2ND SHIFT
 42.55

 3RD SHIFT
 46.25

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 24.34

See (*B1, Q) on OVERTIME PAGE *NOTE: First 10 hours on Saturday

HOLIDAY

See (1) on HOLIDAY PAGE Paid: See (4,6) on HOLIDAY PAGE. Overtime: Triple time for Labor Day if worked.

NOTE: When a holiday falls on Sunday, the following Monday shall be observed as a holiday.

REGISTERED APPRENTICES

WAGES per hour: One year terms at the following percentage of Journeyman's wage

1st	2nd	3rd	4th
50%	60%	70%	80%
\$ 18.50	\$ 22.20	\$ 25.90	\$ 29.60

SUPPLEMENTAL BENEFITS per hour:

\$ 21.84 \$ 21.84 \$ 24.34 \$ 24.34

6-30-Syracuse

Ironworker 05/01/2023

JOB DESCRIPTION Ironworker

DISTRICT 6

ENTIRE COUNTIES

Broome, Cayuga, Cortland, Onondaga, Oswego, Seneca, Tioga, Tompkins

PARTIAL COUNTIES

Chenango: Only the Townships of Lincklaen, Otselic, Pitcher, Pharsalia, German, McDonough, Preston, Norwich, Smithville, Oxford, Guilford, Greene, Coventry, Bainbridge and Afton.

Jefferson: Only the Townships of Alexandria, Theresa, Clayton, Orleans, Cape Vincent, Lyme, Brownville, Pamelia, LeRay, Hounsfield, Watertown, Rutland, Adams, Henderson, Rodman, Ellisburg, Lorraine and Worth.

Madison: Only the Townships of Sullivan, Lenox, Lincoln, Fenner, Smithfield, Cazenovia, Nelson, DeRuyter and Georgetown. Schuyler: Only the Townships of Cayuta, Catharine, Hector and Montour.

Wayne: Only the Townships of Galen, Savannah, Rose, Butler, Huron and Wolcott

Structural, Reinforcing, Re-bar, Machinery Mover & Rigger, Ornamental & Curtain Wall, Window Wall, Pre-Glazed Metal Framed Windows Attached to Steel or Masonry Including Caulking, Fence Erector (Chain Link/Security), Sheeter/Bridge Rail, Pre-Cast Erector, Stone Derrickman, Pre-Engineered Building Erector, Welder

07/01/2022 07/01/2023 Per hour: Additional

> \$ 31.80 \$ 1.50*

NOTE: Shift work mandated by the project owner. All shifts will be (8) hours.

1st Shift \$ 31.80 2nd Shift 34.98 3rd Shift 36.57

WHEN A SINGLE IRREGULAR SHIFT IS WORKED, WITH START TIMES BASED ON SECOND AND THIRD SHIFTS, ADD 10 % TO THE WAGE RATE POSTED ABOVE.

SUPPLEMENTAL BENEFITS

Per hour:

\$30.53 Journeyman

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE See (5, 6) on HOLIDAY PAGE Overtime:

NOTE: Any holiday which occurs on Sunday shall be observed the following Monday.

REGISTERED APPRENTICES

WAGES per hour: One year terms at the following rates.

^{*}To be allocated at a later date.

1st 2nd 3rd 4th \$ 19.50 \$ 21.50 \$ 23.50 \$ 25.50

SUPPLEMENTAL BENEFITS per hour:

 1st year
 \$ 11.53

 2nd year
 19.58

 3rd year
 20.73

 4th year
 21.88

6-60

Laborer - Building 05/01/2023

JOB DESCRIPTION Laborer - Building

DISTRICT 2

ENTIRE COUNTIES

Broome, Chemung, Steuben

PARTIAL COUNTIES

Chenango: Entire County except the Townships of Sherburne, Columbus and New Berlin.

Delaware: Only the Townships of Sidney, Masonville, Walton, Tompkins, Deposit, Hancock and Colchester.

Schuyler: Entire County except the Township of Catherine and the Village of Odessa.

Tioga: Entire County except the Townships of Candor and Spencer.

WAGES

Per hour:

GROUP #1: Basic Laborer - excavation, concrete vibrator, power-driven buggie, demolition (including acetylene torch work) that is customarily done by a laborer

GROUP #2: Air Tool Operators, Mason Tenders

GROUP #3: Blaster, Rock Drill (compressor driven)

GROUP #4: Asbestos, Hazardous, Toxic Waste, Lead and Mold Remediation

	07/01/2022	07/01/2023	07/01/2024	07/01/2025
		Additional	Additional	Additional
GROUP #1	\$ 25.75	\$ 1.20*	\$ 1.20*	\$ 1.25*
GROUP #2	26.75	1.20*	1.20*	1.25*
GROUP #3	27.75	1.20*	1.20*	1.25*
GROUP #4	27.75	1.20*	1.20*	1.25*

^{*}To be allocated at a later date.

IMPORTANT NOTES:

- Laborer tasks on Renewable Energy and Green Energy construction work shall be paid at the appropriate Heavy & Highway rates.
- Wage and supplement rates for the operation of forklift and skid steer may be found under the classification "Operating Engineer".

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Friday, provided the project duration is more than forty (40) hours.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman: \$ 20.80

OVERTIME PAY

See (B, E, *E2, Q) on OVERTIME PAGE

*If working four (4) ten (10) hour days the make up day will be on Friday.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

When a Holiday falls on Sunday it shall be observed on the following Monday.

REGISTERED APPRENTICES

WAGES: 1000 hour terms at the following percent of Journeyman's wage

1st	2nd	3rd	4th
70%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

1st Term	\$ 14.10
2nd Term	15.35
3rd Term	16.23
4th Term	17.10

2-785 (7)

Laborer - Heavy&Highway

05/01/2023

JOB DESCRIPTION Laborer - Heavy&Highway

DISTRICT 2

ENTIRE COUNTIES

Broome, Chemung, Cortland, Schuyler, Steuben, Tioga, Tompkins

PARTIAL COUNTIES

Chenango: Entire County except the Townships of Sherburne, Columbus and New Berlin.

Delaware: Only the Townships of Sidney, Masonville, Walton, Tompkins, Deposit, Hancock and Colchester.

WAGES

Per hour:

GROUP A: Drill Helper, Flagman, Outboard and Hand Boats.

GROUP B: Basic Rate, Bull Float (where used for strike off only), Chain Saw, Concrete Aggregate Bin, Concrete Bootmen, Gin Buggy, Hand or Machine Vibrator, Jack Hammer, Mason Tender, Mortar Mixer, Pavement Breaker, Handlers of Steel Mesh, Small Generators for Laborers Tools, Installation of Bridge Drainage Pipe, Pipe Layers, Vibrator Type Rollers, Tamper, Drill Doctor, Water Pump Operators (1-1/2" & Single Diaphragm), Nozzle (Asphalt, Gunite, Seeding, and Sand Blasting), Laborers on Chain Link Fence Erection, Rock Splitter and Power Unit, Pusher Type Concrete Saw and all other Gas, Electric, and Air Tool Operators, Wrecking Laborer.

GROUP C: Drilling equipment - only where a separate air compressor unit supplies power, Acetylene Torch Operators, Asphalt Raker, Powder Man, Tail or Screw Operator on Asphalt Paver.

GROUP D: Blasters, Form Setters (slab steel forms on highways, roads, streets & airport runways), Stone or Granite Curb Setters.

GROUP E: Hazardous Waste defined as when an employee performs hazardous waste removal, lead abatement and removal, asbestos abatement and removal work on State and/or Federally designated waste site, and were relevant State and/or Federal regulations require employees to use or wear required forms of personal protection.

	07/01/2022	07/01/2023	07/01/2024
		Additional	Additional
GROUP A	\$ 32.80	\$ 3.00*	\$ 2.50*
GROUP B	33.00	3.00*	2.50*
GROUP C	33.20	3.00*	2.50*
GROUP D	33.40	3.00*	2.50*
GROUP E	36.00	3.00*	2.50*

^{*}To be allocated at a later date.

NOTE ADDITIONAL AMOUNTS FOR THE FOLLOWING CONDITIONS:

- A single irregular work shift starting any time between 5:00 PM and 1:00 AM on governmental mandated night work shall be paid an additional \$3.00 per hour.
- When an employee is required by the employer and/or by the material data safety sheets of a product, during its application, to wear a half or full face replaceable cartridge respirator for more then (2) hours, then in such case said employee(s) will be paid the Group E rate for the shift.

IMPORTANT NOTES:

- Laborer tasks on Renewable Energy and Green Energy construction work shall be paid at the appropriate Heavy & Highway rates.
- Wage and supplement rates for the operation of forklift and skid steer may be found under the classification "Operating Engineer".

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$23.11

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

- If Holiday falls on Sunday, it will be celebrated on Monday. If the Holiday falls on Saturday, it will be celebrated on Saturday.
- An Employee must work the scheduled working day before and the scheduled working day after a holiday to receive holiday pay. However, an employee not able to report because of proven sickness, death in immediate family, or accident shall be entitled to holiday pay.

REGISTERED APPRENTICES

WAGES: 1000 hour terms at the following percentage of Journeyman's GROUP B wage:

1st	2nd	3rd	4th
70%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

1st term	\$ 20.86
2nd term	21.61
3rd term	21.99
4th term	22.36

2-785h

Laborer - Tunnel 05/01/2023

JOB DESCRIPTION Laborer - Tunnel

DISTRICT 2

ENTIRE COUNTIES

Broome, Chemung, Cortland, Schuyler, Steuben, Tioga, Tompkins

PARTIAL COUNTIES

Chenango: Entire County except the Townships of Sherburne, Columbus, and New Berlin.

Delaware: Only the Townships of Sidney, Masonville, Walton, Tompkins, Deposit, Hancock and Colchester.

WAGES

Per hour:

GROUP A: Change House Man

GROUP B: Miners and all Machine Men, Safety Miner, All Shaft work, Caisson work, Drilling, Blow Pipe, all Air Tools, Tugger, Scaling, Nipper, Guniting pot to nozzle, Bit Grinder, Signal Man (top and bottom), Concrete Man, Shield Driven Tunnels, mixed face and soft ground, liner plate tunnels in free air.

GROUP C: Blaster

GROUP D: Hazardous waste removal work on a State and/or Federally designated waste site where relevant State and/or Federal regulations require employees to use or wear required forms of personal protection.

	07/01/2022	07/01/2023	07/01/2024
		Additional	Additional
Group A	\$ 35.98	\$ 3.00*	\$ 2.00*
Group B	36.18	3.00*	2.00*
Group C	38.98	3.00*	2.00*
Group D	39.18	3.00*	2.00*

^{*}To be allocated at a later date.

NOTE ADDITIONAL AMOUNTS FOR THE FOLLOWING CONDITIONS:

- A single irregular work shift starting any time between 5:00 PM and 1:00 AM on governmental mandated night work shall be paid an additional \$3.00 per hour.
- When an employee is required by the employer and/or by the material data safety sheets of a product, during its application, to wear a half or full face replaceable cartridge respirator for more then (2) hours, then in such case said employee(s) will be paid the Group D rate for the shift.

IMPORTANT NOTE: Wage and supplement rates for the operation of forklift and skid steer may be found under the classification "Operating Engineer".

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 23.11

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

- If Holiday falls on Sunday, it will be celebrated on Monday. If the Holiday falls on Saturday, it will be celebrated on Saturday.

DISTRICT 6

- An Employee must work the scheduled working day before and the scheduled working day after a holiday to receive holiday pay. However, an employee not able to report because of proven sickness, death in immediate family, or accident shall be entitled to holiday pay.

HOLIDAY

Paid: See (5, 6) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

If the holiday falls on Saturday, it will be celebrated on Friday. If the holiday falls on Sunday, it will be celebrated on Monday

REGISTERED APPRENTICES

WAGES: 1000 hour terms at the following percentage of Group B wage

1st 2nd 3rd 4th 70% 80% 85% 90%

SUPPLEMENTAL BENEFITS per hour:

\$ 7.75
7.75
15.51
23.11

2-785T

Lineman Electrician 05/01/2023

JOB DESCRIPTION Lineman Electrician

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES

A Lineman/Technician shall perform all overhead aerial work. A Lineman/Technician on the ground will install all electrical panels, connect all grounds, install and connect all electrical conductors, assembly of all electrical materials, conduit, pipe, or raceway; placing of fish wire; pulling of cables, wires or fiber optic cable through such raceways; splicing of conductors; dismantling of such structures, lines or equipment.

A Groundman/Truck Driver shall: Build and set concrete forms, handle steel mesh, set footer cages, transport concrete in a wheelbarrow, hand or machine concrete vibrator, finish concrete footers, mix mortar, grout pole bases, cover and maintain footers while curing in cold weather, operate jack hammer, operate hand pavement breaker, tamper, concrete and other motorized saws, as a drill helper, operate and maintain generators, water pumps, chainsaws, sand blasting, operate mulching and seeding machine, air tools, electric tools, gas tools, load and unload materials, hand shovel and/or broom, prepare and pour mastic and other fillers, assist digger operator/equipment operator in ground excavation and restoration, landscape work and painting. Only when assisting a lineman technician, a groundman/truck driver may assist in installing conduit, pipe, cables and equipment.

NOTE: Includes Teledata Work within ten (10) feet of High Voltage Transmission Lines. Also includes digging of holes for poles, anchors, footer, and foundations for electrical equipment.

Below rates applicable on all overhead and underground distribution and maintenance work, and all overhead and underground transmission line work and the installation of fiber optic cable where no other construction trades are or have been involved. (Ref #14.01.01)

Per hour:	07/01/2022	05/01/2023	05/06/2024
Lineman, Technician	\$ 56.00	\$ 57.40	\$ 58.90
Crane, Crawler Backhoe	56.00	57.40	58.90
Welder, Cable Splicer	56.00	57.40	58.90
Digging Mach. Operator	50.40	51.66	53.01
Tractor Trailer Driver	47.60	48.79	50.07
Groundman, Truck Driver	44.80	45.92	47.12
Equipment Mechanic	44.80	45.92	47.12
Flagman	33.60	34.44	35.34

Additional \$1.00 per hour for entire crew when a helicopter is used.

Below rates applicable on all electrical sub-stations, switching structures, fiber optic cable and all other work not defined as "Utility outside electrical work". (Ref #14.02.01-A)

Lineman, Technician	\$ 56.00	\$ 57.40	\$ 58.90
Crane, Crawler Backhoe	56.00	57.40	58.90
Cable Splicer	61.60	63.14	64.79
Certified Welder -			

Pipe Type Cable	58.80	60.27	61.85
Digging Mach. Operator	50.40	51.66	53.01
Tractor Trailer Driver	47.60	48.79	50.07
Groundman, Truck Driver	44.80	45.92	47.12
Equipment Mechanic	44.80	45.92	47.12
Flagman	33.60	34.44	35.34

Additional \$1.00 per hour for entire crew when a helicopter is used.

Below rates apply on switching structures, maintenance projects, railroad catenary install/maintenance third rail installation, bonding of rails and pipe type cable and installation of fiber optic cable. (Ref #14.02.01-B)

Lineman, Tech, Welder	\$ 57.32	\$ 58.72	\$ 60.22
Crane, Crawler Backhoe	57.32	58.72	60.22
Cable Splicer	63.05	64.59	66.24
Certified Welder -			
Pipe Type Cable	60.19	61.66	63.23
Digging Mach. Operator	51.59	52.85	54.20
Tractor Trailer Driver	48.72	49.91	51.19
Groundman, Truck Driver	45.86	46.98	48.18
Equipment Mechanic	45.86	46.98	48.18
Flagman	34.39	35.23	36.13

Additional \$1.00 per hour for entire crew when a helicopter is used.

Below rates applicable on all overhead and underground transmission line work & fiber optic cable where other construction trades are or have been involved. This applies to transmission line work only, not other construction. (Ref #14.03.01)

Lineman, Tech, Welder	\$ 58.51	\$ 59.91	\$ 61.41
Crane, Crawler Backhoe	58.51	59.91	61.41
Cable Splicer	58.51	59.91	61.41
Digging Mach. Operator	52.66	53.92	55.27
Tractor Trailer Driver	49.73	50.92	52.20
Groundman, Truck Driver	46.81	47.93	49.13
Equipment Mechanic	46.81	47.93	49.13
Flagman	35.11	35.95	36.85

Additional \$1.00 per hour for entire crew when a helicopter is used.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED BETWEEN THE HOURS LISTED BELOW:

1ST SHIFT	8:00 AM to 4:30 PM REGULAR RATE
2ND SHIFT	4:30 PM to 1:00 AM REGULAR RATE PLUS 17.3 %
3RD SHIFT	12:30 AM to 9:00 AM REGULAR RATE PLUS 31.4 %

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour worked (but also required on non-worked holidays):

	07/01/2022	05/01/2023	05/06/2024
Journeyman	\$ 25.90 *plus 7% of the hourly wage paid	\$ 26.40 *plus 7% of the hourly wage paid	\$ 26.90 *plus 7% of the hourly wage paid
Journeyman Lineman or Equipment Operators with Crane License	\$ 27.90 *plus 7% of the hourly wage paid	\$ 29.40 *plus 7% of the hourly wage paid	\$ 30.90 *plus 7% of the hourly wage paid

^{*}The 7% is based on the hourly wage paid, straight time or premium time.

See (B, E, Q,) on OVERTIME PAGE. *Note* Double time for all emergency work designated by the Dept. of Jurisdiction. NOTE: WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

1st

Paid See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.
Overtime See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.

NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

6th

7th

REGISTERED APPRENTICES

2nd

WAGES per hour: 1000 hour terms at the following percentage of the applicable Journeyman Lineman wage.

4th

wage paid

60%	65%	70%	75%	80%	85%	90%	
SUPPLEMEN	NTAL BENEFI	TS per hour:					
			07/01/2022		05/01/2023		05/06/2024
			\$ 25.90		\$ 26.40		\$ 26.90
			*plus 7% of		*plus 7% of		*plus 7% of
			the hourly		the hourly		the hourly

5th

6-1249a

Lineman Electrician - Teledata	05/01/2023
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wage paid

JOB DESCRIPTION Lineman Electrician - Teledata

3rd

DISTRICT 6

wage paid

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

Per hour:

For outside work, stopping at first point of attachment (demarcation).

, ,,	07/01/2022	01/01/2023	01/01/2024	01/01/2025
Cable Splicer	\$ 36.28	\$ 37.73	\$ 39.24	\$ 40.81
Installer, Repairman	\$ 34.43	\$ 35.81	\$ 37.24	\$ 38.73
Teledata Lineman	\$ 34.43	\$ 35.81	\$ 37.24	\$ 38.73
Tech., Equip. Operator	\$ 34.43	\$ 35.81	\$ 37.24	\$ 38.73
Groundman	\$ 18.25	\$ 18.98	\$ 19.74	\$ 20.53

NOTE: EXCLUDES Teledata work within ten (10) feet of High Voltage (600 volts and over) transmission lines. For this work please see LINEMAN.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED:

1ST SHIFT REGULAR RATE

2ND SHIFT REGULAR RATE PLUS 10% 3RD SHIFT REGULAR RATE PLUS 15%

SUPPLEMENTAL BENEFITS

Per hour:	07/01/2022	01/01/2023	01/01/2024	01/01/2025
Journeyman	\$ 5.14	\$ 5.14	\$ 5.14	\$ 5.14
	*plus 3% of	*plus 3% of	*plus 3% of	*plus 3% of
	the hourly	the hourly	the hourly	the hourly
	wage paid	wage paid	wage paid	wage paid

^{*}The 3% is based on the hourly wage paid, straight time rate or premium rate.

^{*}The 7% is based on the hourly wage paid, straight time or premium time.

See (B, E, Q) on OVERTIME PAGE

NOTE: WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16) on HOLIDAY PAGE

6-1249LT - Teledata

Lineman Electrician - Traffic Signal, Lighting

05/01/2023

JOB DESCRIPTION Lineman Electrician - Traffic Signal, Lighting

DISTRICT 6

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Warren, Washington, Wayne, Wyoming, Yates

WAGES

Lineman/Technician shall perform all overhead aerial work. A Lineman/Technician on the ground will install all electrical panels, connect all grounds, install and connect all electrical conductors which includes, but is not limited to road loop wires; conduit and plastic or other type pipes that carry conductors, flex cables and connectors, and to oversee the encasement or burial of such conduits or pipes.

A Groundman/Truck Driver shall: Build and set concrete forms, handle steel mesh, set footer cages, transport concrete in a wheelbarrow, hand or machine concrete vibrator, finish concrete footers, mix mortar, grout pole bases, cover and maintain footers while curing in cold weather, operate jack hammer, operate hand pavement breaker, tamper, concrete and other motorized saws, as a drill helper, operate and maintain generators, water pumps, chainsaws, sand blasting, operate mulching and seeding machine, air tools, electric tools, gas tools, load and unload materials, hand shovel and/or broom, prepare and pour mastic and other fillers, assist digger operator/equipment operator in ground excavation and restoration, landscape work and painting. Only when assisting a lineman technician, a groundman/truck driver may assist in installing conduit, pipe, cables and equipment.

A flagger's duties shall consist of traffic control only. (Ref #14.01.01)

Per hour:	07/01/2022	05/01/2023	05/06/2024
Lineman, Technician	\$ 48.19	\$ 49.32	\$ 50.54
Crane, Crawler Backhoe	48.19	49.32	50.54
Certified Welder	50.60	51.79	53.07
Digging Machine	43.37	44.39	45.49
Tractor Trailer Driver	40.96	41.92	42.96
Groundman, Truck Driver	38.55	39.46	40.43
Equipment Mechanic	38.55	39.46	40.43
Flagman	28.91	29.59	30.32

Above rates are applicable for installation, testing, operation, maintenance and repair on all Traffic Control (Signal) and Illumination (Lighting) projects, Traffic Monitoring Systems, and Road Weather Information Systems. Includes digging of holes for poles, anchors, footer foundations for electrical equipment; assembly of all electrical materials or raceway; placing of fish wire; pulling of cables, wires or fiber optic cable through such raceways; splicing of conductors; dismantling of such structures, lines or equipment.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED BETWEEN THE HOURS LISTED BELOW:

1ST SHIFT 8:00 AM TO 4:30 PM REGULAR RATE

2ND SHIFT 4:30 PM TO 1:00 AM REGULAR RATE PLUS 17.3% 3RD SHIFT 12:30 AM TO 9:00 AM REGULAR RATE PLUS 31.4%

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour worked (but also required on non-worked holidays):

07/01/2022 05/01/2023 05/06/2024

Journeyman	\$ 25.90 *plus 7% of the hourly wage paid	\$ 26.40 *plus 7% of the hourly wage paid	\$ 26.90 *plus 7% of the hourly wage paid
Journeyman Lineman or	\$ 27.90	\$ 29.40	\$ 30.90
Equipment Operators	*plus 7% of	*plus 7% of	*plus 7% of
with Crane License	the hourly	the hourly	the hourly
	wage paid	wage paid	wage paid

^{*}The 7% is based on the hourly wage paid, straight time or premium time.

See (B, E, Q) on OVERTIME PAGE. *Note* Double time for all emergency work designated by the Dept. of Jurisdiction.

NOTE: WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked.

Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid: See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day. Overtime: See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.

NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

REGISTERED APPRENTICES

WAGES per hour: 1000 hour terms at the following percentage of the applicable Journeyman Lineman wage.

1st	2nd	3ra	4tn	5th	6th	/tn	
60%	65%	70%	75%	80%	85%	90%	
SUPPLEM	MENTAL BEN	EFITS per hou	ır:				
		·	07/01/2	022	05/01/2	023	05/06/2024
			\$ 25.9	0	\$ 26.4	0	\$ 26.90
			*plus 7%	of	*plus 7%	of	*plus 7% of
			the hour	ly	the hour	ly	the hourly
			wage na	id	wage na	id	wage naid

^{*}The 7% is based on the hourly wage paid, straight time or premium time.

6-1249a-LT

Lineman Electrician - Tree Trimmer

05/01/2023

DISTRICT 6

JOB DESCRIPTION Lineman Electrician - Tree Trimmer

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES

Applies to line clearance, tree work and right-of-way preparation on all new or existing energized overhead or underground electrical, telephone and CATV lines. This also would include stump removal near underground energized electrical lines, including telephone and CATV lines.

Per hour:	07/01/2022	01/01/2023
Tree Trimmer	\$ 28.25	\$ 29.80
Equipment Operator	24.98	26.35
Equipment Mechanic	24.98	26.35
Truck Driver	20.80	21.94
Groundman	17.13	18.07
Flag person	13.20*	13.20*

^{*}NOTE- Rate effective 12/31/2022: \$14.20

SUPPLEMENTAL BENEFITS

Per hour worked (but also required on non-worked holidays):

07/01/2022 01/01/2023

Journeyman \$ 10.23 \$ 10.48 *plus 3% of *plus 3% of the hourly wage paid wage paid

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

NOTE: WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid: See (5, 6, 8, 15) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 16, 25) on HOLIDAY PAGE

NOTE: All paid holidays falling on a Saturday shall be observed on the preceding Friday.

All paid holidays falling on a Sunday shall be observed on the following Monday.

6-1249TT

Mason - Building 05/01/2023

JOB DESCRIPTION Mason - Building DISTRICT 5

ENTIRE COUNTIES

Broome, Chenango, Delaware, Otsego, Tioga

WAGES

Per hour: 07/01/2022

Building:

Bricklayer, Cement \$ 34.29

Mason, Plasterer, Stone Mason, Tuck Pointer

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 23.31

OVERTIME PAY

See (B,E,E2*,Q) on OVERTIME PAGE

*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One year terms at the following percentage of Journeyman's wage:

1st 2nd 3rd 4th \$ 21.86 \$ 27.00 \$ 28.18 \$ 30.86

Supplemental benefits per hour:

1st 2nd 3rd 4th \$ 20.13 \$ 20.19 \$ 22.48 \$ 23.27

5-3B - Bing - Z2

DISTRICT 5

Mason - Heavy&Highway 05/01/2023

JOB DESCRIPTION Mason - Heavy&Highway

ENTIRE COUNTIES

Allegany, Broome, Chautauqua, Chemung, Chenango, Cortland, Delaware, Genesee, Livingston, Monroe, Ontario, Orleans, Otsego, Schuyler, Seneca, Steuben, Tioga, Tompkins, Wayne, Wyoming, Yates

^{*} The 3% is based on the hourly wage paid, straight time rate or premium rate.

PARTIAL COUNTIES

Cattaraugus: Enitre county except in the Township of Perrysburg and the Village of Gowanda only the Bricklayer classification applies.

Erie: Only the Bricklayer classification applies. Niagara: Only the Bricklayer classification applies.

WAGES

Per hour: 07/01/2022

Heavy & Highway:

Cement Mason \$ 34.88 Bricklayer 34.88

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$23.53

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

1500 hour terms at the following percentage of Journeyman's wage:

1st 2nd 3rd 4th 50% 60% 70% 80%

Supplemental benefits per hour:

 1st term
 \$ 14.03

 2nd term
 \$ 22.97

 3rd term
 \$ 23.11

 4th term
 \$ 23.25

5-3h

Mason - Tile Finisher 05/01/2023

JOB DESCRIPTION Mason - Tile Finisher

DISTRICT 5

ENTIRE COUNTIES

Broome, Chemung, Chenango, Cortland, Delaware, Otsego, Schuyler, Steuben, Tioga, Tompkins

PARTIAL COUNTIES

Allegany: Towns of Alfred, Almond, Andover and Burns.

WAGES Wages

Per hour: 07/01/2022

Building:

Marble, Slate, Terrazzo \$ 30.86

and Tile Finisher

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 18.61

OVERTIME PAY

See (B,E,E2*,Q) on OVERTIME PAGE

*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One year terms at the following percentage of Journeyman's wage:

1st 2nd 3rd \$ 18.52 \$ 21.60 \$ 24.69

Supplemental benefits per hour:

5-3TF - Z4

Mason - Tile Setter 05/01/2023

JOB DESCRIPTION Mason - Tile Setter

DISTRICT 5

ENTIRE COUNTIES

Broome, Chemung, Chenango, Cortland, Delaware, Otsego, Schuyler, Steuben, Tioga, Tompkins

PARTIAL COUNTIES

Allegany: Towns of Alfred, Almond, Andover and Burns.

WAGES

Wages

Per Hour: 07/01/2022

Building:

Marble, Slate, Terrazzo \$ 33.69

and Tile Setter

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$21.56

OVERTIME PAY

See (B,E,E2*,Q) on OVERTIME PAGE

*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One year terms at the following percentage of Joureyman's wage:

1st 2nd 3rd 4th \$ 20.21 \$ 23.58 \$ 26.95 \$ 30.32

Supplemental benefits per hour:

1st 2nd 3rd 4th \$ 12.29 \$ 12.42 \$ 21.30 \$ 21.43

5-3TS - Z4

Millwright 05/01/2023

JOB DESCRIPTION Millwright ENTIRE COUNTIES

DISTRICT 6

Prevailing Wage Rates for 07/01/2022 - 06/30/2023 Last Published on May 01 2023

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES

THE FOLLOWING RATE APPLIES TO ANY GAS/STEAM TURBINE AND OR RELATED COMPONENT WORK, INCLUDING NEW INSTALLATIONS OR MAINTENANCE AND ANY/ALL WORK PERFORMED WITHIN THE PROPERTY LIMITS OF A NUCLEAR FACILITY.

Per hour: 07/01/2022

Millwright - Power Generation \$41.23

NOTE: ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount subject to any overtime premiums):

- Certified Welders shall receive an additional \$1.75 per hour provided he/she is directed to perform certified welding.
- If a work site has been declared a hazardous site by the Owner and the use of protective gear (including, as a minimum, air purifying canister-type chemical respirators) are required, then that employee shall receive an additional \$1.50 per hour.
- An employee performing the work of a machinist shall receive an additional \$2.00 per hour. For the purposes of this premium to apply, a "machinist" is a person who uses a lathe, Bridgeport, milling machine or similar type of tool to make or modify parts.
- When performing work underground at 500 feet and below, the employee shall receive an additional \$1.00 per hour.

SUPPLEMENTAL BENEFITS

Per hour paid:

Journeyman \$ 26.72*

*NOTE: Subject to OT premium

OVERTIME PAY

See (B, E, *E2, Q, V) on OVERTIME PAGE

*NOTE - Saturday may be used as a make-up day and worked at the straight time rate of pay during a work week when conditions such as weather, power failure, fire, or natural disaster prevent the performance of work on a regular scheduled work day.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

NOTE: Any holiday that falls on Sunday shall be observed the following Monday. Any holiday that falls on Saturday shall be observed the preceding Friday.

REGISTERED APPRENTICES

WAGES per hour: One year terms at the following percentage of Journeyman's wage:

Appr. 1st year	65 %*
Appr. 2nd year	75 %*
Appr. 3rd year	80 %*
Appr. 4th year	90 %*

*NOTE: Additional premium for the following work listed below:

Certified Welder	\$ 1.75
Hazardous Waste Work	1.50
Machinist	2.00
Underground	1.00
(500' and below)	

SUPPLEMENTAL BENEFITS per hour:

Appr. 1st year	\$ 11.83
Appr. 2nd year	22.26
Appr. 3rd year	23.74
Appr. 4th year	25.24

6-1163Power

Millwright 05/01/2023

JOB DESCRIPTION Millwright

DISTRICT 7

ENTIRE COUNTIES

Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Herkimer, Madison, Seneca, Tioga, Yates

 Per hour:
 07/01/2022

 Building
 \$ 32.22

 Heavy & Highway*
 34.22

NOTE: ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount subject to any overtime premiums):

- Certified Welders shall receive an additional \$1.75 per hour provided he/she is directed to perform certified welding.
- On Building projects, If a work site has been declared a hazardous site by the Owner and the use of protective gear (including, as a minimum, air purifying canister-type chemical respirators) are required, then that employee shall receive an additional \$1.50 per hour.
- H/H work performed on hazardous waste sites where employees are required to wear protective gear shall receive an additional \$2.00 per hour over the Millwright H/H rate for all hours worked on the day protective gear was worn.
- An employee performing the work of a machinist shall receive an additional \$2.00 per hour. For the purposes of this premium to apply, a "machinist" is a person who uses a lathe, Bridgeport, milling machine or similar type of tool to make or modify parts.
- When performing work underground at 500 feet and below, the employee shall receive an additional \$1.00 per hour.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 23.32

OVERTIME PAY

See (B, E, *E2, Q) on OVERTIME PAGE

*Note - Saturday may be used as a make-up day and worked at the straight time rate of pay during a work week when conditions such as weather, power failure, fire, or natural disaster prevent the performance of work on a regular scheduled work day.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

NOTE: Any holiday that falls on Sunday shall be observed the following Monday. Any holiday that falls on a Saturday shall be observed the preceding Friday.

REGISTERED APPRENTICES

WAGES per hour: One year terms at the following percentage of Journeyman's wage:

Appr. 1st year	65 %*
Appr. 2nd year	75 %*
Appr. 3rd year	80 %*
Appr. 4th year	90 %*

*NOTE: Additional premium for the following work listed below:

Certified Welder	\$ 1.75
Hazardous Waste Work (Bldg)	1.50
Hazardous Waste Work (H/H)	2.00
Machinist	2.00
Underground	1.00
(500' and below)	

SUPPLEMENTAL BENEFITS per hour:

Operating Engineer - Building

Appr. 1st year	\$ 11.23
Appr. 2nd year	19.69
Appr. 3rd year	20.90
Appr. 4th year	22.11

7-1163 Zone 2

05/01/2023

JOB DESCRIPTION Operating Engineer - Building

DISTRICT 1

ENTIRE COUNTIES
Broome, Chenango, Tioga

WAGES

CLASS A1:

Crane, hydraulic cranes, tower crane, locomotive crane, piledriver, cableway, derricks, whirlies, dragline, boom trucks over 5 tons.

CLASS A:

^{*}Effective 5/1/2019, all Heavy and Highway Millwright construction will be paid at the rate indicated above.

Shovel, all Excavators (including rubber tire full swing), Gradalls, power road grader, all CMI equipment, front-end rubber tire loader, tractor-mounted drill (quarry master), mucking machine, concrete central mix plant, concrete pump, belcrete system, automated asphalt concrete plant, and tractor road paver, boom trucks 5 tons and under, maintenance engineer, self-contained crawler drill-hydraulic rock drill.

CLASS B:

Backhoes (rubber tired backhoe/loader combination), bulldozer, pushcat, tractor, traxcavator, scraper, LeTourneau grader, form fine grader, self-propelled soil compactor (fill roller), asphalt roller, blacktop spreader, power brooms, sweepers, trenching machine, Barber Green loader, side booms, hydro hammer, concrete spreader, concrete finishing machine, one drum hoist, power hoisting (single drum), hoist two drum or more, three drum engine, power hoisting (two drum and over), two drum and swinging engine, three drum swinging engine, hod hoist, A-L frame winches, core and well drillers (one drum), post hole digger, model CHB Vibro-Tamp or similar machine, batch bin and plant operator, dinky locomotive, skid steer loader, track excavator 5/8 cubic yard or smaller, front end rubber tired loader under four cubic yards, vacum machine(mounted or towed).

CLASS C:

Fork lift, high lift, all terrain fork lift: or similar, oiler, fireman and heavy-duty greaser, boilers and steam generators, pump, vibrator, motor mixer, air compressor, dust collector, welding machine, well point, mechanical heater, generators, temporary light plants, electric submersible pumps 4" and over, murphy type diesel generator, conveyor, elevators, concrete mixer, beltcrete power pack (belcrete system), seeding, and mulching machines, pumps.

WAGES per hour

	07/01/2022	
Class # A1	\$ 44.81	
Class # A	42.41	
Class # B	41.95	
Class # C	39.64	

Additional \$0.50 per hr for Tower Cranes.

Additional \$1.25 per hr for Cranes with Boom length & jib 150ft. and over.

Additional \$2.25 per hr for Cranes with Boom length & jib 200ft. and over.

Additional \$2.50 per hr over B rate for Nuclear Leader work.

Additional \$0.40 per hr for tunnel or excavation of shaft 40' or more deep.

Additional \$2.50 per hour if work requires Personal Protective Equipment for hazardous waste site activities with a level C or over rating.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour

Journeyman \$30.00

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

Note: If a holiday falls on Sunday, it will be celebrated on Monday. If the holiday falls on Saturday, it will be celebrated on Friday. Employees who work a designated holiday shall be paid double time plus 8 hours at straight time.

REGISTERED APPRENTICES

Wages per hour

1000 hours terms at the following percentage of Journeyperson's wage Class B:

1st 2nd 3rd 4th 60% 70% 80% 90%

Supplemental Benefits per hour worked

All terms \$ 25.50

1-158 BCT

^{*} In the event that equipment listed above is operated by robotic control, the classification covering the operation will be the same as if manually operated.

Operating Engineer - Heavy&Highway

05/01/2023

JOB DESCRIPTION Operating Engineer - Heavy&Highway

DISTRICT 1

ENTIRE COUNTIES

Albany, Broome, Chenango, Clinton, Columbia, Essex, Franklin, Fulton, Greene, Hamilton, Herkimer, Montgomery, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Tioga, Warren, Washington

PARTIAL COUNTIES

Dutchess: Defined as north of the northern boundary line of City of Poughkeepsie then due east to Route 115 to Bedell Road then east along Bedell Road to VanWagner Road then north along VanWagner Road to Bower Road then east along Bower Road to Rte. 44 east to Route 343 then along Route 343 east to the northern boundary of Town of Dover Plains and east along the northern boundary of Town of Dover Plains to Connecticut.

WAGES

CLASSIFICATION A:

Asphalt Curb Machine (Self Propelled, Slipform), Asphalt Paver, Automated Concrete Spreader (CMI Type), Automatic Fine Grader, Backhoe (Except Tractor Mounted, Rubber Tired), Backhoe Excavator Full Swing (CAT 212 or similar type), Back Filling Machine, Belt Placer (CMI Type), Blacktop Plant (Automated), Boom truck, GPS operated Bull Dozer, Cableway, Caisson Auger, Central Mix Concrete Plant (Automated), Concrete Curb Machine (Self Propelled, Slipform), Concrete Pump, Crane, Cherry Picker, Derricks (steel erection), Dragline, Overhead Crane (Gantry or Straddle type), Pile Driver, Truck Crane, Directional Drilling Machine, Dredge, Dual Drum Paver, Excavator (All PurposeHydraulically Operated) (Gradall or Similar), Front End Loader (4 cu. yd. and Over), Head Tower (Sauerman or Equal), Hoist (Two or Three Drum), Holland Loader, Maintenance Engineer, Mine Hoist, Mucking Machine or Mole, Pavement Breaker(SP) Wertgen; PB-4 and similar type, Power Grader, Profiler (over 105 H.P.), Quad 9, Quarry Master (or equivalent), Scraper, Shovel, Side Boom, Slip Form Paver (If a second man is needed, he shall be an Oiler), Tractor Drawn BeltType Loader, Truck or Trailer Mounted Log Chipper (Self Feeder), Tug Operator (Manned Rented Equipment Excluded), Tunnel Shovel

CLASSIFICATION B:

Backhoe (Tractor Mounted, Rubber Tired), Bituminous Recycler Machine, Bituminous Spreader and Mixer, Blacktop Plant (NonAutomated), Blast or Rotary Drill (Truck or Tractor Mounted), Brokk, Boring Machine, Cage Hoist, Central Mix Plant [(NonAutomated) and All Concrete Batching Plants], Concrete Paver (Over 16S), Crawler Drill (Self-contained), Crusher, Diesel Power Unit, Drill Rigs, Tractor Mounted, Front End Loader (Under 4 cu. yd.), Greaseman/Lubrication Engineer, HiPressure Boiler (15 lbs. and over), Hoist (One Drum), Hydro-Axe, Kolman Plant Loader and Similar Type Loaders (If Employer requires another man to clean the screen or to maintain the equipment, he shall be an Oiler), L.C.M. Work Boat Operator, Locomotive, Material handling knuckle boom, Mini Excavator (under 18,000 lbs.), Mixer (for stabilized base self-propelled), Monorail Machine, Plant Engineer, Prentice Loader, Profiler (105 H.P. and under), Pug Mill, Pump Crete, Ready Mix Concrete Plant, Refrigeration Equipment (for soil stabilization), Road Widener, Roller (all above subgrade), Sea Mule, Self-contained Rideon Rock Drill(Excluding Air-Track Type Drill), Skidder, Tractor with Dozer and/or Pusher, Trencher, Tugger Hoist, Vacum machine (mounted or towed), Vermeer saw (ride on, any size or type), Welder, Winch, Winch Cat

CLASSIFICATION C:

A Frame Winch Hoist on Truck, Articulated Heavy Hauler, Aggregate Plant, Asphalt or Concrete Grooving Machine (ride on), Ballast Regulator(Ride-on), Boiler (used in conjunction with production), Bituminous Heater (self-propelled), Boat (powered), Cement and Bin Operator, Concrete Pavement Spreader and Finisher Concrete Paver or Mixer (16' and under), Concrete Saw (self-propelled), Conveyor, Deck Hand, Directional Drill Machine Locator, Drill (Core and Well), Farm Tractor with accessories, Fine Grade Machine, Fireman, Fork Lift, Form Tamper, Grout Pump, Gunite Machine, Hammers (Hydraulic self-propelled), Hydra-Spiker (ride-on), Hydraulic Pump (jacking system), Hydro-Blaster (Water), Mulching Machine, Oiler, Parapet Concrete or Pavement Grinder, Post Hole Digger and Post Driver, Power Broom (towed), Power Heaterman, Power Sweeper, Revinius Widener, Roller (Grade and Fill), Scarifier (ride-on), Shell Winder, Skid steer loader (Bobcat or similar), Span-Saw (ride-on), Steam Cleaner, Tamper (ride-on), Tie Extractor (ride-on), Tie Handler (ride-on), Tie Inserter (ride-on), Tie Spacer (ride-on), Tire Repair, Track Liner (ride-on), Tractor, Tractor (with towed accessories), Vibratory Compactor, Vibro Tamp, Well Point, and the following hands-off equipment: Compressors, Dust Collectors, Generators, Pumps, Welding Machines, Light Plants and Heaters

- Note for all above classifications of Operating Engineer - In the event that equipment listed above is operated by robotic control, the classification covering the operation will be the same as if manually operated.

WAGES per hour

	07/01/2022	
Master Mechanic	\$ 51.03	
Class A*	49.42	
Class B	48.51	
Class C	45.94	

Additional \$2.50 per hour for All Employees who work a single irregular work shift starting from 5:00 PM to 1:00 AM that is mandated by the Contracting Agency.

Additional \$2.50 per hr. for hazardous waste removal work on State and/or Federally designated waste site which require employees to wear Level C or above forms of personal protection.

- (*) Premiums for CRANES is based upon Class A rates with the following premiums:
- Additional \$4.00 per hr for Tower Cranes, including self erecting.

- Additional \$3.00 per hr for Lattice Boom Cranes and all other cranes with a manufacturers rating of fifty (50) tons and over.
- Additional \$2.00 per hr for all Hydraulic Cranes and Derricks with a manufacturer's rating of 49 ton and below, including boom trucks.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour

Journeyperson \$ 30.75

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

Note: If the holiday falls on Sunday, it will be celebrated on Monday. If the Holiday falls on a Saturday employer can choose to celebrate

Saturday or give Friday off with pay.

REGISTERED APPRENTICES

Wages per hour

1000 hours terms at the following percentage of Journeyperson's wage Class B

1st 2nd 3rd 4th 60% 70% 80% 90%

Supplemental Benefits per hour worked

All Terms \$ 26.15

1-158H/H Alb

Operating Engineer - Survey Crew

05/01/2023

DISTRICT 12

JOB DESCRIPTION Operating Engineer - Survey Crew

ENTIRE COUNTIES

Albany, Allegany, Broome, Cayuga, Chemung, Chenango, Clinton, Columbia, Cortland, Essex, Franklin, Fulton, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Oneida, Onondaga, Ontario, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Warren, Washington, Wayne, Yates

PARTIAL COUNTIES

Dutchess: The northern portion of the county from the northern boundary line of the City of Poughkeepsie, north.

Genesee: Only the portion of the county that lies east of a line down the center of Route 98 to include all area that lies within the City of

Batavia.

WAGES

These rates apply to Building, Tunnel and Heavy Highway.

Per hour:

SURVEY CLASSIFICATIONS:

Party Chief - One who directs a survey party.

Instrument Person - One who operates the surveying instruments.

Rod Person - One who holds the rods and assists the Instrument Person.

07/01/2022

Party Chief \$47.37 Instrument Person 43.51 Rod Person 32.26

Additional \$3.00/hr. for Tunnel Work Additional \$2.50/hr. for Hazardous Work Site

SUPPLEMENTAL BENEFITS

Per hour worked:

Journeyman \$ 28.05

See (B, E, P, *X) on OVERTIME PAGE

*Note: \$24.10/Hr. Only for "ALL" premium hours paid when worked.

HOLIDAY

Paid: See (5, 6) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

WAGES: 1000 hour terms based on the Percentage of Rod Persons Wage:

07/01/2022

0-1000 60% 1001-2000 70% 2001-3000 80%

SUPPLEMENTAL BENEFIT per hour worked:

0-1000 \$ 19.83 / PHP \$17.03 1001-2000 22.85 / " 19.45 2001-3000 25.88 / " 21.93

NOTE: PHP is premium hours paid when worked.

12-158-545 D.H.H.

Operating Engineer - Survey Crew - Consulting Engineer

05/01/2023

JOB DESCRIPTION Operating Engineer - Survey Crew - Consulting Engineer

DISTRICT 12

ENTIRE COUNTIES

Albany, Allegany, Broome, Cayuga, Chemung, Chenango, Clinton, Columbia, Cortland, Essex, Franklin, Fulton, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Oneida, Onondaga, Ontario, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Warren, Washington, Wayne, Yates

PARTIAL COUNTIES

Dutchess: The northern portion of the county from the northern boundary line of the City of Poughkeepsie, north.

Genesee: Only the portion of the county that lies east of a line down the center of Route 98 to include all area that lies within the City of Batavia.

WAGES

These rates apply to feasibility and preliminary design surveying, line and grade surveying for inspection or supervision of construction when performed under a Consulting Engineer Agreement.

Per hour:

SURVEY CLASSIFICATIONS:

Party Chief - One who directs a survey party.

Instrument Person - One who operates the surveying instruments.

Rod Person - One who holds the rods and assists the Instrument Person.

07/01/2022

Party Chief \$ 47.37 Instrument Person 43.51 Rod Person 32.26

Additional \$3.00/hr. for Tunnel Work.

Additional \$2.50/hr. for EPA or DEC certified toxic or hazardous waste work.

SUPPLEMENTAL BENEFITS

Per hour worked:

Journeyman \$ 28.05

OVERTIME PAY

See (B, E, Q, *X) on OVERTIME PAGE

*Note: \$24.10/Hr. Only for "ALL" premium hours paid when worked.

HOLIDAY

Paid: See (5, 6) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

WAGES: 1000 hour terms based on percentage of Rod Persons Wage:

07/01/2022

0-1000 60% 1001-2000 70% 2001-3000 80%

SUPPLEMENTAL BENEFIT per hour worked:

0-1000 \$ 19.83 / PHP \$17.03 1001-2000 \$ 22.85 / " 19.45 2001-3000 \$ 25.88 / " 21.93

NOTE: PHP is premium hours paid when worked.

12-158-545 DCE

Operating Engineer - Tunnel

05/01/2023

JOB DESCRIPTION Operating Engineer - Tunnel

DISTRICT 7

ENTIRE COUNTIES

Albany, Allegany, Broome, Cayuga, Chemung, Chenango, Clinton, Columbia, Cortland, Essex, Franklin, Fulton, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Oneida, Onondaga, Ontario, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Warren, Washington, Wayne, Yates

PARTIAL COUNTIES

Dutchess: Northern part of Dutchess, to the northern boundary line of the City of Poughkeepie, then due east to Route 115 to Bedell Road, then east along Bedell Road to VanWagner Road, then north along VanWagner Road to Bower Road, then east along Bower Road to Rte. 44 east to Rte. 343, then along Rte. 343 east to the northern boundary of the Town of Dover Plains, to the borderline of the State of Connecticut.

Genesee: Only that portion of the county that lies east of a line drawn down the center of Route 98 and the entirety of the City of Batavia.

WAGES

CLASS A: Automatic Concrete Spreader (CMI Type); Automatic Fine Grader; Backhoe (except tractor mounted, rubber tired); Belt Placer (CMI Type); Blacktop Plant (automated); Cableway; Caisson Auger; Central Mix Concrete Plant (automated); Concrete Curb Machine (self-propelled slipform); Concrete Pump (8" or over); Dredge; Dual Drum Paver; Excavator; Front End Loader (4 cu. yd & over); Gradall; Head Tower (Sauerman or Equal); Hoist (shaft); Hoist (two or three Drum); Log Chipper/Loader (self-feeder); Maintenance Engineer (shaft and tunnel); any Mechanical Shaft Drill; Mine Hoist; Mining Machine(Mole and similar types); Mucking Machine or Mole; Overhead Crane (Gantry or Straddle Type); Pile Driver; Power Grader; Remote Controlled Mole or Tunnel Machine; Scraper; Shovel; Side Boom; Slip Form Paver (If a second man is needed, they shall be an Oiler); Tripper/Maintenance Engineer (shaft & tunnel); Tractor Drawn Belt-Type Loader; Tug Operator (manned rented equipment excluded); Tunnel Shovel

CLASS B: Automated Central Mix Concrete Plant; Backhoe (topside); Backhoe (track mounted, rubber tired); Backhoe (topside); Bituminous Spreader and Mixer, Blacktop Plant (non-automated); Blast or Rotary Drill (truck or tractor mounted); Boring Machine; Cage Hoist; Central Mix Plant(non-automated); all Concrete Batching Plants; Compressors (4 or less exceeding 2,000 c.f.m. combined capacity); Concrete Pump; Crusher; Diesel Power Unit; Drill Rigs (tractor mounted); Front End Loader (under 4 cu. yd.); Grayco Epoxy Machine; Hoist (One Drum); Hoist (2 or 3 drum topside); Knuckle Boom material handler; Kolman Plant Loader & similar type Loaders (if employer requires another person to clean the screen or to maintain the equipment, they shall be an Oiler); L.C.M. Work Boat Operator; Locomotive; Maintenance Engineer (topside); Maintenance Grease Man; Mixer (for stabilized base-self propelled); Monorail Machine; Plant Engineer; Personnel Hoist; Pump Crete; Ready Mix Concrete Plant; Refrigeration Equipment (for soil stabilization); Road Widener; Roller (all above sub-grade); Sea Mule; Shotcrete Machine; Shovel (topside); Tractor with Dozer and/or Pusher; Trencher; Tugger Hoist; Tunnel Locomotive; Vacuum Machine (mounted or towed); Welder; Winch; Winch Cat

CLASS C: A Frame Truck; All Terrain Telescoping Material Handler; Ballast Regulator (ride-on); Compressors (4 not to exceed 2,000 c.f.m. combined capacity; or 3 or less with more than 1200 c.f.m. but not to exceed 2,000 c.f.m.); Compressors ((any size, but subject to other provisions for compressors), Dust Collectors, Generators, Pumps, Welding Machines, Light Plants (4 or any type combination)); Concrete Pavement Spreaders and Finishers; Conveyor; Drill (core); Drill (well); Electric Pump used in conjunction with Well Point System; Farm Tractor with Accessories; Fine Grade Machine; Fork Lift; Grout Pump (over 5 cu. ft.); Gunite Machine; Hammers (hydraulic-self-propelled); Hydra-Spiker (ride-on); Hydra-Blaster (water); Hydro-Blaster; Motorized Form Carrier; Post Hole Digger and Post Driver; Power Sweeper; Roller grade & fill); Scarifer (ride-on); Span-Saw (ride-on); Submersible Electric Pump (when used in lieu of well points); Tamper (ride-on); Tie-Extractor (ride-on), Tie Handler (ride-on), Tie Inserter (ride-on), Tie Spacer (ride-on); Track Liner (ride-on); Tractor with towed accessories; Vibratory Compactor; Vibro Tamp, Well Point

CLASS D: Aggregate Plant; Cement & Bin Operator; Compressors (3 or less not to exceed 1,200 c.f.m. combined capacity); Compressors ((any size, but subject to other provisions for compressors), Dust Collectors, Generators, Pumps, Welding Machines, Light Plants (3 or less or any type or combination)); Concrete Saw (self-propelled); Form Tamper; Greaseman; Hydraulic Pump (jacking system); Junior Engineer; Light Plants; Mulching Machine; Oiler; Parapet Concrete or Pavement Grinder; Power Broom (towed); Power Heaterman (when used for production); Revinius Widener; Shell Winder; Steam Cleaner; Tractor

Per hour: 07/01/2022

Master Mechanic \$ 52.60 CLASS A 50.19

CLASS B	48.97
CLASS C	46.18
CLASS D	43.17

Additional \$5.00 per hour for Hazardous Waste Work on a state or federally designated hazardous waste site where the Operating Engineer is in direct contact with hazardous material and when personal protective equipment is required for respiratory, skin and eye protection. Fringe benefits will be paid at the hourly wage premium.

CRANES:

Crane 1: All cranes, including self-erecting to be paid \$4.00 per hour over the Class A rate.

Crane 2: All Lattice Boom Cranes and all cranes with a manufacturer's rating of fifty (50) ton and over to be paid \$3.00 per hour over Class A

Crane 3: All hydraulic cranes and derricks with a manufacturer's rating of forty nine (49) ton and below, including boom trucks, to be paid \$2.00 per hour over Class A rate.

\$ 54.19 Crane 1 Crane 2 53.19 Crane 3 52.19

SUPPLEMENTAL BENEFITS

Per hour:

\$23.70 + 9.35*

OVERTIME PAY

See (B, B2, E, Q, X) on OVERTIME PAGE

HOLIDAY

See (5, 6) on HOLIDAY PAGE Paid: See (5, 6) on HOLIDAY PAGE Overtime: If a holiday falls on Sunday, it shall be observed on Monday.

REGISTERED APPRENTICES

WAGES:(1000) hours terms at the following percentage of Journeyman's Class B wage.

60% 1st term 2nd term 65% 3rd term 70% 4th term 75%

SUPPLEMENTAL BENEFITS per hour: Same as Journeyman

7-158-832TL.

JOB DESCRIPTION Painter **DISTRICT** 2

ENTIRE COUNTIES

Broome, Chenango, Tioga

WAGES

Per hour:

	07/01/2022	05/01/2023	05/01/2024 Additional
Painter	\$ 26.64	\$ 27.00	\$ 1.35*
Taper, Paperhangers, and Vinyl hangers	27.97	28.35	1.42*

^{*}To be allocated at a later date.

ADDITIONAL AMOUNTS FOR SPECIFIC TYPES OF JOBSITE CONDITIONS (amount subject to any overtime premiums):

- Additional \$ 1.10 per hour for Brush and Roll Epoxy (Solvent Base Only)
- Additional \$ 0.60 per hour for Swing Scaffold, Boatswain chair, Spray helper, Steam cleaning acid and high pressure water, Power grinders with respirator
- Additional \$ 0.60 per hour for Structural steel (buildings) defined as new or old construction where ceilings, walls or the steel itself is to be painted from open trusses which require climbing or crawling without the support of solid scaffolding or scaffolding starting at the floor or ground level.
- Additional \$ 1.00 per hour for Spray Painting
- Additional \$ 1.00 per hour for Steeple Jack (Over 100 feet)

^{*} This portion of benefits subject to same premium rate as shown for overtime wages.

- Additional \$ 1.50 per hour for Spray Epoxy (Solvent Based)
- Additional \$ 0.90 per hour for Sandblasting

NOTE - SEE BRIDGE PAINTER RATES FOR BRIDGES & TANKS

** IMPORTANT NOTICE - EFFECTIVE 04/01/2009 **

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 22.24 \$ 23.23

OVERTIME PAY

See (B, *E2, F, R) on OVERTIME PAGE

*Saturday is also payable at the straight time rate if the employee misses work, except where a doctor or hospital's verification of illness is produced Monday through Friday when work was available to the employee. Saturday is not a make-up day when work is missed as a result of a Holiday.

If working 4 (four) 10 (ten) hour day schedule, Friday will be the makeup day.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

A Holiday that falls on a Sunday will be celebrated on Monday, a holiday that falls on a Saturday will be celebrated on Friday.

REGISTERED APPRENTICES

WAGES:

Painter: 750 hour terms at the Painter Apprentice wage rate:

1st	2nd	3ra	4th	5tn	otn	/tn	8tn
\$ 18.00	\$ 19.00	\$ 20.00	\$ 21.00	\$ 22.00	\$ 23.00	\$ 24.00	\$ 25.00

Taper: 750 hour terms at the following Journeyman Taper Apprentice wage rate:

1st	2nd	3rd	4th	5th	6th
\$ 20.00	\$ 21.00	\$ 22.00	\$ 23.00	\$ 24.00	\$ 25.00

ADDITIONAL AMOUNTS FOR SPECIFIC TYPES OF JOBSITE CONDITIONS (amount subject to any overtime premiums):

- Additional \$ 1.10 per hour for Brush and Roll Epoxy (Solvent Base Only)
- Additional \$ 0.60 per hour for Swing Scaffold, Boatswain chair, Spray helper, Steam cleaning acid and high pressure water, Power grinders with respirator
- Additional \$ 0.60 per hour for Structural steel (buildings) defined as new or old construction where ceilings, walls or the steel itself is to be painted from open trusses which require climbing or crawling without the support of solid scaffolding or scaffolding starting at the floor or ground level.
- Additional \$ 1.00 per hour for Spray Painting
- Additional \$ 1.00 per hour for Steeple Jack (Over 100 feet)
- Additional \$ 1.50 per hour for Spray Epoxy (Solvent Based)
- Additional \$ 0.90 per hour for Sandblasting

SUPPLEMENTAL BENEFITS per hour:

Painter/Decorator:

T diriter/Decor	ator.						
1st	2nd	3rd	4th	5th	6th	7th	8th
\$ 6.00	\$ 7.00	\$ 8.00	\$ 9.10	\$ 11.00	\$ 11.00	\$ 13.00	\$ 14.00
Taper/Drywall	Finisher:						
1st	2nd	3rd	4th	5th	6th		
\$ 6.00	\$ 7.00	\$ 8.00	\$ 10.00	\$ 13.00	\$ 14.00		

2-178 B

DISTRICT 3

Painter 05/01/2023

JOB DESCRIPTION Painter

ITIDE COUNTIES

ENTIRE COUNTIES

Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Cortland, Delaware, Erie, Genesee, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Wayne, Wyoming, Yates

WAGES

Per hour: 07/01/2022

 Bridge
 \$ 41.06

 Tunnel
 41.06

 Tank*
 39.06

For Bridge Painting Contracts, ALL WORKERS on and off the bridge (including Flagmen) are to be paid Painter's Rate; the contract must be ONLY for Bridge Painting.

Tank rate applies to indoor and outdoor tanks, tank towers, standpipes, digesters, waste water treatment tanks, chlorinator tanks, etc. Covers all types of tanks including but not limited to steel tanks, concrete tanks, fiberglass tanks, etc.

Note an additional \$1.50 per hour is required when the contracting agency or project specification requires any shift to start prior to 6:00am or after 12:00 noon.

SUPPLEMENTAL BENEFITS

Per hour:

\$ 29.89

OVERTIME PAY

Exterior work only See (B, E4, F*, R) on OVERTIME PAGE.

All other work See (B, F*, R) on OVERTIME PAGE.

*Note - Saturday is payable at straight time if the employee misses work, except where a doctor's or hospital verification of illness is produced Monday through Friday when work was available to the employee.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

750 hour terms at the following percentage of Journeyman's wage rate:

1st 2nd 3rd 4th 5th 6th \$ 24.00 \$ 26.00 \$ 28.00 \$ 30.00 \$ 34.00 \$ 38.00

Supplemental benefits per hour:

 1st
 2nd
 3rd
 4th
 5th
 6th

 \$ 6.60
 \$ 6.95
 \$ 7.30
 \$ 7.65
 \$ 8.00
 \$ 8.35

3-4-Bridge, Tunnel, Tank

Painter - Metal Polisher 05/01/2023

JOB DESCRIPTION Painter - Metal Polisher

DISTRICT 8

ENTIRE COUNTIES

Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

 07/01/2022

 Metal Polisher
 \$ 37.78

 Metal Polisher*
 38.80

 Metal Polisher**
 41.78

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2022

Journeyworker:

All classification \$ 11.24

OVERTIME PAY

See (B, E, P, T) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE Overtime: See (5, 6, 9, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

^{*}Note: Applies on New Construction & complete renovation

^{**} Note: Applies when working on scaffolds over 34 feet.

One (1) year term at the following wage rates:

	07/01/2022
1st year	\$ 16.00
2nd year	17.00
3rd year	18.00
1st year*	\$ 16.39
2nd year*	17.44
3rd year*	18.54
1st year**	\$ 18.50
2nd year**	19.50
3rd year**	20.50

^{*}Note: Applies on New Construction & complete renovation

Supplemental benefits:

Per hour:

1st year	\$ 7.99
2nd year	7.99
3rd year	7.99

8-8A/28A-MP

Plumber 05/01/2023

JOB DESCRIPTION Plumber

DISTRICT 2

ENTIRE COUNTIES

Broome, Chenango

PARTIAL COUNTIES

Cortland: Only the Township of Marathon.
Delaware: Only the Townships of Andes, Bovina, Colchester, Davenport, Delhi, Deposit, Franklin, Hamden, Hancock, Harpersfield, Kortright, Masonville, Meredith, Sidney, Stamford, Tompkins and Walton.

Madison: Only the Township of Georgetown.

Otsego: Only the Townships of Burlington, Butternuts, Decatur, Edmeston, Hartwick, Laurens, Maryland, Milford, Morris, New Lisbon,

Oneonta, Otego, Pittsfield, Unadilla, Westford and Worchester.

Tioga: Only the Townships of Newark Valley and Owego.

WAGES

Per hour:	07/01/2022	05/01/2023	
Plumber	\$ 38.23	\$ 40.38	
Steamfitter	38.23	40.38	

Agency-mandated shift operations:

- 1. Shift work shall start no earlier than 6AM Monday and will conclude no later than 9AM Saturday (overtime premiums applicable after 8 hours in a shift).
- 2. Single irregular shiftwork, less than 3 consecutive days will be paid at the rate of time and one-half of the regular hourly rate.
- 3. 3 consecutive work days or more:

First Shift - No Premium (Starting 6AM-9AM) Second Shift - Regular hourly rate plus 12% Third Shift - Regular hourly rate plus 18%

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman	\$14.45	\$ 14.65
	+16.49*	+16.64*

^{*}This portion of the benefit is subject to the SAME PREMIUM as shown for overtime on projects over \$100 million in total construction costs (including engineering & architecture).

OVERTIME PAY

See (B, E, Q, *V) on OVERTIME PAGE

^{**} Note: Applies when working on scaffolds over 34 feet.

*portion of supplemental benefits subject to V code when project cost is over one hundred million (including engineering & architecture).

HOLIDAY

Paid: See (1) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

When a Holiday falls on Sunday, it will be celebrated the following day. If the holiday falls on a Saturday, it will be observed that day unless so determined by the Federal Government to be celebrated on a different day.

REGISTERED APPRENTICES

WAGES: One year terms at the following percentage of Journeyman's wage.

1st. 2nd. 3rd. 4th. 5th. 50% 55% 60% 70% 85%

SUPPLEMENTAL BENEFITS per hour:

1st term	\$ 14.45	\$ 14.65
	+8.10*	+8.10*
All other terms	\$ 14.45	\$ 14.65
	+12.49*	+12.64*

^{*}This portion of the benefit is subject to the SAME PREMIUM as shown for overtime on projects over \$100 million in total construction costs (including engineering & architecture).

2-112s-SF

Roofer 05/01/2023

JOB DESCRIPTION Roofer

DISTRICT 2

ENTIRE COUNTIES

Broome, Chemung, Chenango, Delaware, Otsego, Schoharie, Schuyler, Steuben, Tioga, Tompkins

WAGES

Per hour: 07/01/2022

Roofer, Waterproofer \$ 29.05

NOTE ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount not subject to overtime premiums):

- On days where more than one shift is worked on the job, the hours worked after 4:30 PM and before 6:30 AM will be paid an additional \$1.90 per hour premium. This premium is not for use in emergency repair situations.
- Premium of \$0.75 per hour will be paid for the application, rip-off or handling of pitch products. The premium will be paid for pitch that is showing, covered or buried on the roof.
- Premium of \$0.70 per hour will be paid when half faced respirator is required by Employer, Building Owner, or Public Entity.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 18.29

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

WAGES: Six month terms at the following percentage of Journeyman's wage.

 1st.
 2nd.
 3rd.
 4th.
 5th.
 6th.

 60%
 65%
 70%
 75%
 80%
 90%

NOTE ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount not subject to overtime premiums):

- On days where more than one shift is worked on the job, the hours worked after 4:30 PM and before 6:30 AM will be paid an additional \$1.90 per hour premium. This premium is not for use in emergency repair situations.
- Premium of \$0.75 per hour will be paid for the application, rip-off or handling of pitch products. The premium will be paid for pitch that is showing, covered or buried on the roof.
- Premium of \$0.70 per hour will be paid when half faced respirator is required by Employer, Building Owner, or Public Entity.

SUPPLEMENTAL BENEFITS per hour:

1st term \$ 14.43

2nd term	14.92
3rd term	15.40
4th term	15.88
5th term	16.37
6th term	17.32

2-203elmi

Sheetmetal Worker	05/01/2023

JOB DESCRIPTION Sheetmetal Worker DISTRICT 2

ENTIRE COUNTIES

Allegany, Broome, Chemung, Delaware, Otsego, Schuyler, Steuben, Tioga, Tompkins

WAGES

/Per hour:

	07/01/2022	05/01/2023	05/01/2024
			Additional
Sheetmetal Worker	\$ 35.30	\$ 36.84	\$ 1.75*
Polyresin Fiberglass	35.40	36.94	1.75*
CAD Operator	36.30	37.84	1.75*

^{*}To be allocated at a later date.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman: \$ 21.21 \$ 21.46

OVERTIME PAY

See (*B1, Q) on OVERTIME PAGE

*On Saturday, time and one half of the hourly rate for the first ten (10) hours, then two (2) times the hourly wage rate for all hours after ten (10) hours worked.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

Note: Holidays are observed on the Holiday, not on the day that it is locally observed.

REGISTERED APPRENTICES

WAGES per hour: Half Year Terms

riali real reillis	1st	2nd	3rd	4th	5th	6th	7th	8th
07/01/2022	21.18	21.18	22.95	24.71	26.48	28.24	30.00	31.78
05/01/2023	22.10	22.10	23.94	25.79	27.63	29.47	31.31	33.16
SUPPLEMENTAL BENI	EFITS per hour:							
	1st	2nd	3rd	4th	5th	6th	7th	8th
07/01/2022	1.68	1.68	17.70	17.78	17.86	17.94	18.02	18.10
05/01/2023	1.68	1.68	17.85	17.93	18.01	18.09	18.17	18.25 2-112

Sprinkler Fitter 05/01/2023

JOB DESCRIPTION Sprinkler Fitter

DISTRICT 1

ENTIRE COUNTIES

Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Washington, Wayne, Wyoming, Yates

WAGES

Per hour 07/01/2022

Sprinkler \$ 38.15

Fitter

SUPPLEMENTAL BENEFITS

Per hour

Journeyperson \$ 27.68

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE Overtime: See (5, 6) on HOLIDAY PAGE

Note: When a holiday falls on Sunday, the following Monday shall be considered a holiday and all work performed on either day shall be at the double time rate. When a holiday falls on Saturday, the preceding Friday shall be considered a holiday and all work performed on either day shall be at the double time rate.

REGISTERED APPRENTICES

Wages per hour

One Half Year terms at the following wage.

1st \$ 18.30	2nd \$ 20.34	3rd \$ 22.12	4th \$ 24.15	5th \$ 26.19	6th \$ 28.22	7th \$ 30.25	8th \$ 32.29	9th \$ 34.32	10th \$ 36.35
Supplemental	Benefits per	hour							
1st \$ 8.37	2nd \$ 8.37	3rd \$ 19.76	4th \$ 19.76	5th \$ 20.01	6th \$ 20.01	7th \$ 20.01	8th \$ 20.01	9th \$ 20.01	10th \$ 20.01 1-669

Teamster - Building 05/01/2023

JOB DESCRIPTION Teamster - Building

DISTRICT 6

ENTIRE COUNTIES

Broome, Cayuga, Cortland, Delaware, Onondaga, Seneca, Tompkins, Yates

PARTIAL COUNTIES

Allegany: Only the Townships of Almond, Burns, and Alfred.

Chenango: Only the Townships of Afton, Bainbridge, Coventry, Greene, Guilford, Oxford and Smithville. Madison: Only the Townships of Cazenovia, DeRuyter, Fenner, Georgetown, Lenox, Nelson and Sullivan.

Oswego: All Townships except Redfield, Boylston and Sandy Creek.

Otsego: Only the Townships of Butternuts, Laurens, Maryland, Millford, Morris, Oneonta, Otego, Unadilla, and Worchester.

Steuben: Only the Townships of Prattsburg, Canisteo, Fremont, Cohoctan, Dansville, Hornell, Hartsville, Greenwood, West Union,

Troupsburg, and Jasper.

Tioga: Only the Townships of Berkshire, Candor, Newark Valley, Nichols, Owego, Richford, and Tioga. All territory east of Nichols/Smithboro to Broome County, within State of New York.

WAGES

GROUP A: Straight Trucks

GROUP B: Tractor Trailer, Farm Tractor, Fuel Truck.

GROUP C: Euclid.

GROUP D: On site Mechanic.

Per hour:	07/01/2022
Building: (under \$ 5 million*) GROUP A GROUP B GROUP C GROUP D	\$ 24.43 24.43 24.43 24.43
Building: (over \$ 5 million*) GROUP A GROUP B GROUP C GROUP D	\$ 25.48 25.58 25.83 25.63

^{*} Total project cost including General Construction, Plumbing, HVAC and Electrical

SUPPLEMENTAL BENEFITS

Per hour:

(under \$5 million*) \$ 28.63 (over \$5 million*) 29.37

OVERTIME PAY

(D, O) on OVERTIME PAGE

^{*} Total project cost including General Construction, Plumbing, HVAC and Electrical

HOLIDAY

See (1) on HOLIDAY PAGE Paid: Overtime: See (5, 6) on HOLIDAY PAGE

6 - 317

Teamster - Heavy&Highway

05/01/2023

JOB DESCRIPTION Teamster - Heavy&Highway

DISTRICT 2

ENTIRE COUNTIES

Broome, Delaware

Chenango: Only the Townships of Smithville, Greene, Coventry, Oxford, Afton, Bainbridge and Guilford. Otsego: Only the Townships of Butternuts, Laurens, Maryland, Milford, Morris, Oneonta, Otego, Unadilla and Worchester.

Tioga: Only the Townships of Nichols, Tioga, Candor, Richford, Berkshire, Newark Valley and Owego.

WAGES

Per hour:

GROUP #1: Warehousemen, Yardmen, Truck Helpers, Pickups, Panel Trucks, Flatboy Material Trucks (straight jobs), Single Axle Dump Trucks, Dumpsters, Material Checkers and Receivers, Greasers, Truck Tiremen, Mechanic Helpers and Parts Chasers, Tandems and Batch Trucks, Mechanics, Dispatcher. Semi-Trailers, Low-boy Trucks, Asphalt Distributor Trucks, Agitator, Mixer Trucks and Dumpcrete type vehicles, Truck Mechanic, Fuel Trucks.

GROUP #2: Specialized Earth Moving Equipment-Euclid type or similar off-highway where not self-loading. Straddle (Ross) Carrier, and selfcontained concrete mobile truck. Off-highway Tandem Back-Dump, Twin Engine Equipment and Double-Hitched Equipment where not selfloading

	07/01/2022	07/01/2023	07/01/2024
Group #1	\$ 29.71	\$ 31.57	\$ 33.57
Group #2	29.80	31.66	33.66

NOTES

- An additional \$1.50 per hour shall be paid to an employee who performs hazardous waste removal work on a City, County, State and/or Federally designated waste site where employee is required to use or wear personal protective equipment.
- A single irregular work shift can star an time between 5:00pm and 1:00am. All employees who work a single irregular shift on governmental mandated night work shall be paid an additional \$2.50 per hour (applicable on projects bid on or after 07/01/2020).

SUPPLEMENTAL BENEFITS

Per hour paid:

07/01/2022	07/01/2023	07/01/2024
\$ 26.62	\$ 27.26	\$ 27.76

OVERTIME PAY

See (B, E, Q, X) on OVERTIME PAGE

HOLIDAY

See (5, 6) on HOLIDAY PAGE Paid: Overtime: See (5, 6) on HOLIDAY PAGE If a holiday falls on Sunday, it will be celebrated Monday.

Any employee laid off within the week in which a holiday falls shall receive holiday pay.

2-317(Bing)

Welder 05/01/2023

JOB DESCRIPTION Welder

DISTRICT 1

ENTIRE COUNTIES

Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

07/01/2022 Per hour

Welder: To be paid the same rate of the mechanic performing the work.*

*EXCEPTION: If a specific welder certification is required, then the 'Certified Welder' rate in that trade tag will be paid.

OVERTIME PAY HOLIDAY

1-As Per Trade

Overtime Codes

Following is an explanation of the code(s) listed in the OVERTIME section of each classification contained in the attached schedule. Additional requirements may also be listed in the HOLIDAY section.

NOTE: Supplemental Benefits are 'Per hour worked' (for each hour worked) unless otherwise noted

(AA)	Time and one half of the hourly rate after 7 and one half hours per day
(A)	Time and one half of the hourly rate after 7 hours per day
(B)	Time and one half of the hourly rate after 8 hours per day
(B1)	Time and one half of the hourly rate for the 9th & 10th hours week days and the 1st 8 hours on Saturday. Double the hourly rate for all additional hours
(B2)	Time and one half of the hourly rate after 40 hours per week
(C)	Double the hourly rate after 7 hours per day
(C1)	Double the hourly rate after 7 and one half hours per day
(D)	Double the hourly rate after 8 hours per day
(D1)	Double the hourly rate after 9 hours per day
(E)	Time and one half of the hourly rate on Saturday
(E1)	Time and one half 1st 4 hours on Saturday; Double the hourly rate all additional Saturday hours
(E2)	Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
(E3)	Between November 1st and March 3rd Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather, provided a given employee has worked between 16 and 32 hours that week
(E4)	Saturday and Sunday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
(E5)	Double time after 8 hours on Saturdays
(F)	Time and one half of the hourly rate on Saturday and Sunday
(G)	Time and one half of the hourly rate on Saturday and Holidays
(H)	Time and one half of the hourly rate on Saturday, Sunday, and Holidays
(1)	Time and one half of the hourly rate on Sunday
(J)	Time and one half of the hourly rate on Sunday and Holidays
(K)	Time and one half of the hourly rate on Holidays
(L)	Double the hourly rate on Saturday
(M)	Double the hourly rate on Saturday and Sunday
(N)	Double the hourly rate on Saturday and Holidays
(O)	Double the hourly rate on Saturday, Sunday, and Holidays
(P)	Double the hourly rate on Sunday
(Q)	Double the hourly rate on Sunday and Holidays
(R)	Double the hourly rate on Holidays
(S)	Two and one half times the hourly rate for Holidays

- (S1) Two and one half times the hourly rate the first 8 hours on Sunday or Holidays One and one half times the hourly rate all additional hours.
- (T) Triple the hourly rate for Holidays
- (U) Four times the hourly rate for Holidays
- (V) Including benefits at SAME PREMIUM as shown for overtime
- (W) Time and one half for benefits on all overtime hours.
- (X) Benefits payable on Paid Holiday at straight time. If worked, additional benefit amount will be required for worked hours. (Refer to other codes listed.)

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Holiday Codes

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 Holiday Pay:

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.

Following is an explanation of the code(s) listed in the HOLIDAY section of each classification contained in the attached schedule. The Holidays as listed below are to be paid at the wage rates at which the employee is normally classified.

(1)	None
(2)	Labor Day
(3)	Memorial Day and Labor Day
(4)	Memorial Day and July 4th
(5)	Memorial Day, July 4th, and Labor Day
(6)	New Year's, Thanksgiving, and Christmas
(7)	Lincoln's Birthday, Washington's Birthday, and Veterans Day
(8)	Good Friday
(9)	Lincoln's Birthday
(10)	Washington's Birthday
(11)	Columbus Day
(12)	Election Day
(13)	Presidential Election Day
(14)	1/2 Day on Presidential Election Day
(15)	Veterans Day
(16)	Day after Thanksgiving
(17)	July 4th
(18)	1/2 Day before Christmas
(19)	1/2 Day before New Years
(20)	Thanksgiving
(21)	New Year's Day
(22)	Christmas
(23)	Day before Christmas
(24)	Day before New Year's
(25)	Presidents' Day
(26)	Martin Luther King, Jr. Day
(27)	Memorial Day
(28)	Easter Sunday

(29) Juneteenth



New York State Department of Labor - Bureau of Public Work State Office Building Campus Building 12 - Room 130 Albany, New York 12240

REQUEST FOR WAGE AND SUPPLEMENT INFORMATION

As Required by Articles 8 and 9 of the NYS Labor Law

 $Fax \ (518) \ 485\text{-}1870 \ \text{or mail this form for new schedules or for determination for additional occupations}.$

This Form Must Be Typed

Submitted By: (Check Only One) Contracting Agency Architect or Engineering	g Firm Public Work District Office Date	2:
A. Public Work Contract to be let by: (Enter Data Pertaining to	Contracting/Public Agency)	
1. Name and complete address	Construction Fund	□ 07 City □ 08 Local School District □ 09 Special Local District, i.e., Fire, Sewer, Water District □ 10 Village □ 11 Town □ 12 County □ 13 Other Non-N.Y. State (Describe)
E-Mail: 3. SEND REPLY TO Check if new or change) Name and complete address:	4. SERVICE REQUIRED. Check appropriate information. New Schedule of Wages and Supplem APPROXIMATE BID DATE: Additional Occupation and/or Redetern	pox and provide project nents.
Telephone:() Fax: () E-Mail:	PRC NUMBER ISSUED PREVIOUSLY FOR THIS PROJECT:	OFFICE USE ONLY
B. PROJECT PARTICULARS		
5. Project Title Description of Work Contract Identification Number Note: For NYS units, the OSC Contract No.	6. Location of Project: Location on Site Route No/Street Address Village or City Town County	
7. Nature of Project - Check One: 1. New Building 2. Addition to Existing Structure 3. Heavy and Highway Construction (New and Repair) 4. New Sewer or Waterline 5. Other New Construction (Explain) 6. Other Reconstruction, Maintenance, Repair or Alteration 7. Demolition 8. Building Service Contract	8. OCCUPATION FOR PROJECT : Construction (Building, Heavy Highway/Sewer/Water) Tunnel Residential Landscape Maintenance Elevator maintenance Exterminators, Fumigators Fire Safety Director, NYC Only	☐ Guards, Watchmen ☐ Janitors, Porters, Cleaners, Elevator Operators ☐ Moving furniture and equipment ☐ Trash and refuse removal ☐ Window cleaners ☐ Other (Describe)
9. Has this project been reviewed for compliance with the Wi	cks Law involving separate bidding?	YES NO
10. Name and Title of Requester	Signature	



NEW YORK STATE DEPARTMENT OF LABOR Bureau of Public Work - Debarment List

LIST OF EMPLOYERS INELIGIBLE TO BID ON OR BE AWARDED ANY PUBLIC WORK CONTRACT

Under Article 8 and Article 9 of the NYS Labor Law, a contractor, sub-contractor and/or its successor shall be debarred and ineligible to submit a bid on or be awarded any public work or public building service contract/sub-contract with the state, any municipal corporation or public body for a period of five (5) years from the date of debarment when:

- Two (2) final determinations have been rendered within any consecutive six-year (6) period determining that such contractor, sub-contractor and/or its successor has WILLFULLY failed to pay the prevailing wage and/or supplements;
- One (1) final determination involves falsification of payroll records or the kickback of wages and/or supplements.

The agency issuing the determination and providing the information, is denoted under the heading 'Fiscal Officer'. DOL = New York State Department of Labor; NYC = New York City Comptroller's Office; AG = New York State Attorney General's Office; DA = County District Attorney's Office.

<u>Debarment Database:</u> To search for contractors, sub-contractors and/or their successors debarred from bidding or being awarded any public work contract or subcontract under NYS Labor Law Articles 8 and 9, <u>or</u> under NYS Workers' Compensation Law Section 141-b, access the database at this link: https://applications.labor.ny.gov/EDList/searchPage.do

For inquiries where WCB is listed as the "Agency", please call 1-866-546-9322

AGENCY	Fiscal Officer	FEIN	EMPLOYER NAME	EMPLOYER DBA NAME	ADDRESS	DEBARMENT START DATE	DEBARMENT END DATE
DOL	DOL	****5754	0369 CONTRACTORS, LLC		515 WEST AVE UNIT PH 13NORWALK CT 06850	05/12/2021	05/12/2026
DOL	DOL	****4018	ADIRONDACK BUILDING RESTORATION INC.		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	AG	****1812	ADVANCED BUILDERS & LAND DEVELOPMENT, INC.		400 OSER AVE #2300HAUPPAUGE NY 11788	09/11/2019	09/11/2024
DOL	DOL	****1687	ADVANCED SAFETY SPRINKLER INC		261 MILL ROAD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	NYC		AGOSTINHO TOME		405 BARRETTO ST BRONX NY 10474	05/31/2018	05/31/2023
DOL	NYC		ALL COUNTY SEWER & DRAIN, INC.		7 GREENFIELD DR WARWICK NY 10990	03/25/2022	03/25/2027
DOL	NYC		AMJED PARVEZ		401 HANOVER AVENUE STATEN ISLAND NY 10304	01/11/2021	01/11/2026
DOL	DOL		ANGELO F COKER		2610 SOUTH SALINA STREET SUITE 14SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		ANGELO F COKER		2610 SOUTH SALINA STREET SUITE 14SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL		ANGELO GARCIA		515 WEST AVE UNIT PH 13NORWALK CT 06850	05/12/2021	05/12/2026
DOL	DOL		ANGELO TONDO		449 WEST MOMBSHA ROAD MONROE NY 10950	06/06/2022	06/06/2027
DOL	DOL		ANITA SALERNO		158 SOLAR ST SYRACUSE NY 13204	01/07/2019	01/07/2024
DOL	DOL	****4231	ANKER'S ELECTRIC SERVICE, INC.		10 SOUTH 5TH ST LOCUST VALLEY NY 11560	09/26/2022	09/26/2027
DOL	DOL		ANTONIO ESTIVEZ		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	NYC		ARADCO CONSTRUCTION CORP		115-46 132RD ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	DOL		ARNOLD A. PAOLINI		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
DOL	NYC		ARSHAD MEHMOOD		168-42 88TH AVENUE JAMAICA NY 11432	11/20/2019	11/20/2024
DOL	NYC	*****2591	AVI 212 INC.		260 CROPSEY AVENUE APT 11GBROOKLYN NY 11214	10/30/2018	10/30/2023
DOL	NYC		AVM CONSTRUCTION CORP		117-72 123RD ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	NYC		AZIDABEGUM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	DOL	*****8421	B & B DRYWALL, INC		206 WARREN AVE APT 1WHITE PLAINS NY 10603	12/14/2021	12/14/2026
DOL	NYC		BALWINDER SINGH		421 HUDSON ST SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	NYC	****8416	BEAM CONSTRUCTION, INC.		50 MAIN ST WHITE PLAINS NY 10606	01/04/2019	01/04/2024
DOL	DOL		BERNARD BEGLEY		38 LONG RIDGE ROAD BEDFORD NY 10506	12/18/2019	12/18/2024
DOL	NYC	****2113	BHW CONTRACTING, INC.		401 HANOVER AVENUE STATEN ISLAND NY 10304	01/11/2021	01/11/2026
DOL	DOL		BIAGIO CANTISANI			06/12/2018	06/12/2023
DOL	DOL	****3627	BJB CONSTRUCTION CORP.		38 LONG RIDGE ROAD BEDFORD NY 10506	12/18/2019	12/18/2024
DOL	DOL	****4512	BOB BRUNO EXCAVATING, INC		5 MORNINGSIDE DR AUBURN NY 13021	05/28/2019	05/28/2024
DOL	DOL		BOGDAN MARKOVSKI		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024
DOL	DOL		BRADLEY J SCHUKA		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025
DOL	DOL		BRUCE P. NASH JR.		5841 BUTTERNUT ROAD EAST SYRACUSE NY 13057	09/12/2018	09/12/2023
DOL	DOL	*****9383	C.C. PAVING AND EXCAVATING, INC.		2610 SOUTH SALINA ST SUITE 12SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL	*****9383	C.C. PAVING AND EXCAVATING, INC.		2610 SOUTH SALINA ST SUITE 12SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL	****4083	C.P.D. ENTERPRISES, INC		P.O BOX 281 WALDEN NY 12586	03/03/2020	03/03/2025

DOL	DOL	****5161	CALADRI DEVELOPMENT CORP.		1223 PARK ST. PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	DOL	*****3391	CALI ENTERPRISES, INC.		1223 PARK STREET PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	NYC		CALVIN WALTERS		465 EAST THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL		CANTISANI & ASSOCIATES LTD		442 ARMONK RD MOUNT KISCSO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CANTISANI HOLDING LLC			06/12/2018	06/12/2023
DOL	DOL		CARMEN RACHETTA		8531 OSWEGO RD BALDWINSVILLE NY 13027	02/03/2020	02/03/2025
DOL	DOL	*****3812	CARMODY "2" INC			06/12/2018	06/12/2023
DOL	DOL	****1143	CARMODY BUILDING CORP	CARMODY CONTRACTIN G AND CARMODY CONTRACTIN G CORP.	442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY CONCRETE CORPORATION			06/12/2018	06/12/2023
DOL	DOL		CARMODY ENTERPRISES, LTD.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY INC		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	****3812	CARMODY INDUSTRIES INC			06/12/2018	06/12/2023
DOL	DOL		CARMODY MAINTENANCE CORPORATION		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY MASONRY CORP		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	AG	****7247	CENTURY CONCRETE CORP		2375 RAYNOR ST RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	****0026	CHANTICLEER CONSTRUCTION LLC		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025
DOL	NYC		CHARLES ZAHRADKA		863 WASHINGTON STREET FRANKLIN SQUARE NY 11010	03/10/2020	03/10/2025
DOL	DOL		CHRISTOPHER GRECO		26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026
DOL	DOL		CHRISTOPHER J MAINI		19 CAITLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	DOL		CHRISTOPHER PAPASTEFANOU A/K/A CHRIS PAPASTEFANOU		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL	****1927	CONSTRUCTION PARTS WAREHOUSE, INC.	CPW	5841 BUTTERNUT ROAD EAST SYRACUSE NY 13057	09/12/2018	09/12/2023
DOL	DOL		CRAIG JOHANSEN		10 SOUTH 5TH ST LOCUST VALLEY NY 11560	09/26/2022	09/26/2027
DOL	DOL	****3228	CROSS-COUNTY LANDSCAPING AND TREE SERVICE, INC.	ROCKLAND TREE SERVICE	26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026
DOL	DOL	****2524	CSI ELECTRICAL & MECHANICAL INC		42-32 235TH ST DOUGLASTON NY 11363	01/14/2019	01/14/2024
DOL	DOL	****7619	DANCO CONSTRUCTION UNLIMITED INC.		485 RAFT AVENUE HOLBROOK NY 11741	10/19/2021	10/19/2026
DOL	DOL		DANIEL ROBERT MCNALLY		7 GREENFIELD DRIVE WARWICK NY 10990	03/25/2022	03/25/2027
DOL	DOL		DARIAN L COKER		2610 SOUTH SALINA ST SUITE 2CSYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		DARIAN L COKER		2610 SOUTH SALINA ST SUITE 2CSYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	NYC		DAVID WEINER		14 NEW DROP LANE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
DOL	DOL		DELPHI PAINTING & DECORATING CO INC		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL	****5175	EAGLE MECHANICAL AND GENERAL CONSTRUCTION LLC		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
DOL	AG		EDWIN HUTZLER		23 NORTH HOWELLS RD BELLPORT NY 11713	08/04/2021	08/04/2026
DOL	DA		EDWIN HUTZLER		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	*****0780	EMES HEATING & PLUMBING CONTR		5 EMES LANE MONSEY NY 10952	01/20/2002	01/20/3002

DOL	NYC	****5917	EPOCH ELECTRICAL, INC		97-18 50TH AVE	04/19/2018	04/19/2024
DOL	DOL		FAIGY LOWINGER		CORONA NY 11368 11 MOUNTAIN RD	03/20/2019	03/20/2024
DOL	DOL		FAIGT LOWINGER		28 VAN BUREN DRMONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL		FRANK BENEDETTO		19 CATLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	DOL	****4722	FRANK BENEDETTO AND CHRISTOPHER J MAINI	B & M CONCRETE	19 CAITLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	DA		FREDERICK HUTZLER		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	NYC	*****6616	G & G MECHANICAL ENTERPRISES, LLC.		1936 HEMPSTEAD TURNPIKE EAST MEDOW NY 11554	11/29/2019	11/29/2024
DOL	DOL		GABRIEL FRASSETTI			04/10/2019	04/10/2024
DOL	NYC		GAYATRI MANGRU		21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	DOL		GEOFF CORLETT		415 FLAGGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DA		GEORGE LUCEY		150 KINGS STREET BROOKLYN NY 11231	01/19/1998	01/19/2998
DOL	DOL		GIGI SCHNECKENBURGER		261 MILL RD EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	NYC	****3164	GLOBE GATES INC	GLOBAL OVERHEAD DOORS	405 BARRETTO ST BRONX NY 10474	05/31/2018	05/31/2023
DOL	DOL		HANS RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	DOL		HERBERT CLEMEN		42 FOWLER AVENUE CORTLAND MANOR NY 10567	01/24/2023	01/24/2028
DOL	DOL		HERBERT CLEMEN		42 FOWLER AVENUE CORTLAND MANOR NY 10567	10/25/2022	10/25/2027
DOL	DOL	****5131	INTEGRITY MASONRY, INC.	M&R CONCRETE	722 8TH AVE WATERVLIET NY 12189	06/05/2018	06/05/2023
DOL	DOL		IRENE KASELIS		32 PENNINGTON AVE WALDWICK NJ 07463	05/30/2019	05/30/2024
DOL	DOL	*****9211	J. WASE CONSTRUCTION CORP.		8545 RT 9W ATHENS NY 12015	03/09/2021	03/09/2026
DOL	DOL		J.M.J CONSTRUCTION		151 OSTRANDER AVENUE SYRACUSE NY 13205	11/21/2022	11/21/2027
DOL	DOL		J.R. NELSON CONSTRUCTION		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		J.R. NELSON CONSTRUCTION		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		J.R. NELSON, LLC		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		J.R. NELSON, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		J.R.N COMPANIES, LLC		531 THIRD STREET ALBANY NY 12206	12/12/2022	12/12/2027
DOL	DOL		J.R.N COMPANIES, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL	****1147	J.R.N. CONSTRUCTION, LLC		531 THIRD ST ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL	****1147	J.R.N. CONSTRUCTION, LLC		531 THIRD ST ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		JAMES C. DELGIACCO		722 8TH AVE WATERVLIET NY 12189	06/05/2018	06/05/2023
DOL	DOL		JAMES J. BAKER		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL		JAMES LIACONE		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		JAMES RACHEL		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	11/15/2022	11/15/2027
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL	****7993	JBS DIRT, INC.		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026

DOL	DOL	****5368	JCH MASONRY & LANDSCAPING INC.		35 CLINTON AVE OSSINING NY 10562	09/12/2018	09/12/2023
DOL	DOL	****2435	JEFFEL D. JOHNSON	JMJ7 AND SON	5553 CAIRNSTRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JEFFEL JOHNSON ELITE CARPENTER REMODEL AND CONSTRUCTION		C2 EVERGREEN CIRCLE LIVERPOOL NY 13090	11/21/2022	11/21/2027
DOL	DOL	****2435	JEFFREY M. JOHNSON	JMJ7 AND SON	5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	NYC		JENNIFER GUERRERO		1936 HEMPSTEAD TURNPIKE EAST MEADOW NY 11554	11/29/2019	11/29/2024
DOL	DOL		JIM PLAUGHER		17613 SANTE FE LINE ROAD WAYNEFIELD OH 45896	07/16/2021	07/16/2026
DOL	DOL		JMJ7 & SON CONSTRUCTION, LLC		5553 CAIRNS TRAIL LIVERPOOL NY 13041	11/21/2022	11/21/2027
DOL	DOL		JMJ7 AND SONS CONTRACTORS		5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JMJ7 CONTRACTORS		7014 13TH AVENUE BROOKLYN NY 11228	11/21/2022	11/21/2027
DOL	DOL		JMJ7 CONTRACTORS AND SONS		5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JMJ7 CONTRACTORS, LLC		5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JOHN GOCEK		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL		JOHN LUCIANO			05/14/2018	05/14/2023
DOL	DOL		JOHN MARKOVIC		47 MANDON TERRACE HAWTHORN NJ 07506	03/29/2021	03/29/2026
DOL	DOL		JOHN WASE		8545 RT 9W ATHENS NY 12015	03/09/2021	03/09/2026
DOL	DOL		JON E DEYOUNG		261 MILL RD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DOL		JORGE RAMOS		8970 MIKE GARCIA DR MANASSAS VA 20109	07/16/2021	07/16/2026
DOL	DOL		JORI PEDERSEN		415 FLAGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DOL		JOSE CHUCHUCA		35 CLINTON AVE OSSINING NY 10562	09/12/2018	09/12/2023
DOL	DOL		JOY MARTIN		2404 DELAWARE AVE NIGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL	****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL	****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	11/15/2022	11/15/2027
DOL	DOL	****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL	****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL	****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL	*****1147	JRN CONSTRUCTION, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL	*****1147	JRN CONSTRUCTION, LLC		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		JRN PAVING, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		JRN PAVING, LLC		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		JULIUS AND GITA BEHREND		5 EMES LANE MONSEY NY 10952	11/20/2002	11/20/3002
DOL	DOL		KARIN MANGIN		796 PHELPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
DOL	DOL		KATE E. CONNOR		7088 INTERSTATE ISLAND RD SYRACUSE NY 13209	03/31/2021	03/31/2026
DOL	DOL	****2959	KELC DEVELOPMENT, INC		7088 INTERSTATE ISLAND RD SYRACUSE NY 13209	03/31/2021	03/31/2026
DOL	DOL		KIMBERLY F. BAKER		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL	****3490	L & M CONSTRUCTION/DRYWALL INC.		1079 YONKERS AVE YONKERS NY 10704	08/07/2018	08/07/2023

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DOL	DA	*****8816	LAKE CONSTRUCTION AND DEVELOPMENT CORPORATION		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	DOL		LEROY E. NELSON JR		531 THIRD ST ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		LEROY E. NELSON JR		531 THIRD ST ALBANY NY 12206	12/22/2022	12/22/2027
DOL	AG	****3291	LINTECH ELECTRIC, INC.		3006 TILDEN AVE BROOKLYN NY 11226	02/16/2022	02/16/2027
DOL	DA	****4460	LONG ISLAND GLASS & STOREFRONTS, LLC		4 MANHASSET TRL RIDGE NY 11961	09/06/2018	09/06/2023
DOL	DOL		LOUIS A. CALICCHIA		1223 PARK ST. PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	NYC		LUBOMIR PETER SVOBODA		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	NYC		M & L STEEL & ORNAMENTAL IRON CORP.		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	DOL	****2196	MAINSTREAM SPECIALTIES, INC.		11 OLD TOWN RD SELKIRK NY 12158	02/02/2021	02/02/2026
DOL	DA		MANUEL P TOBIO		150 KINGS STREET BROOKLYN NY 14444	08/19/1998	08/19/2998
DOL	DA		MANUEL TOBIO		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	NYC		MAREK FABIJANOWSKI		50 MAIN ST WHITE PLAINS NY 10606	01/04/2019	01/04/2024
DOL	NYC		MARIA NUBILE		84-22 GRAND AVENUE ELMHURST NY 11373	03/10/2020	03/10/2025
DOL	DOL		MASONRY CONSTRUCTION, INC.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	****3333	MASONRY INDUSTRIES, INC.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		MATTHEW P. KILGORE		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	DOL		MAURICE GAWENO		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		MICHAEL LENIHAN		1079 YONKERS AVE UNIT 4YONKERS NY 10704	08/07/2018	08/07/2023
DOL	DOL	****4829	MILESTONE ENVIRONMENTAL CORPORATION		704 GINESI DRIVE SUITE 29MORGANVILLE NJ 07751	04/10/2019	04/10/2024
DOL	NYC	****9926	MILLENNIUM FIRE PROTECTION, LLC		325 W. 38TH STREET SUITE 204NEW YORK NY 10018	11/14/2019	11/14/2024
DOL	NYC	****0627	MILLENNIUM FIRE SERVICES, LLC		14 NEW DROP LNE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
DOL	DOL	****1320	MJC MASON CONTRACTING, INC.		42 FOWLER AVENUE CORTLAND MANOR NY 10567	10/25/2022	10/25/2027
DOL	DOL	****1320	MJC MASON CONTRACTING, INC.		42 FOWLER AVENUE CORTLAND MANOR NY 10567	01/24/2023	01/24/2028
DOL	NYC		MUHAMMED A. HASHEM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	NYC		NAMOW, INC.		84-22 GRAND AVENUE ELMHURST NY 11373	03/10/2020	03/10/2025
DOL	DA	****9786	NATIONAL INSULATION & GC CORP		180 MILLER PLACE HICKSVILLE NY 11801	12/12/2018	12/12/2023
DOL	DOL	****3684	NATIONAL LAWN SPRINKLERS, INC.		645 N BROADWAY WHITE PLAINS NY 10603	05/14/2018	05/14/2023
DOL	NYC		NAVIT SINGH		402 JERICHO TURNPIKE NEW HYDE PARK NY 11040	08/10/2022	08/10/2027
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	11/15/2022	11/15/2027
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL	****7429	NICOLAE I. BARBIR	BESTUCCO CONSTRUCTI ON, INC.	444 SCHANTZ ROAD ALLENTOWN PA 18104	09/17/2020	09/17/2025
DOL	NYC	****5643	NYC LINE CONTRACTORS, INC.		402 JERICHO TURNPIKE NEW HYDE PARK NY 11040	08/10/2022	08/10/2027
DOL	DOL		PAULINE CHAHALES		935 S LAKE BLVD MAHOPAC NY 10541	03/02/2021	03/02/2026

DOL	DOL		PETER STEVENS		11 OLD TOWN ROAD SELKIRK NY 12158	02/02/2021	02/02/2026
DOL	DOL		PETER STEVENS		8269 21ST ST BELLEROSE NY 11426	12/22/2022	12/22/2027
DOL	DOL	*****0466	PRECISION BUILT FENCES, INC.		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	NYC		RASHEL CONSTRUCTION CORP		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	DOL	*****1068	RATH MECHANICAL CONTRACTORS, INC.		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	DOL	****2633	RAW POWER ELECTRIC CORP.		3 PARK CIRCLE MIDDLETOWN NY 10940	07/11/2022	07/11/2027
DOL	DA	****7559	REGAL CONTRACTING INC.		24 WOODBINE AVE NORTHPORT NY 11768	10/01/2020	10/01/2025
DOL	DOL	*****9148	RICH T CONSTRUCTION		107 WILLOW WOOD LANE CAMILLUS NY 13031	11/13/2018	11/13/2023
DOL	DOL		RICHARD MACONE		8617 THIRD AVE BROOKLYN NY 11209	09/17/2018	09/17/2023
DOL	DOL		RICHARD REGGIO		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	DOL	*****9148	RICHARD TIMIAN	RICH T CONSTRUCTI ON	108 LAMONT AVE SYRACUSE NY 13209	10/16/2018	10/16/2023
DOL	DOL		RICHARD TIMIAN JR.		108 LAMONT AVE SYRACUSE NY 13209	10/16/2018	10/16/2023
DOL	DOL		RICHARD TIMIAN JR.		108 LAMONT AVE SYRACUSE NY 13209	11/13/2018	11/13/2023
DOL	DOL		ROBBYE BISSESAR		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	01/11/2003	01/11/3003
DOL	DOL		ROBERT A. VALERINO		3841 LANYARD COURT NEW PORT RICHEY FL 34652	07/09/2019	07/09/2024
DOL	DOL		ROBERT BRUNO		5 MORNINGSIDE DRIVE AUBURN NY 13021	05/28/2019	05/28/2024
DOL	DOL		RODERICK PUGH		404 OAK ST SUITE 101SYRACUSE NY 13203	07/23/2018	07/23/2023
DOL	DOL	****4880	RODERICK PUGH CONSTRUCTION INC.		404 OAK ST SUITE 101SYRACUSE NY 13203	07/23/2018	07/23/2023
DOL	DOL		ROMEO WARREN		161 ROBYN RD MONROE NY 10950	07/11/2022	07/11/2027
DOL	DOL		RONALD MESSEN		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL		ROSEANNE CANTISANI			06/12/2018	06/12/2023
DOL	DOL	****7172	RZ & AL INC.		198 RIDGE AVENUE VALLEY STREAM NY 11581	06/06/2022	06/06/2027
DOL	DOL	****1365	S & L PAINTING, INC.		11 MOUNTAIN ROAD P.O BOX 408MONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL	****7730	S C MARTIN GROUP INC.		2404 DELAWARE AVE NIAGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL		SAL FRESINA MASONRY CONTRACTORS, INC.		1935 TEALL AVENUE SYRACUSE NY 13206	07/16/2021	07/16/2026
DOL	DOL		SAL MASONRY CONTRACTORS, INC.		(SEE COMMENTS) SYRACUSE NY 13202	07/16/2021	07/16/2026
DOL	DOL	****9874	SALFREE ENTERPRISES INC		P.O BOX 14 2821 GARDNER RDPOMPEI NY 13138	07/16/2021	07/16/2026
DOL	DOL		SALVATORE A FRESINA A/K/A SAM FRESINA		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13218	07/16/2021	07/16/2026
DOL	DOL		SAM FRESINA		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13218	07/16/2021	07/16/2026
DOL	NYC	*****0349	SAM WATERPROOFING INC		168-42 88TH AVENUE APT.1 AJAMAICA NY 11432	11/20/2019	11/20/2024
DOL	NYC	****1130	SCANA CONSTRUCTION CORP.		863 WASHINGTON STREET FRANKLIN SQUARE NY 11010	03/10/2020	03/10/2025
DOL	DOL	****2045	SCOTT DUFFIE	DUFFIE'S ELECTRIC, INC.	P.O BOX 111 CORNWALL NY 12518	03/03/2020	03/03/2025
DOL	DOL		SCOTT DUFFIE		P.O BOX 111 CORNWALL NY 12518	03/03/2020	03/03/2025
DOL	NYC	****6597	SHAIRA CONSTRUCTION CORP.		421 HUDSON STREET SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024

DOL	DOL		SHANE NOLAN		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		SHULEM LOWINGER		11 MOUNTAIN ROAD 28 VAN BUREN DRMONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL	****0816	SOLAR ARRAY SOLUTIONS,		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL	****0440	SOLAR GUYS INC.		8970 MIKE GARCIA DR MANASSAS VA 20109	07/16/2021	07/16/2026
DOL	NYC		SOMATIE RAMSUNAHAI		115-46 132ND ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	DOL	*****2221	SOUTH BUFFALO ELECTRIC, INC.		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
DOL	NYC	*****3661	SPANIER BUILDING MAINTENANCE CORP		200 OAK DRIVE SYOSSET NY 11791	03/14/2022	03/14/2027
DOL	DOL		STANADOS KALOGELAS		485 RAFT AVENUE HOLBROOK NY 11741	10/19/2021	10/19/2026
DOL	DOL	****3496	STAR INTERNATIONAL INC		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	08/11/2003	08/11/3003
DOL	DOL	****6844	STEAM PLANT AND CHX SYSTEMS INC.		14B COMMERCIAL AVENUE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL	****9933	STEED GENERAL CONTRACTORS, INC.		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL	****9528	STEEL-IT, LLC.		17613 SANTE FE LINE ROAD WAYNESFIELD OH 45896	07/16/2021	07/16/2026
DOL	DOL		STEFANOS PAPASTEFANOU, JR. A/K/A STEVE PAPASTEFANOU, JR.		256 WEST SADDLE RIVER RD UPPER SADDLE RIVER NJ 07458	05/30/2019	05/30/2024
DOL	DOL		STEVE TATE		415 FLAGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DOL		STEVEN MARTIN		2404 DELWARE AVE NIAGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL	****3800	SUBURBAN RESTORATION CO. INC.		5-10 BANTA PLACE FAIR LAWN PLACE NJ 07410	03/29/2021	03/29/2026
DOL	DOL	****1060	SUNN ENTERPRISES GROUP, LLC		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024
DOL	DOL	*****9150	SURGE INC.		8269 21ST STREET BELLEROSE NY 11426	12/22/2022	12/22/2027
DOL	DOL		SYED RAZA		198 RIDGE AVENUE NY 11581	06/06/2022	06/06/2027
DOL	DOL	****8209	SYRACUSE SCALES, INC.		158 SOLAR ST SYRACUSE NY 13204	01/07/2019	01/07/2024
DOL	DOL		TERRY THOMPSON		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
DOL	DOL	****9733	TERSAL CONSTRUCTION SERVICES INC		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13208	07/16/2021	07/16/2026
DOL	DOL		TERSAL CONTRACTORS, INC.		221 GARDNER RD P.O BOX 14POMPEI NY 13138	07/16/2021	07/16/2026
DOL	DOL		TERSAL DEVELOPMENT CORP.		1935 TEALL AVENUE SYRACUSE NY 13206	07/16/2021	07/16/2026
DOL	DOL		TEST		P.O BOX 123 ALBANY NY 12204	05/20/2020	05/20/2025
DOL	DOL	****6789	TEST1000		P.O BOX 123 ALBANY NY 12044	03/01/2021	03/01/2026
DOL	DOL	****5766	THE COKER CORPORATION	COKER CORPORATIO N	2610 SOUTH SALINA ST SUITE 14SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL	****5766	THE COKER CORPORATION	COKER CORPORATIO N	2610 SOUTH SALINA ST SUITE 14SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DA	****4106	TRIPLE H CONCRETE CORP		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	****8210	UPSTATE CONCRETE & MASONRY CONTRACTING CO INC		449 WEST MOMBSHA ROAD MONROE NY 10950	06/06/2022	06/06/2027
DOL	DOL	****6392	V.M.K CORP.		8617 THIRD AVE BROOKLYN NY 11209	09/17/2018	09/17/2023
DOL	DOL	****6418	VALHALLA CONSTRUCTION, LLC.		796 PHLEPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
DOL	NYC	****2426	VICKRAM MANGRU	VICK CONSTRUCTI ON	21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025

DOL	NYC		VICKRAM MANGRU		21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	DOL		VICTOR ALICANTI		42-32 235TH ST DOUGLASTON NY 11363	01/14/2019	01/14/2024
DOL	NYC		VIKTAR PATONICH		2630 CROPSEY AVE BROOKLYN NY 11214	10/30/2018	10/30/2023
DOL	DOL		VIKTORIA RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	NYC	*****3673	WALTERS AND WALTERS, INC.		465 EAST AND THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL	****3296	WESTERN NEW YORK CONTRACTORS, INC.		3841 LAYNARD COURT NEW PORT RICHEY FL 34652	07/09/2019	07/09/2024
DOL	DOL		WHITE PLAINS CARPENTRY CORP		442 ARMONK RD	06/12/2018	06/12/2023
DOL	DOL		WILLIAM G. PROERFRIEDT		85 SPRUCEWOOD ROAD WEST BABYLON NY 11704	01/19/2021	01/19/2026
DOL	DOL	****5924	WILLIAM G. PROPHY, LLC	WGP CONTRACTIN G, INC.	54 PENTAQUIT AVE BAYSHORE NY 11706	01/19/2021	01/19/2026
DOL	DOL	****4730	XGD SYSTEMS, LLC	TDI GOLF	415 GLAGE AVE #302STUART FL 34994	10/31/2018	10/31/2023

SECTION 00 01 60

ADDITIONAL INSTRUCTIONS

00 01 60.01 BORINGS AND SUBSURFACE DATA

A. The Owner has obtained subsurface data at the site of the project. Soil samples taken at the time of the borings were classified by the Boring Contractor and recorded in boring log form. The soil samples, boring logs and borings location plan is attached for informational purposes only. This additional information is not a part of the Contract Documents.

00 01 60.02 PRECONSTRUCTION CONFERENCE

A. A preconstruction conference will be held after award of the Contract, but prior to commencement of construction, at the office of the Engineer, and the Contractor shall have an authorized representative of his firm present at this meeting.

00 01 60.03 POWER OF ATTORNEY

A. Attorneys-in-fact who sign Bid Bonds or Contract Bonds must file with each bond a certified and effectively dated copy of their power of attorney.

00 01 60.04 LAWS AND REGULATIONS

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

00 01 60.05 NON-COLLUSIVE BIDDING CERTIFICATION

A. A Non-Collusive Bidding Certification form as bound in these Documents must be executed and accompany the Bid.

00 01 60.06 IRANIAN ENERGY SECTOR DIVESTMENT CERTIFICATION

- A. The Bidder hereby represents that said Bidder is in compliance with New York State General Municipal Law Section 103-g entitled "Iranian Energy Sector Divestment".
- B. By submission of this Bid, each Bidder and each person signing on behalf of any Bidder certifies and in the case of a joint Bid, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and

- 00 01 60.06 IRANIAN ENERGY SECTOR DIVESTMENT CERTIFICATION Continued belief, that each Bidder is not on the list created pursuant to NYS Finance Law Section 165-a(3)(b).
 - C. The Bidder shall submit a signed, notarized and dated Iranian Energy Sector Divestment Certification with its Bid.
 - D. Said certification is mandated by Section 103-g of the General Municipal Law. Reference the Iranian Energy Sector Divestment Certification form included in Section 00 03 73 of this Bid Document.

00 01 60.07 PREVENTION OF SEXUAL HARASSMENT COMPLIANCE

- A. The Bidder hereby represents that said Bidder is in compliance with New York State General Municipal Law Section 201-g entitled "Prevention of Sexual Harassment".
- B. By submission of this Bid, each Bidder and each person signing on behalf of any Bidder certifies, and in the case of a joint Bid each party thereto certifies as to its own organization, under penalty of perjury, that the Bidder has and has implemented a written policy addressing sexual harassment prevention in the workplace and provides annual sexual harassment prevention training to all of its employees. Such policy shall, at a minimum, meet the requirements of Section 201-g of the Labor Law.
- C. The Bidder shall submit a signed, notarized, and dated Bidder's Statement on Sexual Harassment Certification provided in Section 00 03 76, "Bidder's Statement on Sexual Harassment".

00 01 06.08 CHANGES AND AMPLIFICATIONS TO GENERAL CONDITIONS

00 07 53.01 REPRESENTATIONS OF CONTRACTOR

In Paragraph B, ADD "Further, he has notified Engineer in writing of and discrepancies, errors or omissions in the Contract Documents or Specifications."

00 07 55.04 TAXES

Purchased for the Town of Vestal are not subject to any Federal, State or County sales tax. Exemption certificates will be executed upon request.

0 07 61.02 INTERPRETATION OF PLANS AND SPECIFICATIONS

In amendment to this Article, Bidders are advised of their responsibility to immediately notify the Engineer in writing, as the Owner's representative, of any errors, emissions,

00 01 06.08 CHANGES AND AMPLIFICATIONS TO GENERAL CONDITIONS - CONTINUED

discrepancies or inconsistencies which the Bidder may determine through review of the Plans and Specifications during the bidding period. Final interpretation of such items shall be by the Engineer and shall be rectified, if required, by addendum, in accordance with Article 00 01 00.08.

Bidders are also advised that the successful Bidder, as Contractor, shall in no way take advantage of, nor shall be entitled to additional compensation for any prior knowledge of such errors, omissions, discrepancies or inconsistencies not disclosed to the Engineer during the bidding period.

00 01 60.09 CHANGES AND AMPLIFICATIONS TO GENERAL REQUIREMENTS

00 13 40.01 DRAWINGS FURNISHED BY CONTRACTOR

In amendment to this Article, the Contractors shall maintain a record of the progress of work and shall submit three (3) sets of As-Built Drawings upon completion of the project.

00 13 40.02 TRANSMITTAL, IDENTIFICATION AND RESUBMITTAL

Contractor may provide drawings and other data to Engineer and Owner via electronic means as reasonably acceptable to Engineer and Owner. Contractor shall maintain logs of submittals, indicating the action item owner, due dates, timing, and brief description. More than TWO resubmittals shall be considered an additional cost to the Engineer, paid for by the Contractor.

00 13 40.06 DRAWINGS TO BE CHECKED BY THE CONTRACTOR

The Contractor is responsible to verify all dimensions, quantities and representations in the Contract Documents. Should the Contractor identify any discrepancies, the Owner and Engineer shall be notified immediately.

00 15 80 PROJECT SIGNS

Delete in its entirety.

00 15 90 ENGINEER'S FIELD OFFICE TRAILER

Delete in its entirety.

00 01 60.10 ADDITIVE BID ITEMS

- A. Contract No. 1A General Construction:
 - 1. Additive Bid Items No. 1 Shade Structures: Furnish and install two shade structures and associated site work on the west side of the main pool as shown and detailed on Contract Documents.
- B. The Owner reserves the right to accept any combination or all of the Additive Bid Items.

00 01 60.11 STATEMENT OF SPECIAL INSPECTIONS

A. The Statement of Special Inspections including the Schedule of Special Inspections (Section 01 43 26.01) will be completed once a Testing Laboratory and Special Inspector(s) has been selected by Owner and approved by the Engineer and Building Code Officer. The Statement of Special Inspections does not eliminate the Contractor of their responsibility to provide material testing and inspections in accordance with Contract Documents beyond those required in Sections 01 43 26.01.

00 01 60.12 DELEGATION OF PROFESSIONAL DESIGN SERVICES

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Licensed professional shall be properly insured, shall name the Owner and Engineer as additional insureds. The Contractor shall supply a copy of the certificate of insurance prior to commencing services. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

00 01 60.12 DELEGATION OF PROFESSIONAL DESIGN SERVICES - Continued

- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

00 01 60.13 WATER AND ELECTRIC UTILITY CONNECTION

A. The Contractor shall coordinate with the Town of Vestal Department of Public Works to coordinate and facilitate the installation of the new domestic water service. The Contractor shall also coordinate with New York State Electric and Gas to schedule and facilitate the installation of the new electrical service.

00 01 60.14 DELEGATED DESIGN SERVICES

- A. Performance and design criteria:
 - 1. Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 2. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Engineer.
- B. Delegated-design services certification:
 - 1. In addition to Shop Drawings, and other submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 2. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

END OF SECTION



CORPORATE/
BUFFALO OFFICE

5167 South Park Avenue Hamburg, NY 14075 Phone: (716) 649-8110 Fax: (716) 649-8051

CORTLAND OFFICE

60 Miller Street Cortland, NY 13045 Phone: (607) 758-7182 Fax: (607) 758-7188

ROCHESTER OFFICE

535 Summit Point Drive Henrietta, NY 14467 Phone: (585) 359-2730 Fax: (585) 359-9668 Revised Geotechnical Evaluation Report for
Proposed Bath House
Vestal Memorial Pool Facility
209 Clayton Avenue
Town of Vestal, Broome County, New York

Prepared For:

Barton & Loguidice, D.P.C. 443 Electronics Parkway Liverpool, New York, 13088

Prepared By:

WMA Engineering DPC dba Empire Geotechnical Engineering Services 5167 South Park Avenue Hamburg, New York, 14075



Project No. WB-22-029 (SJB Project No. BE-22-029) April 2022



April 14, 2022 Project No. WB-22-029 (SJB Project No. BE-22-029)

CORPORATE/
BUFFALO OFFICE

5167 South Park Avenue Hamburg, NY 14075 Phone: (716) 649-8110 Fax: (716) 649-8051 Barton & Loguidice, D.P.C. 443 Electronics Parkway Liverpool, New York 13088

Attn: Ms. Susan L. Weaver, P.E. Senior Managing Engineer

Re: Revised Geotechnical Evaluation Report for Proposed Bath House

Vestal Memorial Pool Facility

209 Clayton Avenue

Town of Vestal, Broome County, New York

Dear Ms. Weaver:

This revised report presents the results of a geotechnical engineering evaluation completed by WMA Engineering, DPC, dba Empire Geotechnical Engineering Services (Empire), for the proposed Bath House planned at the above referenced site. The geotechnical engineering evaluation was completed by Empire at the request of and as authorized by SJB Services, Inc. (SJB), our affiliated drilling and testing company. SJB was retained by Barton & Loguidice, D.P.C. (B&L) to complete this work, which was done in general accordance with SJB's January 18th, 2022 proposal, and the February 28th, 2022 Agreement for Professional Services between SJB and B&L.

REPORT REVISIONS

The initial Geotechnical Evaluation Report (Report) was issued on April 11, 2022 and was reviewed by B&L. This revised report addresses several comments / questions from B&L regarding the proposed ground level floor and Suitable Granular Fill material. The initial Report should be discarded.

PROJECT BACKGROUND

The Vestal Memorial Pool Facility is located northeast of the Clayton Avenue and Woodlawn Drive intersection (street address 209 Clayton Avenue), within the Town of Vestal, Broome County, New York. The facility includes two pools, a restroom / changing facility (i.e. Bath House), and storage buildings. Remaining portions of the site consist of exterior concrete and asphalt pavement areas and

CORTLAND OFFICE

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ROCHESTER OFFICE 535 Summit Point Drive

Henrietta, NY 14467 Phone: (585) 359-2730 Fax: (585) 359-9668 open lawn areas. Additional details regarding the recent existing site conditions are shown on Figure 1. Based on the information provided by B&L, the existing Bath House will be demolished and a new Bath House of similar size will be constructed at the same general location.

SUBSURFACE EXPLORATION

The subsurface exploration program consisted of two test borings, designated as B-1 and B-2, drilled by SJB on March 25th and March 28th, 2022. The test boring locations were selected by B&L and were provided to SJB on a site plan. SJB then staked the test boring locations in the field using tape measurements referenced to the existing Bath House. The approximate test boring locations are shown on Figure 1. Laser level survey measurements were used by SJB to determine the relative ground surface elevation at the test boring locations, using the floor of the existing Bath House, at the east garage door, as a benchmark. The approximate benchmark location is shown on Figure 1, and was assigned an arbitrary datum elevation of 100.0 feet by SJB.

The test borings were drilled using a Central Mine Equipment (CME) model 550x, all-terrain tire mounted drill rig, and were advanced through the overburden using hollow stem auger and split spoon soil sampling techniques. Both test borings were completed to a depth of 50 feet. Split spoon samples and Standard Penetration Tests (SPTs) were taken continuously from the ground surface to a depth of 22 feet, and in intervals of five feet or less for the remaining depth of the test borings. The split spoon samples and SPTs were completed in accordance with ASTM D1586 – "Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils.

A geologist prepared the test boring logs based on visual observations of the recovered soil samples and a review of the driller's field notes. The soil samples were described based on a visual/manual estimation of the grain size distribution, along with characteristics such as color, relative density, consistency, moisture, etc. The test boring logs are presented in Appendix A along with general information and a key of terms and symbols used to prepare the logs.

SUBSURFACE CONDITIONS

General

Beneath the topsoil at test boring B-1 and beneath the asphalt pavement at test boring B-2, fill type soils were encountered, which extended to depths of about 6 to 8 feet. Beneath the fill layer, and extending to depths of about 20 to 25 feet, the upper indigenous soils consisted of a mixture of silts, clays, gravels, and sands.

The remaining deeper soils consisted of clayey silts with sand and gravel. Bedrock was not encountered at the depths and locations explored. The soil stratigraphy encountered, along with the groundwater conditions observed are described in more detail below and on the test boring logs in Appendix A.

Fill Soils

Beneath the topsoil or asphalt pavement, fill type soils were encountered which extended to a depth of about 8 feet within test boring B-1 and to a depth of about 6 feet within test boring B-2. It should be expected that the fill thickness will vary between and away from the test boring locations, and will depend on the original site topography prior to development. Fill soils will also extend at least to the bottom of the excavations made for the existing building foundations and utilities.

The upper 4 to 6 feet of the fill layer consisted of a reworked mixture of gravels and sands with little amounts of silty clay. The deeper fill soils consisted of clays and silts with varying amounts of sand and gravel. Trace amounts of organics were observed within most of the fill soils. The Standard Penetration Test (SPT) "N" values obtained within the fill soils ranged from 5 to 21, indicating the fill soils have a "loose" to "firm" relative density.

The 6 to 8 feet deep sample from test boring B-2 also contained trace amounts of organics and exhibited an organic odor. This sample of silty clay with gravel and sand did not appear to be fill, but is possibly related to a buried topsoil layer.

Indigenous Soils

Beneath fill layer, the upper indigenous soils to a depth of about 20 to 25 feet consisted of a mixture of varying proportions of silts, clays, gravels, and sands (i.e. clayey silts with sand and gravel, silty clays with gravel and sand, gravel and sand with silty clay, etc.). These soils are classified as ML, CL, GM-GC, and GC-GM group soil using the Unified Soil Classification System (USCS). The Standard Penetration Test (SPT) "N" values obtained within these upper soils ranged from 11 to 53, indicating the more cohesive type soils have a "stiff" to "hard" consistency, and the non-cohesive soils have a "firm" to "very compact" relative density.

The remaining soils consisted mostly of clayey silts with varying amounts of intermixed sands and gravels. With depth, the amount of intermixed sands and gravels decreased. These soils are classified as a ML group soil using the USCS. The Standard Penetration Test (SPT) "N" values obtained within these soils mostly ranged from 33 to 91, indicating the deeper soils have a "hard" consistency.

Groundwater

Based on the information summarized below, it appears a general groundwater condition exists near a depth of 6 to 8 feet, near the interface between the fill layer and the indigenous soils. Some shallower zones of perched groundwater within the fill layer could also exist.

Water level measurements were made within the completed test borings, and are recorded on the test boring logs in Appendix A. No free standing water was observed within completed test boring B-1. Within completed test boring B-2, water was measured at a depth of 31 feet. The variable depths suggest the groundwater did not have sufficient time to fully accumulate and/or stabilize in the boring holes within the time that had elapsed from the completion of drilling operations to the time of measurements.

The collected soil samples were described as "moist" to "wet" beginning at a depth of 6 feet within test boring B-1 and beginning at a depth of 4 feet within test boring B-2. The soils were described as "wet" beginning at a depth of 8 feet within test boring B-1 and 10 feet within test boring B-2, which appear to represent a general groundwater condition. The "moist to wet" conditions, encountered as shallow as 4 feet could represent some perched or trapped groundwater within more granular or looser zones of fill soils. It should be expected that both general and perched groundwater conditions could vary with location and with changes in soil conditions, precipitation, and seasonal conditions. Installation of groundwater observation wells would be necessary to better define the groundwater conditions at the site.

GEOTECHNICAL RECOMMENDATIONS

General Considerations and Recommendations

The following general considerations and recommendations are provided to assist with planning for the design and construction of the new Bath House. More detailed recommendations are presented in the subsequent sections of this report.

1. Development of the project will be primarily impacted by the 6 to 8 feet of existing fill type soils and the possible buried topsoil layer at about 6 feet within test boring B-2. The use of conventional spread foundations bearing within the fill soils is not recommended. Construction of spread foundations within the fill soils can undergo potentially excessive and unpredictable total and differential settlement. Therefore, for spread foundations to be used, the existing fill soils would have to be completely removed from beneath the proposed spread foundations, and be replaced with Engineered Fill.

- 2. Due to the thickness of fill soils, removal and replacement might not be an economically feasible option. As an alternative, a deep foundation system could be considered, which will transfer the building loads through the fill layer and into the underlying indigenous soils. Helical piles are considered to be a suitable deep foundation option for the soil conditions encountered. Helical piles consist of a steel plate formed into the shape of a helix (one pitch of a screw thread) attached to steel shaft. Installation is accomplished by applying torque to the shaft and screwing the pile into the soil.
- 3. Excavations to remove the fill soils could encounter a general groundwater condition near the interface between the fill layer and the indigenous soils. Some perched groundwater could also be encountered within the fill soils. Appropriate dewatering measures should be implemented to allow for construction to proceed in the dry.
- 4. The fill soils will also impact the requirements for the floor construction. It is common practice to recommend that the existing fill soils be removed and replaced with properly controlled and compacted new fill beneath the slab-ongrade areas. We understand, however, that due to the depth and extent of the existing fill encountered, it may not be economically practical to remove the fill in its entirety for the floor construction. Therefore, the Town of Vestal and B&L could consider removing a portion of the existing fill and provide some additional Structural Fill/Subbase Stone beneath the slab-on-grade construction. There are some uncertainties with this approach, such as long-term differential settlement, which could potentially occur with leaving undetected unsuitable fill soils in-place.

If the Town of Vestal and B&L are willing accept these risks, then we would recommend the following be implemented as minimum requirements for constructing the slab-on-grade over the existing fill soils.

- Following removal of the surface materials and excavation to the subgrade elevation, the existing fill subgrades must be thoroughly compacted and then proof rolled, evaluated and prepared in accordance with our recommendations.
- Existing building foundations should be removed to a depth of at least 2 feet beneath the subgrade elevation.

- The slab-on-grade floor system should be constructed over a minimum 10 inch thick layer of Subbase Stone, separated from the existing fill soil subgrades with a suitable stabilization/separation geotextile, such as Mirafi 600X.
- Any deleterious materials, such as wood, concrete foundations, organics, soft soils, highly voided construction debris, etc., which are present within the fill soils at the bottom of the floor subgrade excavation, should be further undercut, removed, and replaced with additional Structural Fill material.

If the Town of Vestal and B&L are not willing to accept the risks with leaving the fill in-place in its current state, then consideration will need to be given to completely removing the existing fill soils and installing new fill materials (Suitable Granular Fill) in a controlled manner. Leaving the existing fill in-place and constructing a structural floor slab supported by a helical pile foundation system could also be considered.

5. Based on the subsurface conditions encountered in the test borings, the project site can be classified as Seismic Site Class "D" in accordance with the Building Code of New York State.

Spread Foundations

Spread foundations for the building should bear on suitable, relatively undisturbed, indigenous soil subgrades or they can bear on Engineered Fill (i.e. compacted Structural Fill or Flowable Backfill) placed over suitable indigenous soil subgrades.

Suitable indigenous soil bearing grades should consist of the "firm" or "very stiff" mixture of clayey silts, sands, and gravels, which are free of fill soils, organics, softer, and wet indigenous soils, or otherwise deleterious conditions. Suitable bearing grades are expected to be encountered at depths of about 6 to 8 feet.

Subsurface conditions could vary between and away from the exploration locations, and therefore could require adjustments in the suitable subgrade elevation, based on actual conditions encountered at the time of construction. Accordingly, full time inspection of the foundation bearing subgrades, by qualified geotechnical personnel, is recommended as the excavations are made at the time of construction.

If it is necessary to place Structural Fill beneath the foundations, it should be placed beyond the foundation limits a horizontal distance equal to at least 0.5 times the thickness of the Structural Fill layer beneath the foundations. Excavations, therefore, will need to be planned and sized accordingly. The Structural Fill should

have a minimum lift thickness of 6 inches. Recommendations for Structural Fill material, along with its placement and/or compaction are presented within the Material Recommendations section of this report.

Flowable backfill material, if used, should be a non-swelling type material and should have a minimum 28-day compressive strength (f'c) of 250 pounds per square inch (psi). The flowable backfill should extend at least 12 inches horizontally beyond the foundation limits for its entire depth.

Continuous wall footings should be at least 2.0 feet in width and column/individual footings should be at least 3.0 feet in width. Exterior foundations, along with interior foundations within unheated portions of the building, should be embedded a minimum of 4.0 feet below finished exterior grades for frost protection. Interior foundations should be embedded a minimum of 2.5 feet below the finished floor elevation, provided the building will be heated. All foundations, however, should bear on suitable bearing grades in accordance with the recommendations above.

Spread foundations constructed on suitable indigenous soil bearing grades or on properly constructed Engineered Fill materials placed over the suitable indigenous soil bearing subgrades can be sized based on a maximum net allowable bearing pressure of 2,500 pounds per square foot (psf). It is estimated that spread foundations sized and properly constructed in accordance with our recommendations, and our understanding of the proposed project, will undergo a total settlement of less than ¾ inch.

Helical Piles

Helical piles can be considered as an alternative to spread foundations. Helical piles consist of a steel plate formed into the shape of a helix (one pitch of a screw thread) attached to a round shaft. Installation is accomplished by applying torque to the shaft and screwing it into the soil. During the installation, the torque can be measured as a correlation to the design capacity.

It is recommended that the helical piles bear within the indigenous soils, at a depth of at least 15 feet, where the soils were consistently firmer. Preliminarily, helical piles designed to bear at or below a depth of 15 feet, can be designed based on an allowable end bearing capacity of 10 kips per square foot. Accordingly, a 14 inch diameter helix (end area of 1.07 square feet) would be expected to develop an allowable axial capacity of about 10 kips per pile.

However, we recommend a performance specification for the helical piles be developed (i.e. required compressive capacity). The helical pile installation contractor can then provide a suitable design and installation procedure. Variables will include the diameter and the number of helical plates per pile, anticipated length, number of piles, grouting or no grouting, etc. A New York State registered Professional Engineer should prepare the helical pile design.

At least one load test per helical pile type should be completed to determine the helical pile capacity has been obtained with an adequate factor of safety (i.e. Factor of Safety of 2.0 or greater). Exterior grade beams and pile caps should be embedded a minimum of 4 feet for frost protection.

Slab-on-Grade Floor

As discussed, the floor can be constructed as a slab-on-grade over the existing fill soils, provided the Town of Vestal and B&L are willing to accept the risks associated with leaving a portion of the existing fill in-place. These risks include the potential for some on-going, long-term settlement, and unpredictable differential settlement, because of the variable composition and density of the fill soils, and potentially undetected areas of unsuitable fill soils such as buried organics or wood.

If the risks are acceptable, it is recommended that a minimum of 10 inches of Subbase Stone be placed beneath the slab-on-grade. A suitable stabilization / separation geotextile, such as Mirafi 600X, should be placed over the prepared soil subgrades prior to placement of the Subbase Stone layer.

The existing fill soil subgrades should be thoroughly compacted and properly prepared and evaluated in accordance with our recommendations within the Site Preparation and Construction section of this Report, prior to placement of the geotextile and Subbase Stone material. Suitable Granular Fill can be used to raise the site grades beneath the Subbase Stone, if needed. All newly installed fill soils should be compacted in a controlled manner, as specified, and to a stable well engineered condition.

If all the existing fill soils are removed from beneath the slab-on-grade floor, and are replaced with Suitable Granular Fill, the Subbase Stone layer can be reduced to 4 inches. In addition, a geotextile between the Suitable Granular Fill and the Subbase Stone layer is not required.

The slab-on-grade floor slab can be designed using a modulus of subgrade reaction of 150 pounds per cubic inch at the top of the Subbase Stone layer. The floor slab will be constructed above the finished site grades. Therefore, the use of a moisture barrier does not appear warranted, unless otherwise recommended by the finished flooring manufacturer.

It is recommended that the slab-on-grade be constructed such that it floats on the subbase and is not structurally connected to, or resting directly on, perimeter walls or column footings, in order to limit differential settlement effects, unless the slab / wall interface is designed with sufficient reinforcement to bridge potential differential settlement effects at these interfaces.

We note that the above subbase stone thicknesses are not designed for carrying construction vehicle loads. Therefore, it may be desirable for the Contractor to temporarily increase the Subbase Stone thickness within the building pad area to provide a suitable working surface to stage the construction, carry construction vehicle loads and protect the underlying subgrades. This will be particularly important if construction proceeds during seasonally wet periods.

Structural Floor Slab

As discussed above, a structural floor slab supported by helical piles could be considered as an alternative to constructing the slab-on-grade over the existing fill soils, or removing and replacing all the existing fill soils. Although potentially more costly, a structural floor slab will negate the settlement risks associated with constructing the floor over the fill soils.

A minimum of 4 inches Subbase Stone material should be installed beneath the structural floor slab to provide a suitable working surface to construct the structural floor slab. It is understood the finished floor grade will be established above the surrounding exterior grades. Therefore, the use of a moisture barrier does not appear warranted, unless otherwise recommended by the finished flooring manufacturer.

We note that the above subbase stone thicknesses are not designed for carrying construction vehicle loads. Therefore, it may be desirable for the Contractor to temporarily increase the Subbase Stone thickness within the building pad area to provide a suitable working surface to stage the construction, carry construction vehicle loads and protect the underlying subgrades. This will be particularly important if construction proceeds during seasonally wet periods.

Seismic Design Considerations

Based on the subsurface conditions encountered in the test borings, the project site should be classified as Seismic Site Class "D" in accordance with ASCE 7-16, Table 20.3-1, as referenced in the 2020 Building Code of New York State. Therefore, seismic design can be based on this seismic site classification.

The spectral response accelerations at the project site were obtained by Empire using the SEAOC / OSHPD web site application https://seismicmaps.org/. Using the site location, the spectral response accelerations are 0.113g for the short period (0.2 second) response (S_S) and 0.045g for the one second response (S₁). For design purposes, these spectral response accelerations must be adjusted for the Seismic Site Class "D" soil profile determined for the project site.

Accordingly, the adjusted spectral response accelerations for Site Class "D" are as follows:

- Short Period Response (S_{MS}) 0.181g
- 1 Second Period Response (S_{M1}) 0.107g

The corresponding five percent damped design spectral response accelerations (S_{DS} and S_{D1}) are as follows:

- $S_{DS} 0.121g$
- $S_{D1} 0.072g$

SITE PREPARATION AND CONSTRUCTION

Construction Dewatering

Construction dewatering will be required for surface water control and for excavations which encounter perched and general groundwater conditions. Dewatering should be implemented in conjunction with excavation work such that the work generally proceeds in the dry. Surface water should be diverted away from and prevented from accumulating on exposed soil subgrades. It is anticipated that diversion berms and proper site grading, should generally be sufficient to control surface water conditions.

Perched or trapped groundwater conditions, or potentially general groundwater conditions, when encountered, should be depressed at least 1 to 2 feet below the excavation bottom. It is anticipated that sump and pump methods of dewatering will be necessary, as a minimum, to control groundwater conditions, should it be encountered. Where general groundwater conditions are encountered within the more granular indigenous soils, installation of deeper sumps / wells could become necessary to control the groundwater conditions. Surface water and groundwater dewatering

plans should include implementation of measures to control erosion, sedimentation and the migration of soil fines.

Excavation and Spread Foundation Construction

Excavation to the proposed bearing grades for spread foundations, should be performed using a method which reduces disturbance to the indigenous soil bearing grades, such as a backhoe equipped with a smooth blade bucket. All fill soils and any other deleterious soil material beneath the proposed foundation bearing grades should be removed. Any resulting over-excavations should be backfilled with Engineered Fill.

The indigenous soil bearing grades should be observed and evaluated by qualified geotechnical personnel, prior to placement of Engineered Fill and/or the foundation structure. Placement and compaction of Structural Fill beneath foundations should also be observed and tested.

If the foundation bearing grades are not protected and they degrade, they should be undercut/removed accordingly. All soil bearing grades for foundation construction should be protected from precipitation and surface water. We recommend the foundations be placed immediately upon excavation to the design foundation bearing grade. However, if construction of the foundations proceeds during seasonal wet periods and/or the foundations will not be constructed on the same day of the excavation, it may be desirable to place a 2 to 3 inch thick lean concrete mud mat in the excavation bottom to help protect the exposed subgrades and provide a suitable working surface to set the reinforcing.

After completion of the foundation construction, the excavations should be backfilled as soon as possible and prior to construction of the superstructure. It is recommended that the foundation excavations, within slab-on-grade and pavement areas, be backfilled with a Suitable Granular Fill or Structural Fill, as described below.

Helical Pile Installation and Testing

Helical piles should be installed by a qualified and experienced contractor. The helical piles should be installed in a smooth, continuous manner with sufficient pressure to advance the helical piles. Alignment of the helical piles should be maintained within 1% of the total length.

At least one load test per helical pile type should be completed to determine the helical pile capacity has been obtained with an adequate factor of safety (i.e. Factor of Safety of 2.0 or greater). A correlation, using the torque during installation and the load testing data should be used to confirm subsequent helical piles are installed

to two times the allowable design load. A qualified individual should observe the helical pile installation and prepare a report summarizing the installation process, load testing results, torque during installation, length of pile, etc.

Subgrade Preparation for Slab-on-Grade Construction

All existing pavements, floor slabs, topsoil, organics, wood, and any other deleterious materials should be removed from within the limits of the proposed new building area. Existing foundations and utilities within the proposed limits of the building foundations should be completely removed. Foundations from former buildings should be removed to a depth of at least 24 inches beneath the subgrade elevation within the building floor areas and to a depth of at least 12 inches beneath the subgrade elevation within the asphalt pavement and lawn areas.

Excavations remaining after demolition and removal of the existing structures that are beneath proposed spread foundations should be backfilled with Structural Fill. Excavations which are outside the limits of foundations can be backfilled with Suitable Granular Fill. Soil material recommendations are provided in the following section of this Report. All backfilling should be monitored, tested, and properly documented on a "full-time" basis by qualified geotechnical engineering personnel.

Following removal of the surface materials, structures, and excavation to the proposed subgrades, the exposed fill soil subgrades should be allowed to dry, as necessary, and then be thoroughly compacted/densified, followed by proof-rolling. The compaction and proof-rolling should be performed prior to any fill placement, using a smooth drum roller weighing at least 10 tons. The roller should be operated in the vibratory mode for compacting the soil subgrades and in the static mode for the proof rolling.

The compaction should include at least four passes over the exposed subgrades. The proof rolling should include at least two passes over the exposed subgrades. The subgrade compaction and proof-rolling should be done under the guidance of, and observed/evaluated by qualified geotechnical personnel.

Any areas, which appear wet, soft, unstable or otherwise exhibit unsuitable materials or conditions, should be further undercut and stabilized. Over excavation, which may be required as the result of the subgrade inspection and/or proof-rolling, should be performed based on guidance provided by qualified geotechnical personnel. Resulting over-excavations should be backfilled with Structural Fill as described in the following section.

The backfill soils (i.e. Suitable Granular Fill or Structural Fill) can then be installed to raise site grades, followed by installation of the separation/stabilization and the Subbase Stone. The backfill soils, and the Subbase Stone should be placed to a stable condition and should not "pump", "rut" or show signs of movement or significant deflection (i.e. unstable conditions) as it is being constructed. Any unsuitable conditions should be undercut and removed. The subgrades should also be properly graded, drained and protected from moisture and frost. Placement of Subbase Stone over wet, soft, snow covered or frozen subgrades is not acceptable.

It is recommended that utility trenches located within the slab-on-grade areas be backfilled with controlled Structural Fill. During construction, the contractor should take precautions to limit construction traffic over the subgrades. Any subgrades, which become damaged, rutted or unstable should be undercut and repaired as necessary prior to placement of the overlying fill courses.

MATERIAL RECOMMENDATIONS

Structural Fill Material

Structural Fill / Subbase Stone, which is placed beneath foundations, should consist of a crusher run stone or a crushed gravel product, which is free of clay, organics and friable or deleterious particles. The material should comply with NYSDOT Standard Specifications, Item No. 304.12 - Type 2 Subbase or Item No. 304.14 - Type 4 Subbase, with the condition that if a gravel and sand product is used (vs. a crusher run stone), the gravel should be a crushed gravel material, with at least 50% of the particles greater than ½ inch, having a minimum of one crushed face. The Structural Fill / Subbase Stone should have the following gradation requirements.

	Type 2 Subbase d stone)	Item 304.14 – Type 4 Subbase (crushed gravel)			
Sieve Size Distribution	Percent Finer by Weight	Sieve Size Distribution	Percent Finer by Weight		
2 inch ½ inch no. 40 no. 200	100 25 to 60 5 to 40 0 to 10	2 inch ½ inch no. 40 no. 200	100 30 to 65 5 to 40 0 to 10		

The Structural Fill / Subbase Stone should be compacted to a minimum of 95 percent of the maximum dry density as measured by the modified Proctor test (ASTM D1557). Placement of fill should not exceed a maximum loose lift thickness of 6 to 9 inches. The loose lift thickness should be reduced in conjunction with the compaction equipment used so that the required density is attained. The Structural

Fill / Subbase Stone should have a moisture content within two percent of the optimum moisture content at the time of compaction.

Subbase Stone

The subbase stone course placed as the aggregate beneath slab-on-grade construction, should conform to the same material requirements as Structural Fill as stated above.

Suitable Granular Fill

Suitable soil material, well graded from coarse to fine, and classified as GW, GP, GM, SW, SP or SM type soil using the Unified Soil Classification System (ASTM D-2487) and having no more than 85 percent by weight material passing the No. 4 sieve, no more than 20 percent by weight material passing the No. 200 sieve and which is generally free of particles greater than 6 inches, will be acceptable as Suitable Granular Fill. Material meeting the requirements of New York State Department of Transportation, Standard Specifications, Item 203.07 – Select Granular Fill is acceptable for use as Suitable Granular Fill.

It should also be free of topsoil, asphalt, concrete rubble, wood, debris, clay and other deleterious materials. Suitable Granular Fill can be used as foundation backfill and as subgrade fill to raise site grades beneath slab-on-grade subbase stone. Suitable Granular Fill should be installed to the same requirements for Structural Fill, as outlined above.

CLOSING

This report was prepared to assist in the design and construction of the proposed Bath House within the Vestal Memorial Pool Facility, located at 209 Clayton Avenue, within the Town of Vestal, Broome County, New York. The report has been prepared for the exclusive use of Barton & Loguidice, D.P.C. and other members of the project design team, for specific application to this site and this project only.

The site information and recommendations were prepared based on Empire's understanding of the proposed project, as described herein, and through the application of generally accepted soils and foundation engineering practices. Empire should be consulted with any questions regarding the interpretation of the findings of our work, and/or the geotechnical considerations and recommendations presented. In addition, the recommendations presented are provided as guidance to the designer and should not be considered a project specification. No warranties, expressed or implied are made by the conclusions, opinions, recommendations or services provided.

Empire should be informed of any changes to the planned project so that it may be determined if any modifications to the information presented in this report are necessary. Empire and / or its designated representative should also be retained to review final plans and specifications and to monitor the foundation and site work construction to verify that the recommendations were properly interpreted and implemented.

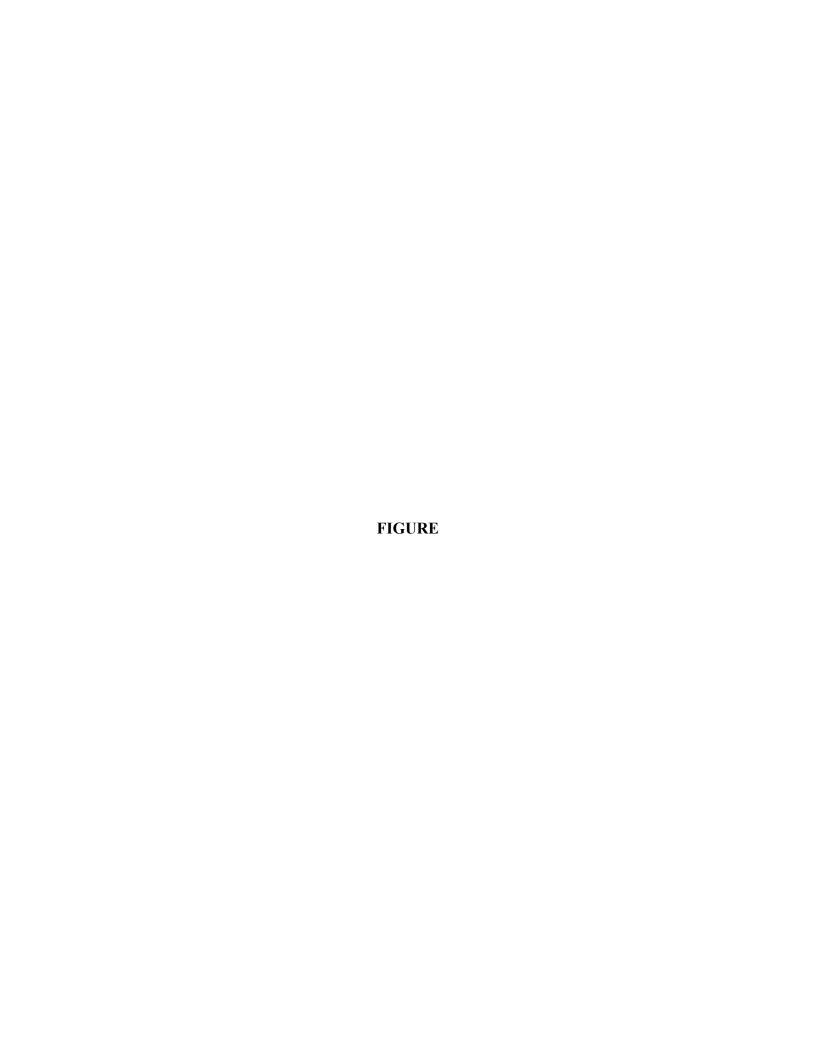
Additional information regarding the use and interpretation of this report is presented in Appendix B.

Respectfully Submitted:

WMA Engineering DPC dba Empire Geotechnical Engineering Services

Thomas R. Seider, P.E.

Senior Geotechnical Engineer





LEGEND:

INDICATES APPROXIMATE LOCATION AND DESIGNATION OF TEST BORING.

B.M. A BENCHMARK: FLOOR AT GARAGE DOOR. ASSIGNED AN ARBITRARY DATUM ELEVATION OF 100.0 FEET BY SJB SERVICES, INC.

NOTE: FIGURE DEVELOPED FROM GOOGLE EARTH.



PROPOSED BATH HOUSE VESTAL MEMORIAL POOL FACILITY 209 CLAYTON AVENUE TOWN OF VESTAL, BROOM COUNTY, NEW YORK

EXPLORATION LOCATION PLAN

DR BY: BVB	SCALE: NTS	PROJECT NO.: WB-22-029
CHKD BY: TRS	DATE: 4/11/2022	FIGURE NO: 1

APPENDIX A SUBSURFACE EXPLORATION LOGS

GENERAL INFORMATION & KEY TO SUBSURFACE LOGS

The Subsurface Logs attached to this report present the observations and mechanical data collected by the driller at the site, supplemented by classification of the material removed from the borings as determined through visual identification by technicians in the laboratory. It is cautioned that the materials removed from the borings represent only a fraction of the total volume of the deposits at the site and may not necessarily be representative of the subsurface condition between adjacent borings or between the sampled intervals. The data presented of the Subsurface Logs together with the recovered samples provide a basis for evaluating the character of the subsurface conditions relative to the project. The evaluation must consider all the recorded details and their procedures to more accurately evaluate the subsurface conditions. Any evaluation of the contents of this report and recovered samples must be performed by qualified professionals. The following information defines some of the procedures and terms used of the Subsurface Logs to describe the conditions encountered, consistent with the numbered identifiers shown on the Key opposite this page.

- 1. The figures in the Depth column define the scale of the Subsurface Log.
- 2. The Samples column shows, graphically, the depth range from which a sample was recovered. See Table I for descriptions of the symbols used to represent the various types of samples.
- 3. The Sample No. is used for identification on sample containers and/or Laboratory Test Reports.
- 4. Blows on Sampler shows the results of the "Penetration Test", recording the number of blows required to drive a split spoon sampler into the soil. The number of blows required for each six inches is recorded. The first 6 inches of penetration is considered a seating drive. The number of blows required for the second and third 6 inches of penetration is termed the penetration resistance, N.
- 5. Blows on Casing Shows the number of blows required to advance the casing a distance of 12 inches. The casing size, hammer weight, and length of drop are noted at the bottom of the Subsurface Log. If the casing is advanced by means other than driving, the method of advancement will be indicated in the Notes column or under the Method of Investigation at the bottom of the Subsurface Log. Alternatively, sample recovery may be shown in this column or other data consistent with the column heading.
- 6. All recovered soil samples are reviewed in the laboratory by an engineering technician, geologist, or geotechnical engineer, unless noted otherwise. Visual descriptions are made on the basis of a combination of the driller's field descriptions and noted observations together with the sample as received in the laboratory. The method of visual classification is based primarily on the Unified Soil Classification System (ASTM D 2487) with regard to the particle size and plasticity (See Table No. II), and the Unified Soil Classification System group symbols for the soil types are sometimes included with the soil classification. Additionally, the relative portion, by weight, of two or more soil types is described for granular soils in accordance with "Suggested Methods of Test for Identification of Soils" by D.M. Burmister, ASTM Special Technical Publication 479, June 1970. (See Table No. III). Description of the relative soil density or consistency is based upon the penetration records as defined in Table No. IV. The description of the soil moisture is based upon the relative wetness of the soil as recovered and is described as dry, moist, wet, and saturated. Water introduced into the boring either naturally or during drilling may have affected the moisture condition of the recovered sample. Special terms are used as required to describe soil deposition in greater detail; several such terms are listed in Table V. When sampling gravelly soils with a standard two inch diameter split spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter. The presence of boulders and large gravel is sometimes, but not necessarily, detected by an evaluation of the casing and sampler blows or through the "action" of the drill rig as reported by the driller.
- 7. Rock description is based on review of the recovered rock core and the driller's notes. Frequently used rock classification terms are included in Table VI.
- 8. The stratification lines represent the approximate boundary between soil types and the transition may be gradual. Solid stratification lines delineate apparent changes in soil type, based upon review of recovered soil samples and the driller's notes. Dashed lines convey a lesser degree of certainty with respect to either a change in soil type or where such change may occur.
- 9. Miscellaneous observations and procedures noted by the driller are shown in this column, including water level observations. It is important to realize the reliability of the water level observations depends upon the soil type (water does not readily stabilize in a hole through fine grained soils), and that any drill water used to advance the boring may have influenced the observations. The ground water level will fluctuate seasonally, typically. One or more perched or trapped water levels may exist in the ground seasonally. All the available readings should be evaluated. If definite conclusions cannot be made, it is often prudent to examine the conditions more thoroughly through test pit excavations or groundwater observation wells.
- 10. The length of core run is defined as the length of penetration of the core barrel. Core recovery is the length of core recovered divided by the core run. The RQD (Rock Quality Designation) is the total length of pieces of NX core exceeding 4 inches divided by the core run. The size core barrel used is also noted in the Method of Investigation at the bottom of the Subsurface Log.

DATE STARTED FINISHED SHEET	OF	SJB SERVICES, INC. SUBSURFACE LOG	PROJ. No. HOLE No. SURF. ELEV. G.W. DEPTH
PROJECT		LOCATION	
SAMPLES SAMPLE	BLOWS ON SAMPLER SO SWISS OF SAMPLER SO SWISS OF SAMPLER SO SWISS OF SAMPLE SWISS OF SAMPLE SO SWISS OF SAMPLE SWISS OF SAM	SOIL OR ROCK CLASSIFICATION	NOTES
5 1 2 3	3 4 8 7 10 15 50/.5	3" TOPSOIL Brown SILT, some Sand, trace clay, ML (Moist-Loose) Gray SHALE, medium hard, weathered, thin bedded, some fractures (numbered features explained on reverse)	Groundwater at 10' upon completion, and 5' 24 hrs. after completion Run#1, 2.5'-5.0' 95% Recovery 50% RQD

TABLE I

Split Spoon Sample











Rock Core

TABLE II

Identification of soil type is made on basis of an estimate of particle sizes, and in the case of fine grained soils also on basis of plasticity.

Soil Type	Soil Particle Size		
Boulder	>12"		
Cobble	3" - 12"		
Gravel - Coarse	3" - 3/4"	Coarse Grained	
- Fine	3/4" - #4	(Granular)	
Sand - Coarse	#4 - #10		
- Medium	#10 - #40		
- Fine	#40 - #200		
Silt - Non Plastic Clay - Plastic (Co	Fine Grained		

TABLE III

The following terms are used in classifying soils consisting of mixtures of two or more soil types. The estimate is based on weight of total sample.

Term	Percent of Total Sample
"and"	35 - 50
"some"	20 - 35
"little"	10 - 20
"trace"	less than 10

(When sampling gravelly soils with a standard split spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter.)

TABLE IV

The relative compactness or consistency is described in accordance with the following terms:

Granular Soi	Is	Cohesive Soils			
Term	Blows per Foot, N	Term	Blows per Foot, N		
Very Loose Loose Firm	0 - 4 4 - 10 10 - 30	Very Soft Soft Medium Stiff	0 - 2 2 - 4 4 - 8 8 - 15		
Compact Very Compact	30 - 50 >50	Very Stiff Hard	15 - 30 >30		

(Large particles in the soils will often significantly influence the blows per foot recorded during the penetration test)

TABLE V

Varved	Horizontal uniform layers or seams of soil(s).
Layer	Soil deposit more than 6" thick.
Seam	Soil deposit less than 6" thick.
Parting	Soil deposit less than 1/8" thick.
Laminated	Irregular, horizontal and angled seams and partings of soil(s).

TABLE VI

Rock Clas	sification Term	Meaning	Rock Cla	ssification Term	Meaning	
Hardness	- Soft - Medium Hard - Hard - Very Hard	Scratched by fingernail Scratched easily by penknife Scratched with difficulty by penknife Cannot be scratched by penknife	Bedding	LaminatedThin BeddedBeddedThick Bedded	(<1") (1" - 4") (4" - 12") (12" - 36")	Natural breaks in Rock Layers
Weathering	Very WeatheredWeatheredSound	Judged from the relative amounts of disintegration, iron staining, core recovery, clay seams, etc.		- Massive refers to natural brea e rock layers)	(>36") aks in the rock	oriented at some

DATE:

START FINISH

SHEET

3/28/2022

3/28/2022

1 OF 2

SJB SERVICES, INC. SUBSURFACE LOG



HOLE NO. B-1 SURF. ELEV 99.6'

G.W. DEPTH See Notes

PROJECT: PROPOSED BATH HOUSE LOCATION: TOWN OF VESTAL MEMORIAL POOL PROJ. NO.: BE-22-029 209 CLAYTON AVE, VESTAL, NY

DEPTH	Т	SMPL	T	BŁOWS ON SAMPLER			SOIL OR ROCK	North	
FT.		NO.	0/6	6/12	12/18	N		CLASSIFICATION	NOTES
	17	1	3	3				TOPSOIL	Driller noted Topsoil
-	V		4	4		7		Brown fine GRAVEL, some f-c Sand, little Silty Clay,	at the surface
_	17	2	6	11				tr. organics (moist, FILL)	
-	7		10	5		21			
5	17	3	10	11					
	7		9	12		20			Parameter 1
	17	4	4	4				Brown-Gray Silty CLAY, some fine Gravel, little f-c Sand,	
_	V		4	4		8		tr. organics (moist-wet, FILL)	
	7	5	5	9				Brown-Gray Clayey SILT, some f-c Gravel, little f-c Sand,	
10	7/		29	12		38		with Clay Partings (wet, hard, ML)	
	17	6	7	9				Contians little fine Gravel (v. stiff)	
	7/		12	11		21	***************************************	` '	
	17	7	10	11				Contains tr. gravel	
	1/		13	8		24		_	
15	17	8	8	8				Brown-Gray Silty CLAY, some fine Gravel, little f-c Sand	
	1/1	٠.	14	12		22		(wet, v. stiff, CL)	
	1/	9	9	11				Brown f-c GRAVEL, some Clayey Silt, little f-c Sand	
Bather	1/1		13	12		24		(wet, firm, GM-GC)	_
	1/	10	35	30				Brown fine GRAVEL, little Silty Clay, little f-c Sand	
20	1/	***************************************	25	18		55		(wet, v. compact, GC-GM)	
	17	11	17	23				Becomes f-c GRAVEL	
	1/1		30	28		53			_
-	M								
Normal from	1								
25	1							** *** *** *** *** *** *** *** *** ***	
	17	12	8	24				Brown Clayey SILT, little f-m Sand, tr. gravel	
***************************************	1/ [30	35		54		(wet, hard, ML)	
	П								
******	1								
30 —	1								_
	17	13	28	44			, nv., .	Brown-Gray f-c GRAVEL, some Clayey Silt, little f-c Sand	\neg
	1/ [47	38		91		(wet, v. compact, GM-GC)	\neg
•									
	1								\dashv
35	1								
ACCURACIO MACCINACIO	7	14	25	22				Brown Clayey SILT, some fine Gravel, little f-c Sand	
	/		23	31		45		(moist-wet, hard, ML)	
-								,,	
									\dashv
40	1	·							
	LL-	I		1	1				

N = NO. BLOW	'S TO DRIVE 2-II	NCH SPOON 12-INCH	ES WITH A 140 LB. PIN WT. FALLING	30-INCHES PER BLOW	CLASSIFIED BY:	Geologist
DRILLER:	S. WOLK	IEWICZ	DRILL RIG TYPE :	CME 550X		
METHOD OF I	NVESTIGATION	ASTM D-1586 USIN	IG HOLLOW STEM AUGERS			

DATE

START

SHEET

3/28/2022

FINISH 3

3/28/2022 2 OF 2 SJB SERVICES, INC. SUBSURFACE LOG



HOLE NO. B-1 SURF. ELEV 99.6'

G.W. DEPTH See Notes

PROJECT: PROPOSED BATH HOUSE LOCATION: TOWN OF VESTAL MEMORIAL POOL 209 CLAYTON AVE, VESTAL, NY

PRO)J. [NO.:	BE-2	209 CLAYTON AVE, VESTAL, NY						
DEPTH	T	SMPL	MPL BLOWS ON SAMPLER SOIL OR ROCK		NOTES					
FT.		NO.	0/6	6/12	12/18	N	Γ	CLASSIFICATION	1.0.20	
40	+7	15	16	31				Containd little fine Gravel		
-	1/	10	37	22		68		Oorkand hille time oraver		
	/ -		1 37	22		00				\dashv
-	-		-	<u> </u>	 			-		
4.5 —	-		 		-			-		
45 _	٠,	40	-	25						
_	-	16	23	25		<u> </u>	ļ	Becomes Brown-Gray, Contains tr. sand, no gravel		\dashv
_	γ_		32	28	ļ	57		(moist)		
	٠,						<u> </u>			\dashv
	1/	17	27	22				Contains tr. gravel (wet)		
50	\mathcal{L}		28	31		50				
l _	↓				ļ			Boring Complete at 50.0'	No Free Standing Water	
									encountered at boring	
									completion	
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N = NO. BLOWS T	O DRIVE 2-IN	ICH SPOON 12-IN	NCHES WITH A 140 LB. PIN WT. F	FALLING 30-INCHES PER BLOW	CLASSIFIED BY:	Geologist
DRILLER:	S. WOLK	IEWICZ	DRILL RIG TYPE :	CME-550X	_	
METHOD OF INVE	ESTIGATION	ASTM D-1586 U	USING HOLLOW STEM AUGERS			

DATE:

START FINISH 3/25/2022

SHEET

1 OF 2

SJB SERVICES, INC. SUBSURFACE LOG



HOLE NO. B-2 SURF. ELEV 99.8'

G.W. DEPTH See Notes

PROJECT: PROPOSED BATH HOUSE LOCATION: TOWN OF VESTAL MEMORIAL POOL PROJ. NO.: BE-22-029 209 CLAYTON AVE, VESTAL, NY

•										
DEPTH	SMPL BLOWS ON SAMPLER			SOIL OR ROCK	NOTES					
FT.		NO.	0/6	6/12	12/18	N		CLASSIFICATION	NOTES	
	7	1	Х	6				ASPHALT	Driller noted Asphalt	
_	7/		9	9		18		Brown fine GRAVEL, some f-c Sand, little Silty Clay,	at the surface	\neg
	17	2	7	8				tr. organics (moist, FILL)		
	7/		15	5		23		Contains some Silty Clay, little f-c Sand		
5	17	3	5	2				Brown Clayey SILT, some f-c Sand, little fine Gravel	1	
	7/		3	3		5		(moist-wet, FILL)		
-	17	4	6	6				Gray Silty CLAY, some fine Gravel, little f-c Sand,	S-4: Exhibited an	
-	7/		7	8		13		tr. organics (moist-wet, stiff, CL)	Organic Odor	\neg
-	17	5	6	6				Brown-Gray Clayey SILT, little f-m Sand,		
10	1/		6	7		12		with Clay Partings (moist-wet, stiff, ML)		\neg
_	17	6	4	5				Becomes Gray, Contains tr. gravel (wet)		
-	1/		8	8		13				
-	17	7	5	6				Brown fine GRAVEL, some f-c Sand, little Clayey Silt	-[\neg
_	1/		5	6		11		(wet, firm, GM-GC)		
15	17	8	8	8				Becomes f-c GRAVEL, some Clayey Silt, little f-c Sand		\exists
	1/		7	9		15				
_	17	9	10	8				Gray Clayey SILT, some fine Gravel, little f-c Sand	1	\neg
-	1/		7	20		15	,	(wet, stiff, ML)		\exists
	17	10	20	28				Gray fine GRAVEL, some Clayey Silt, little f-c Sand	-	
20	1/		12	14		40		(wet, compact, GM-GC)		\exists
_	17	11	10	8				Gray Clayey SILT, tr. gravel, tr. sand	S-11: Poor Recovery	
	1/		10	15		18		(wet, v. stiff, ML)		\neg
_	T									
_	1	***************************************					***			\dashv
25	1		-							\exists
	17	12	13	15			,, ,,	Contains some fine Gravel, little f-c Sand		
_	1/1		18	22		33		(moist-wet, hard)		
-								(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		\neg
	1									ㅓ
30 -	1									\dashv
	1	13	20	25		,,		Contains little fine Gravel		-
-	1/1		34	39		59				\dashv
-	f						***************************************			
	1									
35	┪╏									
- " -	17	14	6	15				Contains tr. gravel (wet)		_
-	1/1		25	29		40		1		\neg
	$\uparrow \uparrow$									
-	┪╏									\dashv
40	1 }									-
70	11				l	i		L		

N = NO. BLC	OWS TO DRIVE 2-IN	CLASSIFIED BY:	Geologist			
DRILLER:	ER: S. WOLKIEWICZ		DRILL RIG TYPE :	CME 550X		
METHOD O	F INVESTIGATION	ASTM D-1586 U	SING HOLLOW STEM AUGERS			

DATE

START FINISH 3/25/2022

S. WOLKIEWICZ

METHOD OF INVESTIGATION ASTM D-1586 USING HOLLOW STEM AUGERS

SHEET 2 OF 2

SJB SERVICES, INC. SUBSURFACE LOG



HOLE NO. <u>B-2</u> SURF. ELEV <u>99.8'</u>

G.W. DEPTH See Notes

LOCATION: TOWN OF VESTAL MEMORIAL POOL PROJECT: PROPOSED BATH HOUSE PROJ. NO.: BE-22-029 209 CLAYTON AVE, VESTAL, NY **NOTES** SOIL OR ROCK DEPTH SMPL BLOWS ON SAMPLER CLASSIFICATION 12/18 15 9 Contains no gravel 11 25 35 24 16 22 31 33 32 64 17 21 34 (moist) 75 41 40 Boring Complete at 50.0' Free Standing Water recorded at 31' at boring completion 65 80 N = NO. BLOWS TO DRIVE 2-INCH SPOON 12-INCHES WITH A 140 LB. PIN WT. FALLING 30-INCHES PER BLOW Geologist CLASSIFIED BY:

DRILL RIG TYPE:

CME-550X

APPENDIX B

INFORMATION REGARDING THIS GEOTECHNICAL ENGINEERING REPORT

GEOTECHNICAL REPORT LIMITATIONS

WMA Engineering DPC / DBA Empire Geotechnical Engineering Services (Empire) has endeavored to meet the generally accepted standard of care for the services completed, and in doing so is obliged to advise the geotechnical report user of our report limitations. Empire believes that providing information about the report preparation and limitations is essential to help the user reduce geotechnical-related delays, cost over-runs, and other problems that can develop during the design and construction process. Empire would be pleased to answer any questions regarding the following limitations and use of our report to assist the user in assessing risks and planning for site development and construction.

PROJECT SPECIFIC FACTORS: The conclusions and recommendations provided in our geotechnical report were prepared based on project specific factors described in the report, such as size, loading, and intended use of structures; general configuration of structures, roadways, and parking lots; existing and proposed site grading; and any other pertinent project information. Changes to the project details may alter the factors considered in development of the report conclusions and recommendations. Accordingly, Empire cannot accept responsibility for problems which may develop if we are not consulted regarding any changes to the project specific factors that were assumed during the report preparation.

SUBSURFACE CONDITIONS: The site exploration investigated subsurface conditions only at discrete test locations. Empire has used judgement to infer subsurface conditions between the discrete test locations, and on this basis the conclusions and recommendations in our geotechnical report were developed. It should be understood that the overall subsurface conditions inferred by Empire may vary from those revealed during construction, and these variations may impact on the assumptions made in developing the report conclusions and recommendations. For this reason, Empire should be retained during construction to confirm that conditions are as expected, and to refine our conclusions and recommendations in the event that conditions are encountered that were not disclosed during the site exploration program.

USE OF GEOTECHNICAL REPORT: Unless indicated otherwise, our geotechnical report has been prepared for the use of our client for specific application to the site and project conditions described in the report. Without consulting with Empire, our geotechnical report should not be applied by any party to other sites or for any uses other than those originally intended.

CHANGES IN SITE CONDITIONS: Surface and subsurface conditions are subject to change at a project site subsequent to preparation of the geotechnical report. Changes may include, but are not limited to, floods, earthquakes, groundwater fluctuations, and construction activities at the site and/or adjoining properties. *Empire should be informed of any such changes to determine if additional investigative and/or evaluation work is warranted.*

MISINTERPRETATION OF REPORT: The conclusions and recommendations contained in our geotechnical report are subject to misinterpretation. To limit this possibility, Empire should review project plans and specifications relative to geotechnical issues to confirm that the recommendations contained in our report have been properly interpreted and applied.

Subsurface exploration logs and other report data are also subject to misinterpretation by others if they are separated from the geotechnical report. This often occurs when copies of logs are given to contractors during the bid preparation process. To minimize the potential for misinterpretation, the subsurface logs should not be separated from our geotechnical report and the use of excerpted or incomplete portions of the report should be avoided.

OTHER LIMITATIONS: Geotechnical engineering is less exact than other design disciplines, as it is based partly on judgement and opinion. For this reason, our geotechnical report may include clauses that identify the limits of Empire's responsibility, or that may describe other limitations specific to a project. These clauses are intended to help all parties recognize their responsibilities and to assist them in assessing risks and decision making. Empire would be pleased to discuss these clauses and to answer any questions that may arise.

The following sections are a separate digital file.

DIVISION 00 [03 & 04]

BIDDING & CONTRACT REQUIREMENTS

SECTION 00 04 99 BID SECURITY

SECTION 00 03 01	BIDDER'S CHECKLIST
SECTION 00 03 70	BID PRICES
SECTION 00 03 73	IRANIAN ENERGY SECTOR DIVESTMENT CERTIFICATION
SECTION 00 03 76	STATEMENT ON SEXUAL HARASSMENT
SECTION 00 04 80	NON-COLLUSIVE BIDDING CERTIFICATION
SECTION 00 04 81	STATEMENT OF SURETY'S INTENT
SECTION OF OA SA	DDOUIDITION ON DUDCHASE OF TRODICAL

HARDWOODS CERTIFICATION

SECTION 00 05 70

AGREEMENT

This CONTRACT, in six (6) co	pies, made and entered into this day of				
, 20 , by and betw	reen the , a				
and					
	of.				
	of				
County of	State of				
hereinafter designated as the Contractor	r, Party of the Second Part.				
part of the other herein contained, have the First Part for itself and its successor	es hereto, each in consideration of the Agreements on the mutually agreed, and hereby mutually agree, the Party of es, and the Party of the Second Part for itself, himself or eir executors, administrators and assigns as follows:				
	der this Agreement and Contract, the Contractor shall ork required to furnish and install complete Contract				

Article 2. In consideration of the payments to be made as hereinafter provided, and of the performance by the Owner of all matters and things to be performed by the Owner as hereinafter provided, the Contractor agrees, at his own sole cost and expense to perform all the labor and services, and to furnish all the labor and materials, plant and equipment necessary to complete, and to complete in good, substantial, workmanlike and approved manner, the work described under Article 1 hereof, within the time hereinafter specified and in accordance with the terms, conditions and provisions of this Contract and with the instructions, order and directions of the Engineer made in accordance with this Contract.

No. ___.

Article 3. The Owner agrees to pay and the Contractor agrees to accept, as full compensation for all work done and materials furnished, and also for all costs and expense incurred, and loss or damages sustained by reason of the action of the elements or growing out of the nature of the work, or from any unforeseen obstruction or difficulty encountered in the prosecution of the work, and for all risks of every description connected with the work, and for all expenses incurred by, or in consequence of, the suspension or discontinuance of the work as herein specified, and for well and faithfully completing the work, and the whole thereof, as herein provided, and for maintaining the work in good condition until the final payment is made, the prices stipulated in the proposal hereto attached.

Article 4. CONTRACT DOCUMENTS. The following Documents shall constitute integral parts of the Agreement, the whole to be collectively known and referred to as the Contract: Advertisement For Bids, Information for Bidders, Wage Rates, Additional Instructions, Bid Documents, Agreement, Performance Bond, Labor & Materials Payment Bond, Insurance Certificates, General Conditions, General Requirements, Specifications, Contract Drawings, and all interpretations of, or addenda to the CONTRACT DOCUMENTS issued by the Owner or the Engineer with the approval of the Owner.

The Table of Contents, Indices, Headings, Titles contained herein and in said documents are solely to facilitate reference to various provisions of the Contract Documents and in no way affect, limit or cast light on the interpretations of the provisions to which they refer.

Article 5. Contractor agrees to comply with all requirements of the Contract Documents and with all provisions of law and implementing regulations. If the Contractor shall fail to comply with any of the terms, conditions, provisions, or stipulations of this Contract, then the Owner may make use of any or all remedies at law or in equity, or as provided in the Contract and shall have the right and power to proceed in accordance with the provisions thereof.

Article 6. The following alterations and addenda have been made and included in this	S				
Contract before it was signed by the parties hereto:					

Article 7. This agreement shall be construed and enforced in accordance with the laws of the State of New York.

Article 8. The Contractor agrees:

- (a) He hereby voluntarily and irrevocably submits himself to the jurisdiction and venue of any court of competent jurisdiction over the subject matter of this Contract located within the State of New York in which any litigation is brought based on or arising out of this Contract.
- (b) Any litigation brought by the Contractor based on or arising out of this Contract shall be brought only in the Supreme Court of the State of New York within the County in which the Owner is located.
- (c) Any legal process or notice connected with any litigation may be served on the Contractor by United States registered mail, postage pre-paid, addressed to the Contractor at his address stated in this Contract or at the Address stated in this Contract for the furnishing of notices to the Contractor or at the Contractor's last known address, and that service in such manner shall constitute good and valid service of process upon the Contractor.
- (d) The Contractor hereby waives any defense which might be available to it in any such litigation based on or alleging lack of jurisdiction or venue, or, if process is served in the manner provided in Subparagraph (c) immediately above, invalid service of process, and that he will duly enter his appearance in any such action.
- (e) This Contract may be presented in court as conclusive evidence of the foregoing agreement.

written.		(OWNER)
	By:	
(Seal)		
		CONTRACTOR
(Seal)	By:	

IN WITNESS WHEREOF, the parties to this Agreement have hereunto set their hands and seals and have executed this Agreement in six (6) copies the day and year first above

(ACKNOWLEDGMENT OF OFFICER OF OWNER ATTESTING CONTRACT)

State of	_)
State of County of) SS: _)
On this day of	, 20, before me personally came and
11	to me known, who, being by me
duly sworn, did depose and say that he is the	e
executed the foregoing instrument; that he k impressions appearing on said instrument is	described in and which mows the seal of said Owner; that one of the a true and correct impression of such seal; and that wer his signature by virtue of the authority in him
	CONTRACTOR, IF A CORPORATION) _)
State of County of) SS: _)
On this day of	, 20, before me personally came and
	to me known, who, being
by me duly sworn, did depose and say that he is the	ne resides at
executed the foregoing instrument, that he k	the corporation described in and which mows the seal of said corporation; that one of the that it was so affixed by order of the directors of the thereto by like order.

(ACKNOWLEDGMENT OF CONTRACTOR, IF A PARTNERSHIP)

State of)) SS:		
County of)		
On this appeared be one of the memb	day of pers of the firm of		, 20	_, before me personally came andto me known and known to me to he acknowledged to me that he
described in and wheexecuted the same a	no executed the foregons and for the act and o	oing instrume deed of said	ent, and firm.	he acknowledged to me that he
(ACK	NOWLEDGMENT O	F CONTRA	CTOR,	IF AN INDIVIDUAL)
State of)) SS:		
County of				
On this	day of	, 20	_, befor	re me personally came and me known and known to me to be
the person describe executed the same.	d in and who executed	d the foregoing	ng instru	ument and acknowledged that he

(ACKNOWLEDGMENT OF CONTRACTOR, IF A LIMITED LIABILITY COMPANY)

State of)) SS:	
County of) 55:	
On this day of	, 20	_, before me personally came and
		, to me known, who being by
me duly sworn, did depose and say	that he resides at _	
	that he is the	
of		, the limited liability company described
in and which executed the foregoin	g instrument; that h	ne knows the seal of said limited liability
	-	ent is such seal; that it was so affixed by
order of the managing members of	said limited liabilit	y company, and that he signed his name
thereto by like order.	•	
,		

(Certification of Owner's Attorney)

I, the undersigned, the duly a	authorized and acting legal representative of
	do hereby certify as follows:
execution thereof, and I am of duly executed by the proper prepresentatives; that said representatives on behalf of the agreements constitute valid a	oregoing Contract and surety bonds and the manner of of the opinion that each of the aforesaid agreements has been parties thereto acting through their duly authorized oresentatives have full power and authority to execute said respective parties named thereon; and that the foregoing and legally binding obligations upon the parties executing the terms, conditions and provisions thereof.
	By:
	Owner's Attorney
(Date)	_

END OF SECTION

SECTION 00 06 10

PERFORMANCE BOND

(ATTACH PERFORMANCE BOND HERE)

END OF SECTION

SECTION 00 06 20

LABOR & MATERIALS PAYMENT BOND

(ATTACH LABOR & MATERIALS PAYMENT BOND HERE)

SECTION 00 06 50

CERTIFICATE OF INSURANCE

(ATTACH INSURANCE CERTIFICATES HERE)

GENERAL CONDITIONS

SECTION 00 07 50

DEFINITIONS OF WORDS & TERMINOLOGY

00 07 50.01 DEFINITIONS OF WORDS AND TERMS

Wherever the following words or corresponding pronouns are used in this Contract, they shall have the meaning given herein:

- A. CONTRACT, OR CONTRACT DOCUMENTS: each of the various documents referred to in the Agreement, both severally and as a whole, including all additions, deletions, modifications and interpretations incorporated therein or appended thereto by or with approval of the Owner prior to the execution of the Contract.
- B. OWNER: the party of the first part to this Contract, or any duly authorized agents or officers empowered to act therefor.
- C. CONTRACTOR: the party of the second part to this Contract, or the legal representatives or agents appointed by said party for the performance of the work.
- D. ENGINEER: the firm of Barton & Loguidice, engaged by the Owner to provide Engineering services in connection with the work of this Contract, or its representatives duly authorized in writing to act therefor.
- E. SURETY: the person, persons, firm or corporation who executes the Contractor's Performance Bond and Labor & Materials Payment Bond.
- F. SUBCONTRACTOR: any person, other than employee of the Contractor, or any firm or corporation who contracts to act for or in behalf of the Contractor in performing any part of the work in connection with the Contract, exclusive of one who furnishes only materials or equipment.
- G. PROJECT: the entire facility or improvement to which the Contract relates.
- H. SITE: the area or areas bounded by the property lines shown on the Plans, and other areas that may be similarly designated.
- I. THE WORK: all labor, equipment and materials required, either expressly or by implication, to be furnished by the Contractor under this Contract or in connection with Change Orders or Supplemental Agreements thereto.
- J. SUPPLEMENTAL AGREEMENT: an alteration or modification of the Contract Documents, made after execution of the Contract and agreed to in writing by the Contractor and the Owner.

- K. CHANGE ORDER: a written order from the Owner to the Contractor directing an alteration or modification of the nature, scope or type of the work.
- L. BOND OR PERFORMANCE BOND: the guarantee signed by the Surety, that the Contractor will complete all the work as required by the Contract.
- M. LABOR & MATERIALS PAYMENT BOND: the guarantee, signed by the Surety, that the Contractor will pay for all Labor and Material required by the Contract.
- N. SPECIFICATIONS: also referred to as DETAIL SPECIFICATIONS or TECHNICAL SPECIFICATIONS. The written directions, requirements, descriptions of materials, equipment, construction systems, standards and workmanship as applied to the work and specifically including Division 2 Division 48 of the Contract Documents.
- O. PLANS, DRAWINGS OR CONTRACT DRAWINGS: only those drawings listed as such in the Contract Documents with all Addenda thereto.
- P. SHOP DRAWINGS, SETTING DRAWINGS, WORKING DRAWINGS, CONSTRUCTION DRAWINGS: drawings prepared, or caused to be prepared, by the Contractor, Subcontractors, or by their equipment or material suppliers in their behalf, including standard or stock equipment drawings, necessary to the performance of the work in addition to the Contract Drawings, or as may be required by the Engineer to be submitted for review.
- Q. ADDITIONAL DRAWINGS, SUPPLEMENTARY DRAWINGS: drawings, in addition to the Contract Drawings, which may be prepared and issued by the Engineer as part of the instructions to or requests of the Contractor in connection with the work of the Contract or appertaining to changes in the work.
- R. ADDENDUM, ADDENDA: additional Contract provisions, deletions or changes issued by the Owner prior to the receipt of bids.
- S. WRITTEN NOTICE: all written and authoritatively signed communications required in the normal conduct of the work or required to obtain compliance with the Contract provisions or preserve the rights of any party to the Contract. Written notice shall be considered as served when either delivered in person or deposited in a post-paid wrapper in a regularly maintained U.S. Mailbox and addressed to the person, firm or corporation intended to receive such notice, or to their appropriate agent, to the last business address of such known to the server. If mailed, the period of notice shall run from the time of the postal cancellation. It shall be incumbent upon each party to the Contract, and the Engineer, to advise the other parties to the Contract, and the Engineer, of any change in their business address until completion of the Contract and the expiration of all guarantee periods connected therewith.

- T. DIRECTED, ORDERED, REQUIRED, DESIGNATED, PERMITTED, GRANTED, INSTRUCTED, CONSIDERED NECESSARY, APPROVED, SATISFACTORY, ACCEPTABLE: words referring to action or satisfaction of the Engineer, unless another meaning is specifically stated. The same shall apply to words of like import.
- U. AS SHOWN, AS SHOWN ON THE PLANS: words referring to lines, numbers, or statements, or combinations thereof, on the Contract Drawings, unless another meaning is specifically stated.
- V. ELEVATION: or any abbreviation of the word "elevation", followed by figures, shall refer to the distance in feet above the datum established by the Engineer for the Project.
- W. ACT OF GOD: an earthquake, flood, excessive wind or other unusual natural occurrence. Rain, snow, wind, flood, lightning or other natural phenomenon of normal intensity for the locality shall not be included in the meaning of the term.
- X. APPROVED EQUAL, EQUAL: in the Contract Documents or Contract Drawings wherever brand names are specified and followed by the phrase "or approved equal", this phrase shall be modified to read "or equal".

00 07 50.02 REFERENCES TO OTHER SPECIFICATIONS AND CODES

References in these Specifications to published specifications and codes of private and governmental technical societies and agencies shall mean the latest specification for the item or operation involved. Abbreviations of these organizations used in these Specifications may include the following:

ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AGA	American Gas Association
AGCA	Associated General Contractors of America
AGMA	American Gear Manufacturers Association
AISC	American Institute of Steel Construction
AMCA	American Mechanical Contractors Association
ANSI	American National Standards Institute
APWA	American Public Works Association
ARI	American Refrigeration Institute
ASA	American Standards Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigeration & Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWS	American Welding Society

American Association of State Highway and Transportation Officials

AASHTO

AWWA American Water Works Association

CEMA Conveyor Equipment Manufacturers Association

CIPRA Cast-Iron Pipe Research Association

FM Factory Mutual System HEI Heat Exchange Institute HI Hydraulics Institute

IEEE Institute of Electrical and Electronics Engineer IPCEA Insulated Powers Cable Electric Association NAFM National Association of Fan Manufacturers

NBC National Building Code

NBFPU National Board of Fire Protection Underwriters NBCA National Bituminous Concrete Association

NCPI National Clay Pipe Institute NEC National Electrical Code

NELA National Electrical Lamp Association

NEMA National Electrical Manufacturers Association

NETA National Electrical Testing Association NFPA National Fire Protection Association

NSWMA National Solid Wastes Management Association

NYSDOT New York State Department of Transportation, Standard Specifications

(Construction and Materials)

NYSECC New York State Energy Conservation Code

OSHA Occupational, Safety and Health Act

PCA Portland Cement Association SAE Society of Automotive Engineers

SMACNA Sheet Metal & Air Conditioning Contractors National Association

SSPC Steel Structures Painting Council UL Underwriter Laboratories', Inc.

USEPA United States Environmental Protection Agency

END OF SECTION

SECTION 00 07 51

POWERS AND DUTIES OF ENGINEER

00 07 51.01 RESPONSIBILITY OF THE ENGINEER

- A. The Engineer shall decide questions which may arise as to the quality and acceptability of materials furnished, work performed, rate of progress of work, interpretation of Drawings and Specifications and all questions as to the acceptable fulfillment of the Agreement on the part of the Contractor. The duties and responsibilities of the Engineer as set forth herein shall not be extended except through written consent of the Engineer and the Owner.
 - 1. Observation of the Work: The Engineer will make periodic visits to the site to observe the progress and the quality of the executed work. All materials and each part or detail of the work shall be subject at all times to observation by the Engineer and the Owner, and the Contractor will be held strictly to the intent of the Contract Documents in regard to quality of materials, workmanship, and the diligent execution of the Contract. Observations may be made at the site or at the source of material supply, whether mill, plant or shop. The Engineer shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make their observations and construction review.
 - 2. Acceptability of Work: The Engineer's decision as to the acceptability or adequacy of the work shall be final and binding upon the Contractor. The Contractor agrees to abide by the Engineer's decision relative to the acceptability of the work.
 - 3. Engineer's Decisions: All claims of the Owner or the Contractor shall be presented to the Engineer for decision which shall be final except in cases where time and/or financial considerations are involved.
 - 4. The Engineer shall not be responsible for the Contractors or any Subcontractor's construction means, methods, controls, techniques, sequences, procedures or construction safety or their failure to complete the work in accordance with the Contract Documents.
 - 5. Oral Agreements: No oral order, objection, claim or notice by any party to the others shall affect or modify any of the terms or obligations contained in any of the Contract Documents, and none of the provisions of the Contract Documents shall be held to be waived or modified by reason of any act whatsoever, other than by a definitely agreed waiver or

modification thereof in writing, and no evidence shall be introduced in any proceedings of any other waiver or modification.

00 07 51.02 INSPECTION OF WORK

A. Inspection services, performed by the Engineer pursuant to this Contract, whether of material or work, and whether performed prior to, during or after completion of construction, are performed solely for the purpose of determining general conformity of the work with the Contract Plans and Specifications.

Nothing contained herein shall create, or be deemed to create:

- 1. any duty upon the Engineer to supervise the construction procedures and safety procedures followed by any Contractor or Subcontractor or their respective employees or by any other persons at the job site, or
- 2. any liability whatsoever by the Engineer to any employees or any Contractor or Subcontractor or to any other person.

00 07 51.03 NO WAIVER OF RIGHTS

A. No inspection or approval by the Owner, the Engineer, or any of their employees, nor any order, measurement or certification by the Engineer, nor payment for, nor acceptance of the whole or any part of the work by the Owner or the Engineer, nor any order of the Owner for payment of money, nor any possession taken by the Owner, nor any extension of time shall operate as a waiver of any provision of the Contract, or of any right to damage herein provided or of any power herein reserved. Neither shall a waiver of any breach of the Contract be construed to be a waiver of any other or subsequent breach. All remedies in the Contract shall be construed as being cumulative, in addition to each and every other remedy herein contained. The Owner shall have any and all legal and equitable remedies and recourse which they would in any case have.

SECTION 00 07 52

INSURANCE, SECURITIES AND GUARANTEES

00 07 52.01 GUARANTEES, PERFORMANCE BONDS, LABOR AND MATERIALS PAYMENT BONDS AND GUARANTEES

- A. The Contractor shall furnish Performance and Labor and Materials Payment Bonds each in an amount not less than the full amount of the accepted bid. The Performance Bond shall guarantee faithful performance of the work in compliance with all Contract Documents. The Labor and Materials Payment Bonds shall guarantee the payment of all persons performing labor or furnishing materials in connection therewith. The Bonds shall be in a form approved by the Owner and dated the same as the executed Agreement. The Surety company or companies shall be designated by the Contractor and shall be authorized to transact business in New York State, and if this is a Federally aided project, shall appear on the U.S. Treasury Department's most current list (Circular 570 as amended). The premium for these Bonds shall be paid by the Contractor and shall be included as a part of their Bid. An Attorney-in-fact who signs Performance or Labor and Materials Payment Bonds shall file with each Bond or copy thereof a certified copy of their Power-Of-Attorney to sign such Bonds.
- B. Cash in the form of United States currency or a certified check payable to the Owner in the full amount of the accepted Bid, deposited with the Owner, will be accepted in lieu of both Bonds. Such deposit shall serve as the Performance, and Labor and Materials Payment Bonds for all purposes specified, and the Contractor agrees that such deposit, or such portion thereof as may be required to satisfactorily complete the work, shall be forfeited to the Owner.
- C. The Owner reserves the right to order or approve additions to, omissions from, or changes in the work without notice to the Surety.
- D. The Contractor guarantees all the work, materials and equipment called for in the Contract against defects in materials or workmanship for a period of twelve months following the date of the Notice of Substantial Completion. Under this guarantee, the Contractor shall make good, at their own expense and without delay, any failure of any part due to poor or faulty materials, construction or installation, or to the failure of any equipment to satisfactorily perform the work required of it by the Specifications. The Contractor shall also make good any damage to any part of the Project, the environment or other property of the Owner caused by such failure. Any work replaced or rebuilt during the above-mentioned guarantee period shall be similarly guaranteed for a 12-month period starting from the date of acceptance of the repair, reconstruction or replacement.

E. The Contractor's Performance and Labor and Materials Payment Bonds specified in the above paragraph shall fully cover all guarantees specified.

00 07 52.02 ADDITIONAL SECURITY

A. At any time the Owner may become dissatisfied with the Surety or Sureties who furnished the Performance Bond and the Labor and Materials Payment Bonds, or if for other reasons the Bond(s) shall, in the opinion of the Owner, cease to be adequate security to the Owner, the Contractor shall, within five days after notice from the Owner, substitute a new Bond(s) acceptable to the Owner in form, amount and Surety. The premium on such Bond(s) shall be paid by the Contractor. No payments on any Monthly Estimate shall become due and none shall be made until the new Surety shall have been approved and the Bond(s) executed and accepted.

00 07 52.03 CONTRACTOR'S INSURANCE

- A. The Contractor, at their own expense, shall procure and maintain until one year after the date of the Notice of Certificate of Substantial Completion or one year after the Contractor or any Subcontractor last performs any work under the Contract, even if the Project is abandoned or deferred, insurance for liability for damages required by law of the kinds and in the amounts stated herein and as may be modified by provisions in the Additional Instructions, through insurance companies authorized to operate in New York State. The insurance shall cover all operations necessary to complete the work, whether performed by the Contractor or Subcontractors. Before starting work, the Contractor shall furnish the Owner one duplicate original policy and five certificates of insurance for each and every type of insurance required.
- B. All liability insurance required by this Contract shall be maintained in force during the term of this Contract and until one year after the date of the Notice of Substantial Completion or one year after the Contractor or any Subcontractor last performs any work under the Contract, even if the Project is abandoned or deferred.

1. Commercial General Liability Insurance \$1,000,000 Occurrence Bodily Injury & Property Damage \$2,000,000 Aggregate

- 2. Automobile Liability
 Bodily Injury & Property Damage \$1,000,000 Combined Single Limit
- 3. Umbrella Liability \$4,000,000 Occurrence \$4,000,000 Aggregate
- 4. Workers Compensation & Employers Liability Statutory

C. Additional Insured – Contractor shall name Contractor, Owner, the Engineers and any other entity required by contract as additional insured on all liability policies except Workers Compensation and Owners, Contractors Protective Liability with respect to all operations under the Contract by the Contractor, Subcontractor, including suspension and omissions of the Owner. The additional insured status shall be on a primary and non contributing basis over all other valid and collectible insurance, with respect to this Contract.

D. Additional Conditions

1. Waiver of Subrogation: The Contractor and Subcontractors waive all rights against (1) each other and any of their subcontractors, agents and employees, each of the other, and (2) the Owner, the Engineer, the Engineer's consultants, separate contractors, and any of their subcontractors, sub-subcontractors, agents and employees for damages caused by bodily injury, property damage, fire or other causes of loss to the extent covered by insurance provided under the Contract or other insurance applicable to the work, except such rights as they may have to proceeds of such insurance held by the Owner as a fiduciary. The Subcontractor shall require of the Subcontractor's sub-subcontractors, agents and employees, by appropriate agreements, written where legally required for validity, similar waivers in favor of the parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

2. Commercial General Liability (CGL):

- a. Coverage with limits of Insurance of not less than \$1,000,000 each occurrence and \$2,000,000 Annual Aggregate.
- b. If the CGL coverage contains a General Aggregate Limit, such General Aggregate shall apply separately to each project/location.
- c. CGL coverage shall be written on ISO Occurrence Form CG 00 01 1093 or a substitute form providing equivalent coverage and shall cover liability arising from premises, operations, independent contractors, products-completed operations, and personal and advertising injury and contractual liability.
- d. Contractor, Owner and all other parties required of the Contractor, shall be included as additional insureds on the CGL. Coverage for the additional insureds shall apply as Primary and noncontributing Insurance before any other insurance or self-insurance, including any deductible, maintained by, or provided to, the additional insureds.

e. Contractor and Subcontractor shall maintain CGL coverage for itself and all additional insureds for the duration of the project and maintain Completed Operations coverage for itself and each additional insured for at least one year after Contractor or Subcontractor last performs any work under the Contract.

3. Auto Liability:

- a. Business Auto Liability with a combined single limit of at least \$1,000,000 each accident.
- b. Business Auto coverage must include coverage for liability arising out of all owned, leased, hired and non-owned automobiles.
- c. General Contractor, Owner, Engineers and all other parties required of the General Contractor, shall be included as additional insureds on the auto policy.

4. Umbrella Insurance:

- a. Umbrella limits must be at \$4,000,000 each occurrence and \$4,000,000 aggregate.
- b. Umbrella coverage for such additional insureds shall apply as primary before any other insurance or self-insurance, including any deductible, maintained by, or provided to, the additional insured other than the CGL, Auto Liability and Employers Liability coverages maintained by Contractor.
- 5. Workers Compensation and Employers Liability:
 - a. Statutory for New York State. All other states Employers Liability/Insurance limits of at least \$500,000 each accident for bodily injury by accident and \$500,000 each employee for injury by disease.
- 6. Property Insurance (Builders Risk):
 - a. The Contractor shall provide and maintain, at their own expense, such property insurance as required by Contract. Policy(s) shall provide cover for fire, extended cover including open (special) perils and theft to insure all work and materials of the Contract against loss or damage. The value of the insurance shall at all times be equal to or greater than the full value of the Contract. Insurance policies shall be in the name of the Owner and payable to the Owner. Any proceeds there to shall be retained by the Owner as security for the performance by the Contractor in making good any loss, damage or injury. Upon such satisfactory performance by the Contractor, the proceeds shall be paid by the Owner to the Contractor.

E. Owners, Contractors Protective Liability Insurance

1. Owners Protective Liability Insurance at the limits stated in the Additional Instructions issued in the name of the Owner to and covering the liability for damages imposed by law upon the Owner with respect to all operations under the Contract by the Contractor or their Subcontractor, including supervisory acts and omissions of the Owner. Unless otherwise stated in the Additional Instructions, a minimum of \$1,000,000 per occurrence / \$2,000,000 aggregate is required.

F. Insurance Certificates

1. Attached to each certificate of insurance shall be a copy of the Additional Insured Endorsement that is part of the Commercial General Liability Policy. These certificates and the insurance policies required shall contain a provision that coverage afforded under the policies will not be cancelled or allowed to expire until at least 30 days prior written notice has been given to the Contractor/Owner.

SECTION 00 07 53

STATUS OF CONTRACTOR

00 07 53.01 REPRESENTATIONS OF CONTRACTOR

The Contractor warrants and represents that:

- A. They are familiar with all Federal, State, County and Municipal laws, ordinances, regulations and codes pertinent to the work and those employed in connection therewith, including any special acts relating to the work or the Project.
- B. They have carefully examined all the Contract Documents and the Site and has, thereby satisfied themselves as to: the location and nature of the work; the quantity, quality and nature of both surface and subsurface structures and materials apt to be encountered; the quantity, quality and types of plant, equipment and other facilities necessary for the performance of the work; the general and local conditions; and all other matters which may in any way affect the work or their performance under the Contract.
- C. Such work, both temporary and permanent, required under the Contract can be satisfactorily constructed and used for its intended purpose, without injury to any person or damage to any property.
- D. They are financially solvent and experienced in and competent to perform the work of the Contract.
- E. If a corporation foreign to the State of New York, they are aware of the provisions of Article 13 of the Business Corporation Law, with specific reference to the requirements in Section 1301 that certain corporations may not do business in this State without first obtaining a certificate of authority from the Secretary of State.
- F. If a corporation, they are aware of the provisions of Article 145 of the Education Law, with specific reference to the requirements and prohibitions of Section 7209 relating to the practice of professional engineering, or the use of the word "engineer" or "engineering" in a corporate name.

00 07 53.02 ADDRESS OF CONTRACTOR

A. Both the address given in the bid and the Contractor's office at or near the Site, if such is established, are designated as places to either of which letter, notices, or other communications to the Contractor may be mailed or delivered. The delivery at either place, or the depositing, in a post-paid wrapper addressed to either place, in any regularly maintained U.S. Post Office Box, of any letter, notice, or other

communication shall be deemed sufficient service thereof upon the Contract. If at any time during the life of the Contract, it is necessary to change either address, the Contractor shall give written notice to the Owner, the Surety and the Engineer.

B. Nothing herein shall act to prevent or invalidate the personal delivery in hand of any letter, notice or other communication to the Contractor.

00 07 53.03 PATENTS

- A. The Contractor shall pay, as part of this Contract, all costs and fees required to obtain the legal right to use patented equipment, designs, or procedures to be used, as part of the work on this Contract.
- B. The Contractor shall defend, indemnify, keep and save harmless the Owner from all costs, damages, liabilities, judgments and expenses, including reasonable attorney fees which may in any way arise against the Owner because of the use of any patented material, equipment or process furnished or used in the performance of the work or because of the use of patented designs supplied by the Contractor and accepted by the Owner.
- C. If any claim, suit or action at law or inequity of any kind involving any such patent is brought against the Owner, the Owner may retain from any moneys due or to become due to the Contractor an amount considered sufficient by the Owner to protect itself against loss until such action is settled and satisfactory evidence to that effect has been supplied to the Owner.

00 07 53.04 CONTRACTOR'S OBLIGATIONS

- A. The Contractor shall furnish all the plant, machinery, labor, equipment, material, tools, appliances, shoring, bracing and scaffolding necessary to the proper and safe completion of the work in the manner specified, shown and directed within the time specified. They shall suitably cover the work whenever necessary, and otherwise protect it from damage from any cause whatsoever.
- B. If in the opinion of the Engineer the Contractor's procedures or appliances appear at any time, either before or during progress of the work, to be inadequate or insufficient to provide the quality of the work, or the rate of progress specified, they may order the Contractor to improve their character and increase their sufficiency, and the Contractor shall comply therewith. However, failure of the Engineer to issue such an order shall not relieve the Contractor of their obligations to secure the safety, quality or progress of the work, and the Contractor alone shall be responsible for the safety, adequacy and efficiency of their methods, plant and appliances.

00 07 53.05 LIABILITY FOR INJURIES OR DAMAGE

- A. The Contractor shall be solely responsible and liable for the safety and protection of all persons, including but not limited to the Owner, Engineer, Contractor and Subcontractor and their employees, suppliers and visitors, and shall be solely responsible and liable for the safety and protection of property, including but not limited to the Site and its appurtenances and equipment, and they shall be solely responsible for all physical injuries, including death, to any such persons and for all damage to any such property and its appurtenances, which occurs on account of the work, or because of any negligence, fault or default of the Contractor, a Subcontractor or any of their officers, employees or agents.
- B. The Contractor shall have on the project site at all times, while work is in progress, at least one person skilled in safety and health procedures and familiar with State and Federal safety and health regulations whose responsibility shall be to observe methods and procedures. They shall have the duty and authority to stop and/or correct all unsafe and unhealthy conditions.

00 07 53.06 GENERAL INDEMNIFICATION

A. To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Engineer, Engineer's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from performance of the Contractor's Work under this Contract, provided that any such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, the Contractor's Subcontractors, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or otherwise reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Paragraph.

00 07 53.07 CONTRACTOR'S CLAIM FOR DISPUTED WORK

A. If the Contractor believes they or their Subcontractor or anyone directly or indirectly employed by any of them has sustained damage for disputed work, for which they claim they should be compensated, they shall give written notice to the Engineer, describing the nature and circumstances of the disputed work, within seven days after sustaining such damage. The Contractor shall also file with the Engineer, within 30 days of the date on which the alleged damage occurred, an itemized statement of the character and amounts of such damage. Unless both statements shall be filed as so required, the claim for compensation shall be considered invalid and the Contractor shall not be entitled to any payment therefor.

- B. The Contractor shall proceed diligently with performance of the disputed work pending final resolution of their claim for damages.
- C. During the progress of such disputed work, the Contractor shall provide to the Engineer daily records and make reports of all labor, material and equipment used in connection with such work and the cost thereof as specified in Section 00 07 57.03.
- D. If the Owner determines that the work in question is Contract work and not a Changed condition, they shall direct the Contractor to continue the disputed work, and the Contractor must promptly comply.
- E. If the Owner determines that the work in question is not Contract work and is a Changed condition, they shall direct the Contractor to continue the work and shall have prepared a Change Order in accordance with Section 00 07 57.03.

00 07 53.08 NO CLAIMS AGAINST INDIVIDUALS

A. No claim shall be made by the Contractor or their Subcontractor or anyone directly or indirectly employed by any of them against any officer, employee or agent of the Owner and the Engineer for, or because of, anything done or failure to be done in connection with the work.

00 07 53.09 CONTRACTOR'S TITLE TO MATERIALS

- A. Neither the Contractor nor any Subcontractor shall purchase any materials, equipment or supplies for work subject to any chattel mortgage or under a conditional sale agreement or other agreement by which an interest is retained by the seller. The Contractor shall obtain and maintain good and clear title to all materials and supplies used by them in the work until attachment to or incorporation in the work.
- B. Nothing in the Contract shall be construed as vesting in the Contractor any property right in materials or equipment specified after they shall have been attached to or incorporated in the work or the ground, nor in materials and equipment for which partial payments have been made. All such materials and equipment shall become the property of the Owner upon such attachment or incorporation.

00 07 53.10 TITLE TO OLD MATERIALS

A. All materials removed from existing structures or construction, and all materials or articles of intrinsic or historic value found in excavations or on the Site shall be brought to the attention of the Engineer, and if they shall so order, shall become or remain the property of the Owner, and shall be carefully preserved for future use. If not claimed by the Owner, such materials or articles shall be removed from the Site and disposed of by the Contractor at their own expense.

SECTION 00 07 54

CONTRACTOR'S ORGANIZATION & STAFF

00 07 54.01 SUPERINTENDENTS, FOREMEN & AGENTS

A. The Contractor shall at all times, except during periods of shut-down or work suspension that have been approved or directed, have a competent superintendent, foreman or other representative on the Site, who shall see that the work is performed in accordance with the Contract Documents and directions of the Engineer given thereunder, and who shall have authority to act for the Contractor and to receive and carry out orders from the Engineer, and who shall receive materials and equipment shipped to the Contractor. The Contractor shall be responsible for the acts of their superintendents, foremen, agents and employees during the life of the Contract.

00 07 54.02 COMPETENCY & CHARACTER OF EMPLOYEES

- A. The Contractor shall employ only competent and skillful persons to perform the work. This provision shall apply equally to common laborers and skilled craftsmen or tradesmen.
- B. Whenever the Engineer informs the Contractor that any person on the work is, in the Engineer's opinion, incompetent, intemperate, unfaithful, insufficiently skillful, or disorderly, or refuses to carry out the provisions of the Contract, or to stop doing unsatisfactory work when so ordered, or who uses threatening or abusive language to, or engages in offensive, hostile, or harassing conduct toward the Owner, Engineer, or any authorized representative(s) thereof, such person shall be discharged from the work by the Contractor and shall not again be employed without written consent of the Engineer.

00 07 54.03 CONTRACTOR'S FIELD OFFICE

A. Unless waived by provisions within Additional Instructions, the Contractor shall provide, furnish and maintain for their own use a field office, with telephone, on the Site during the entire period of construction. The Contractor shall obtain approval of the Engineer of the type, size and location of such office, shanties or other temporary structures on the Site, prior to their erection.

B. The Contractor will receive no direct payment for providing, maintaining or removing the Contractor's Field Office specified above, and compensation for same shall be included, as part of their overhead, in the prices to be paid for the various items in this Contract.

SECTION 00 07 55

PERMITS, TAXES, ACCESS, OTHER CONTRACTS

00 07 55.01 LAWS, REGULATIONS & PERMITS

- A. The Contractor shall procure at their own expense all necessary permits from the Federal, State, County, Town, municipal or other public agencies that may be involved in the work or the Project or have jurisdiction thereover, and shall serve all notices required by law or ordinance and pay all fees and charges incidental thereto. They shall at all times keep themselves fully informed of all laws, ordinances and regulations which in any way affect the work, the materials, methods and equipment used in the work, the conduct of the work, and persons engaged or employed on the work, and of all orders, instructions and decrees of bodies, agencies or tribunals having any authority or jurisdiction over the work or the Project.
- B. If the Contractor should discover any discrepancy or inconsistency in any Contract Documents relating to any permit, law, ordinance, regulation, code, order, decree or instruction, they shall immediately report the same in writing to the Engineer.
- C. The Contractor shall at all times observe and comply with all such existing and all laws which come into existence during the execution of the Contract, as well as permits, codes, decrees, ordinances, regulations, orders and instructions, and shall cause their superintendents, foremen, employees and agents to do likewise.

00 07 55.02 REQUIRED LEGAL PROVISIONS DEEMED INCLUDED

- A. All clauses and provisions of law required by law to be included in the Contract shall be deemed to be included herein, and the Contract shall be interpreted, administered and enforced as though they were included. If, through oversight or otherwise, any such clause or provision is not included, or is not correctly included, the Contract shall immediately be physically amended or corrected, at the request of either party, to provide the necessary compliance.
- B. The inclusion in the Contract Documents of any portion of any law or ordinance or code, regulation, decree, order, permit, instruction or interpretation emanating from a public body or agency, shall not be construed to mean that all such laws or legal requirements deemed necessary, in effect, or applicable to all or any portion of the work or the Contract have been included.

00 07 55.03 UNLAWFUL REQUIREMENTS DEEMED EXCLUDED

A. If the Contract Documents contain any unlawful provision not an essential part of the Contract and which shall not appear to have been a controlling or material inducement to the making of the Contract by the parties thereto, such provision shall be construed to be of no effect and shall, upon written notice by either party, be deemed stricken from the Contract without affecting the binding force of the remainder on both parties.

00 07 55.04 TAXES

A. The Contractor shall pay all sales, use, excise, transportation and other taxes and fees for which they are liable under the Contract. The cost of such taxes and fees shall be included in the price, or total of several prices, given in the Bid on which the Agreement is based, and no separate payment will be made therefor.

00 07 55.05 ACCESS TO WORK AND CONTRACTOR'S RECORDS

- A. The Owner and the Engineer, and their employees, agents and representatives, shall have access to the work, the Site, and the premises used by the Contractor, and the Contractor shall provide and maintain safe and suitable facilities therefor. Subcontractors, and any other parties who may contract with the Owner to do work on the Site shall, for all purposes which may be required by their contracts, have the same privileges and facilities.
- B. Whenever requested, the Contractor shall give the Engineer access to invoices, bills of lading, trip tickets, lists of employees, survey notes and other such data connected with the work.

SECTION 00 07 56

TIME ELEMENTS

00 07 56.01 **COMMENCEMENT & COMPLETION**

The Contractor shall begin performance of the work within the time specified in A. the Information for Bidders, and shall substantially complete the work within the time specified in the Information for Bidders.

00 07 56.02 TIME OF ESSENCE

Α. Since the provisions of this Contract relating to the commencement and completion of the work are to enable the Owner to construct and place in use an improvement or facility in accordance with a pre-determined program, such provisions are of the essence of this Contract. It is agreed that the Owner will suffer damages if the work is not completed in the time specified.

PROGRESS 00 07 56.03

- The rate of progress shall be as uniform as practicable and such that all the work A. will be completed within the time specified, or within any time extensions that may be granted by the Owner.
- В. The Engineer will notify the Contractor in writing if, at any time, they are of the opinion the work is unnecessarily delayed and will not be completed on time. The Contractor shall, within 10 days after receipt of such notice, take such action as will, in the opinion of the Engineer, improve the rate of progress to an extent that will insure completion of the work within the time specified. If the Contractor shall fail or refuse to take such steps within 10 days, the Owner may notify the Contractor to stop work or terminate the Contract in accordance with the provisions of Article 00 07 60.01, OWNER'S RIGHT TO STOP WORK OR TERMINATE CONTRACT.

00 07 56.04 APPROVED WORK SCHEDULES

A. Unless waived by provision in the Information for Bidders, within three weeks after award of the Contract, the Contractor shall submit to the Engineer for approval three copies of their proposed work schedule. The schedule shall show the Contractor's proposed relative order and sequence of commencement and completion of all salient portions of the work, including the delivery and installation of equipment, and shall give the estimated dates of commencement and completion of the various portions of the work.

8.20 TIME ELEMENTS

- B. If more than one Contract is to be awarded on the same phase of the project, the General Contractor shall provide the Engineer with additional copies of their work schedule after the schedule shall have been approved. The Engineer will transmit these to the other Contractors for reference in the preparation of their proposed work schedules and submittal of same for approval. In such case each Contractor other than the General Contractor shall submit their proposed schedule for approval within three weeks after receipt of a copy of the General Contractor's approved schedule.
- C. Each Contractor shall adhere to the approved schedule for their Contract. If a Contractor causes one or more other Contractors to be damaged by failing to adhere to their schedule, they shall save harmless the Owner and the Engineer from any and all actions and charges of the other Contractors against the Owner or the Engineer as the result of such failure.
- D. 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. If the Engineer finds the revised schedule not acceptable they may require the Contractor to submit a new revised schedule.
- E. If the Contractor fails to submit a work schedule within the time period described or any revision or update when required, the Owner may withhold payment pursuant to Section 00 07 59.07 of the Contract until such time as the Contractor submits the required work schedule.
- F. See also Article 00 10 12.01, COLLATERAL WORK.

00 07 56.05 WORK SUSPENSION

A. When, in the opinion of the Engineer, good cause of suspension of the work exists, the Contractor shall suspend the work or any portion thereof, upon written order of the Engineer, for such period of time as the Engineer may direct. If the reason for suspension is beyond the control of the Contractor, the time within which the work is required to be completed shall be extended by the number of calendar days the work is suspended.

00 07 56.06 TIME EXTENSIONS

A. Should the work be obstructed or delayed through the neglect, delay or default of any other Contractor on the Project, or by an Act of God, or by a general strike, or by delays caused by governmental authorities having jurisdiction over the work, or by delay on the part of the Owner in performing any work or furnishing any material or equipment stated in the Contract to be furnished by the Owner, or by any Supplementary Agreement or Change Order issued by the Owner, the Contractor shall have no claim for damages against the Owner or the Engineer, other than the price or prices agreed upon under Supplemental Agreement, or Change Order, but shall be entitled to such an extension of time for completion of

the work as the Engineer certifies is equitable because of such obstruction, delay, Supplemental Agreement, or Change Order, provided that claim for a time extension is made by the Contractor, in writing within seven days from the end of the time when the alleged cause therefore shall have occurred. Time necessary for Shop Drawing review, for changes to meet actual conditions, and delays incurred by seasonal and weather limitations for the locality should be normally anticipated and are neither compensatory nor eligible for extensions of time. See also ARTICLE 00 10 12.01, COLLATERAL WORK, and 00 07 57.03, CHANGE ORDERS AND PAYMENT OR CREDIT THEREFOR.

00 07 56.07 ENGINEERING AND INSPECTION CHARGES

- Α. When the work embraced in the Contract is not substantially completed on or before the date specified therein, or within any time extensions granted by the Owner, engineering and inspection expenses incurred by the Owner in connection with the work from the specified or extended date of substantial completion until the date of actual Substantial Completion shall be charged to the Contractor. The date of actual substantial completion shall be determined as the date of issuance of the Notice of Substantial Completion.
- B. Supplementary Agreements or Change Orders added to the original Contract, as well as extenuating circumstances beyond the control of the Contractor, will be given due consideration by the Owner prior to assessing engineering and inspection charges against the Contractor.
- C. In addition, should the Contractor apply for and receive dispensation to work more than eight hours per day or forty hours per week by the Industrial Commissioner, the Contractor will be charged the associated overtime premium rate for the Engineer's on-site inspection representative(s).
- D. Should the remaining minor punch list items not be completed within sixty (60) days of the Notice of Substantial Completion or within any time extensions granted by the Owner, the Contractor shall pay the Owner for any engineering and inspection expenses incurred by the Owner from the specified or extended date of minor punch list completion until when such punch list items are fully complete.
- E. These additional engineering and inspection charges shall be in the form of agreed-upon damages to the Owner and shall be deducted from moneys due or to become due the Contractor.

8.20 TIME ELEMENTS

00 07 56.08 PER DIEM CHARGES FOR DELAY

A. For each calendar day or fraction thereof that any work except minor punch list items as listed on the Notice of Substantial Completion shall remain uncompleted after the Contract time specified for the substantial completion of the work in the Information For Bidders or extensions thereof granted by the Owner, the Contractor shall pay the Owner agreed-upon damages as follows, unless modified in the Additional Instructions:

Original Contract Amount		Agreed-Upon Damages
From More Than	To and Including	Per Calendar Day
\$ 0	\$ 25,000	\$ 50
\$ 25,000	\$ 50,000	\$ 100
\$ 50,000	\$ 100,000	\$ 200
\$ 100,000	\$ 500,000	\$ 300
\$ 500,000	\$ 2,000,000	\$ 500
\$ 2,000,000	\$ 5,000,000	\$ 600
\$ 5,000,000	\$10,000,000	\$ 800
\$10,000,000		\$1,000

- B. The date of actual Substantial Completion shall be determined as the date of issuance of the Notice of Substantial Completion.
- C. Such sums shall be in addition to engineering and inspection charges as provided for in ARTICLE 00 07 56.07 and shall not be in the nature of a penalty, but agreed-upon damages to the Owner in such case and shall be a part of the consideration of the Contract.
- D. The sums and charges specified above shall be deducted from moneys due or to become due the Contractor and the amount still owing, if any, shall be paid on demand by the Contractor or the Surety. Such payments shall not relieve the Contractor or the Surety from any other obligation under the Contract.
- E. Before assessing engineering and inspection charges, or per diem charges for damages, the Owner will give due consideration to any and all Supplementary Agreements and Change Orders as well as extenuating circumstances beyond control of the Contractor including any delays due to any preference, priority or allocation order duly issued by the Government. Such charges will be assessed, however, in cases in which the Owner considers the Contractor liable as the result of slow work, inefficient operation, insufficient labor, equipment or material, the removal and replacement of poor work, or other unwarranted reasons.

SECTION 00 07 57

CHANGES IN THE WORK

00 07 57.01 RIGHT TO ALTER CONTRACT

A. The Owner may at any time alter or modify the Contract Documents, and the Contractor shall conform to such alterations or modifications after the Owner and the Contractor shall have entered into a Supplementary Agreement in writing therefor. The Contractor shall perform no work and furnish no material in connection with the alterations or modifications, nor shall they receive any additional payment therefor, unless and until such a Supplementary Agreement has been executed, as required by law. The Owner and the Contractor agree that alterations and modifications thus made shall in no way compromise the validity or coverage of the original Contract or Bond, or the liability of the signers thereof. All work performed under any such Supplementary Agreement shall be subject to all the provisions of the original Contract not expressly altered or modified.

00 07 57.02 MINOR CHANGES

A. When ordered by the Engineer, the Contractor shall make minor changes in the location of the work, installation of equipment, and other things called for in the Contract, at no additional cost to the Owner. Such minor changes shall be limited to matters that do not alter the character, quantity or cost of the work as a whole. The Engineer shall be the sole judge of what constitutes a minor change.

00 07 57.03 CHANGE ORDERS & PAYMENT OR CREDIT THEREFOR

- A. The Owner, without invalidating the Contract, may make changes by altering, adding to or deducting from the work the contract sum being adjusted accordingly. All such work shall be executed in conformity with the terms and conditions of the original Contract, unless otherwise provided in the order for same. Any claim for extension of time caused thereby shall be adjusted at the time of ordering such change.
- B. No instructions, either written or verbal, shall be construed as an order for changes unless it be in the form of a Change Order, bearing the signed approval of the Owner and the signed acceptance of the Contractor, except in the case of disagreement as to value of changes, when the Contractor's signature to the order will not be mandatory. Change Order shall describe or enumerate the work to be performed and state the price, if any, to be added to or deducted from the Contract sum. If the nature of the work is such that a Change Order, as above, cannot be issued until the work has been advanced sufficiently to obtain exact quantities, said work will be authorized in writing by the Owner, with the accompanying

- statement that a Change Order will be issued when the necessary information is at hand.
- C. Except as provided in the above paragraph, no change shall be made, unless in pursuance of a Change Order, and no claim for an addition to the Contract sum shall be valid unless so ordered. If the Contractor believes that any instructions, by drawing or otherwise, involves extra cost under their Contract, they shall give the Owner and the Engineer written notice and then proceed as indicated in Article 00 07 53.07, Contractor's Claim for Disputed Work.
- D. The value of any Change Order shall be determined by one or more of the following methods and in the following order:
 - 1. By prices specifically named in the specifications or proposals.
 - 2. By acceptance of agreed unit prices based on estimated cost plus overhead and profit as applicable.
 - 3. By estimate of the actual cost of labor and materials plus overhead and profit, cost to be determined as the work progresses.
 - 4. By actual cost of labor and materials plus overhead and profit, cost to be determined as the work progresses.
 - 5. By estimate of the value as deducible from the approved detailed estimate.
- E. Overhead shall be defined as an allowance to compensate for all costs, charges and expenses, direct or indirect, except for the actual cost of labor and material as defined by the following paragraph. Overhead shall be considered to include, but not be limited to insurance (other than as mentioned in the following paragraph) bond or bonds, field and office supervisors and assistants above the level of foreman, use of small tools and minor equipment, incidental job burdens, general office expense, etc.
- F. Actual cost of labor and material shall be defined as the amount paid for the following items, to the extent determined reasonable and necessary.
 - 1. Cost of materials delivered to the job site for incorporation into the Contract work.
 - 2. Wage paid to workmen and foremen and wage supplements paid to labor organizations in accordance with current labor agreements.
 - 3. Premiums or taxes paid by the Contractor for Worker's Compensation Insurance, unemployment insurance, FICA tax and other payroll taxes as required by law, net of actual and anticipated refunds and rebates.
 - 4. Sales tax paid as required by law.

- 5. Allowance for use of construction equipment (exclusive of hand tools and minor equipment), as approved for use by the Engineer. The rate on self-owned equipment used for periods of under one week will be the Associated Equipment Distributor's published monthly rate divided by 22 days to establish a daily rate and divided again by eight hours to establish an hourly rate. Equipment used for periods of 5 days or more will be billed at a rate equal to 45% of the published monthly rate. In the alternative, the Engineer may approve for reimbursement a rate representing the allocable costs of ownership. Self-owned equipment is defined to include equipment rented from controlled or affiliated companies. Rented equipment will be paid for at the actual rental cost.
- 6. Gasoline, oil and grease required for operation and maintenance will be paid for at the actual cost. When, in the opinion of the Contractor, and as approved by the Engineer, suitable equipment is not available on the Site, the moving of said equipment to and from the Site will be paid for at actual cost.
- 7. When the material furnished under item (1) is used material, its value shall be pro-rated to the value of new material, but should be no more than its cost. When, in the opinion of the Engineer, the salvage value of salvageable material furnished under item (1) exceeds the cost of salvage, a suitable credit shall be given the Owner.
- G. Regardless of the method used to determine the value of any change, the Contractor will be required to submit evidence satisfactory to the Engineer to substantiate each and every item that constitutes their proposal of the value of the change. The amounts allowed for overhead and profit shall not exceed the applicable percentages as established in the two following paragraphs.
- H. If the work is done directly by the Contractor, overhead in an amount of 10% may be added if method B, C or D is used, and to the cost of the labor and materials plus overhead there may be added 10% for profit. The percentages for overhead and profit may vary according to the nature, extent and complexity of the work involved, but in no case shall exceed the percentages set forth in this paragraph and in the following paragraph. No percentages for overhead and profit will be allowed on payroll taxes or on the premium portion of overtime pay.
- I. If the work is done by a Subcontractor, Subcontractor's overhead in the amount of 5% may be added to cost of labor and materials if method B, C or D is used and to the cost of labor and materials plus overhead there may be added 10% for the Subcontractor's profit. To this amount there may be added 10% for the Contractor's combined overhead and profit. No percentage for overhead and profit will be allowed on payroll taxes or on the premium portion of overtime pay. However, to the extent that the aggregate dollar value of changes under a contract exceeds \$75,000, the 10% overhead applied to total costs of labor and materials incurred by the prime Contractor shall be reduced to 5%, and the combined

overhead and profit of 10% applied to sub-contract billings shall be reduced to 5%. In addition, on all individual Change Orders in excess of \$75,000, the overhead shall be no more than 5% of the total actual cost of labor and materials incurred by the prime Contractor, and the combined prime Contractor's overhead and profit allowance applied to Sub-contract billings shall be no more than 5%.

J. The Owner shall determine by which of the foregoing methods the value of any changes shall be computed.

00 07 57.04 CORRECTION OF WORK

- A. Any materials, plant or equipment delivered to the Site for use in the work which may be disapproved by the Engineer as unsuitable or not in keeping with the Specifications shall be immediately removed by the Contractor from the Site.
- B. If any portion of the work is damaged in any way, or if defects or faults develop before the Inspection at Substantial Completion and issuance of a Certificate of Substantial Completion, or before the expiration of the 12-month guarantee period, the Contractor shall repair, replace or otherwise make good the damage or defects to the satisfaction of the Engineer, regardless of whether the work may have previously passed the specified inspections and tests. No additional payment will be made for such remedial work.
- C. Failure on the part of the Engineer to condemn defective work shall not imply acceptance of the work, nor act to release the Contractor from their obligations to repair, replace or otherwise make good the work at their own expense, notwithstanding that such work may have been estimated for payment or that partial or full payments may have been made therefor.

00 07 57.05 EMERGENCY POWERS UNIMPAIRED

A. The provisions of this shall not detract from the authority of the Contractor or the Engineer to act in case of emergency, as provided elsewhere in the Contract Documents.

SECTION 00 07 58

ASSIGNMENT & SUBCONTRACTS

00 07 58.01 SUBCONTRACTS

- A. Should the Contractor desire to subcontract any portion of the work, they shall first submit to the Engineer a statement outlining the nature and amount of the work proposed to be subcontracted and the name of the person, firm or corporation they proposes as Subcontractor. If requested by the Engineer, the Contractor shall also provide a statement as to the proposed Subcontractor's experience, financial ability, insurance certificates, or other qualifications for the nature and scope of the work proposed to be undertaken.
- B. The proposed Subcontractor shall not enter upon the Site nor perform any work, either on or off the Site, until written approval of the Subcontractor has been granted by the Engineer and the Surety.
- C. Subcontracts shall in no way, directly or indirectly, release, compromise or modify the responsibility of the Contractor or the Surety for the satisfactory and full completion of the work. The Owner shall not be liable to any Subcontractor for any lien on structures to be constructed as part of the work or claim on moneys due the Contractor or any other lien, claim or damages whatsoever. The approval of the Engineer and the Surety of a Subcontractor shall in no way create a contractual obligation between the Owner and the Subcontractor.
- D. In the event a Subcontractor shall disregard the directions of the Engineer, or fail in any other way to abide by all conditions of the Contract, the Contractor shall, upon written order of the Engineer, require the Subcontractor to discontinue work under the Contract.
- E. The Contractor shall be responsible for the coordination of all of their Subcontractors engaged upon the work, both in connection with their own work and the work of other contractors, if any, working collaterally on the Project.
- F. The divisions or sections of the various Contract Documents and Bid Items are not intended to define portions of the work to be divided among Subcontractors, nor to influence the Contractor to award Subcontracts, nor to limit or enlarge the work performed by any trade, unless a Subcontractor experienced in providing a certain specialized type of work is specifically required in the Contract.

00 07 58.02 LIMIT OF SUBCONTRACTS VALUE

A. The Owner reserves the right to limit the total value of all Subcontracts to fifty (50) percent of the total Contract price.

00 07 58.03 ASSIGNMENT

- A. In accordance with the provisions of Section 109 of the General Municipal Law of the State of New York, the Contractor shall not assign, convey, transfer, sublet or otherwise dispose of this Contract, or of their right, title or interest therein, or their power to execute such Contract, to any other person or corporation without the prior written consent of the Owner.
- B. If the Contractor shall, without such consent of the Owner, assign, convey, transfer, sublet or otherwise dispose of this Contract to any other person or corporation, the Owner may revoke and annul the Contract, in which instance the Owner shall be relieved and discharged from any and all liability and obligations to the Contractor arising from the Contract, and to the persons or corporation to which the Contract shall have been assigned, conveyed, transferred, sublet or otherwise disposed of, and the Contractor and their assignees, conveyees, transferees or sublessees shall forfeit and lose all moneys theretofore earned under such Contract, except so much as they may be required to pay their employees.
- C. Nothing herein shall prevent an assignment by the Contractor for the benefit of their creditors made pursuant to the laws of the State of New York.

00 07 58.04 PAYMENT

A. Payment to Subcontractors and/or material suppliers shall be in accordance with Section 106b of the General Municipal Law of the State of New York.

SECTION 00 07 59

PAYMENTS

00 07 59.01 **ESTIMATED QUANTITIES**

The Contractor agrees that the estimated quantities given in the Bid are only for A. the purpose of comparing bids and that they are satisfied with and will at no time dispute the said estimates as a means of comparing the aforesaid bids, that they will make no claim for loss of profits or anticipated profits because of any difference between the said estimated quantities and the quantities of the various classes of work actually furnished or performed, that the Owner shall not be held responsible if any of the said estimated quantities should be found to not even approximate those actually measured during performance of the work, and that the Engineer may direct an increase, decrease or omission of the quantities of any class or part of the work as may be deemed necessary or desirable.

00 07 59.02 PRICES ALL-INCLUSIVE

A. The price or prices herein agreed to shall be for the work complete, and shall include the furnishings of all labor, tools, plant, equipment and materials therefor, whether required directly or indirectly, unless otherwise specified.

00 07 59.03 **LUMP SUM PRICES**

- A. A lump sum price stated in the Bid for an item shall be for the work complete as shown on the Plans and described in the Specifications for the corresponding item and shall include the cost of all labor, tools, plant, equipment and materials, specified or implied, incidental to the work of the item complete and ready for the service intended.
- Within three weeks after execution of the Contract, the Contractor shall submit to В. the Engineer for approval three copies of a detailed schedule showing the breakdown of all lump sum bid prices in the Contract. The schedule shall indicate the quantities and amount estimated for each part of the work. The schedule shall be apportioned by the Contractor for labor and for materials, if so requested by the Engineer. The Contractor shall revise the schedule until it is satisfactory to the Engineer. The approved breakdown will be used in the preparation of monthly estimates and payments to the Contractor.

8.20 **PAYMENTS**

00 07 59.04 UNIT PRICES

A. A unit price stated in the Bid for an item of the work specified to be measured for payment by units of volume, weight, area, length or number shall be paid for each unit of the net amount of the work of the item actually performed or furnished and incorporated in the finished work in accordance with the Specifications, Plans and as directed, as measured along the payment lines specified or shown, local custom to the contrary notwithstanding. It is agreed that the planimeter shall be considered an instrument of precision for the measurement on drawings and plans of areas in connection with the estimation of quantities in cases where geometric methods would be comparatively laborious.

00 07 59.05 MONTHLY ESTIMATES AND PAYMENTS

- A. Unless otherwise noted in the Additional Instructions or the Specifications once each month, on a day of the month selected by the Engineer, they will make an estimate of the value of the work done during the previous month, provided such value exceeds one thousand dollars. The Engineer shall submit this Monthly Estimate to the Owner for payment. The Owner will pay the Contractor each month, within 30 days of the date of the Monthly Estimate, a sum equal to ninety-five (95) percent of the Monthly Estimate, retaining five (5) percent of each estimate until the work or major portions thereof is substantially completed.
- B. The work will be considered Substantially Complete when the work of the Contract including all alterations or modifications (see Section 00 07 57 CHANGES IN THE WORK) is at least ninety-nine (99) percent complete and the estimated value of minor items to be completed is equal to or less than one (1) percent.
- C. The Engineer will include in the Monthly Estimates the delivered cost of equipment and non-perishable materials on site and off site which have been tested or inspected by the Engineer and approved by them for incorporation in the work. Only equipment and materials for which the Contractor furnishes the Engineer receipted invoices as evidence that they have unconditional title thereto will be included. Such invoices shall be furnished the Engineer at least ten days in advance of the established date of preparation of Monthly Estimates.
- D. The Contractor shall provide and maintain insurance for the said equipment and materials (on site and off site) as specified in 00 07 52.03.
- E. Payments made for materials and equipment delivered will in no way affect the Contractor's responsibilities regarding the same.

00 07 59.06 WITHDRAWAL OF RETAINED PERCENTAGE

A. Pursuant to Section 106 of New York State General Municipal Law and notwithstanding any inconsistent provisions of any general, special or local law under any contract made or awarded by any political subdivision, or any officer, board or agency thereof, or of any district therein, the Contractor may, from time to time, withdraw the whole or any portion of the amount retained from payments to the Contractor pursuant to the terms of the Contract, upon depositing with the Fiscal Officer of the Political Subdivision or district therein (1) bonds or notes of the United States of America, or obligations, the payment of which is guaranteed by the United States of America, or (2) bonds or notes of the State of New York, or (3) bonds of any political subdivision of the State of New York, of a market value equal to the amount withdrawn. The Fiscal Officer of the Political Subdivision or of a district therein, from time to time shall pay the same, when and as collected, to the Contractor who deposited such obligations. When the deposit is in the form of coupon bonds, the coupons shall be delivered to the Contractor as they respectively come due. The Contractor shall not be entitled to interest or income on, or the coupons of, any obligations so deposited by them, the proceeds of which shall have been used or applied by the Political Subdivision or district therein pursuant to the terms of the Contract. The Fiscal Officer shall be entitled to charge a reasonable fee for such service.

00 07 59.07 OWNER'S RIGHT TO WITHHOLD PAYMENTS

- The Owner may withhold from the Contractor such portions of any approved Α. payments due them as the Owner may judge necessary to:
 - 1. Protect the Owner from loss due to defective work not remedied;
 - 2. Failure to provide work schedule or revisions thereto;
 - 3. Assure the payment of just claims then due and unpaid for labor or materials:
 - Protect the Owner from loss due to injury to persons or damage to the 4. work or property of other Contractors, Subcontractors, or others caused by acts of neglect of the Contractor or their Subcontractors. The Owner shall have the right as agent for the Contractor to apply moneys so withheld as the Owner may deem proper to secure such protection or satisfy such claims, and such payments shall be deemed made for the account of the Contractor.

8.20 **PAYMENTS**

00 07 59.08 INSPECTION AT SUBSTANTIAL COMPLETION

- A. The Engineer will make an Inspection of the work as soon as possible after the Contractor gives written notice that the work is substantially complete. The Contractor shall assist the Engineer, as may be required, in making the Inspection. Cost to the Contractor, if any, to assist the Engineer in making the Inspection shall be included in the appropriate bid item as selected by the Contractor and no additional payment will be made to the Contractor for their work. After making the Inspection, the Engineer will notify the Contractor in writing of the results, including particulars regarding any part of the work which, in their opinion, is incomplete or requires correction or additional cleaning. The Contractor shall make good any incomplete or defective work before again asking for another Inspection. If in the opinion of the Engineer the work is substantially complete, the Engineer shall issue in writing a Notice of Substantial Completion. Said Notice will list those minor items requiring completion before Final Payment.
- B. See also ARTICLE 00 07 57.04, CORRECTION OF WORK.

00 07 59.09 CERTIFICATE OF SUBSTANTIAL COMPLETION

A. Upon issuance of the Notice of Substantial Completion by the Engineer, and the submission by the Contractor of a written statement from Surety that the Performance Bond (Labor & Materials Payment Bonds included) in the amount of one hundred (100) percent of the value of the Contract is in force for a period of one year following the date of Notice of Substantial Completion, the Engineer will file a Certificate of Substantial Completion with the Owner and the Contractor, certifying that the work is substantially complete and setting forth the amount of work performed and compensation earned by the Contractor. All prior estimates of the amount and value of work performed shall be subject to correction in this certification.

00 07 59.10 PAYMENT AT SUBSTANTIAL COMPLETION

A. Within 30 days after the filing of the Certificate of Substantial Completion the Owner will pay the Contractor one hundred (100) percent of the full value of the work certified therein, less twice the value of any minor work remaining to be completed and all prior payments and advances to or for the account of the Contractor, and the amount necessary to satisfy any claims, liens or judgements against the Contractor which have not been discharged.

00 07 59.11 FINAL PAYMENT

- The Contractor shall fully complete the remaining minor items within sixty (60) A. days of the issuance of the Notice of Substantial Completion.
- B. Upon certification by the Engineer that the remaining items of the Contract including all corrections, alterations and/or modifications have been completed and that no repairs, renewals or replacements are required of the Contractor, or that, if required, such remedies have been effected, the Engineer shall prepare a Final Payment request recommending to the Owner payment to the Contractor of the amount retained at the time of substantial completion less any amount necessary to satisfy any claims, liens or judgements against the Contractor which have not been discharged.
- C. Within 30 days after the receipt from the Contractor of acceptable affidavits, certificates or waivers as evidence that no right to any claim or lien exists, the Owner will pay the remainder of the Contract as indicated in the Final Payment.
- D. See also Article 00 01 50.06, VERIFICATION OF AMOUNTS DUE FOR WAGES AND SUPPLEMENTS.

00 07 59.12 ACCEPTANCE OF FINAL PAYMENT

Acceptance by the Contractor of the Final Payment shall serve as a release to the A. Owner of all claims and of all liability to the Contractor for all things done or furnished in connection with the work, and for any and all acts of neglect of the Owner or others relating to or because of the work, except the Contractor's claim for interest upon the Final Payment, if this payment is unduly delayed. No payment whatsoever shall operate to release the Contractor or the Surety from their obligations under the Contract or Bond.

00 07 59.13 **GUARANTEE INSPECTION**

A. On or about one year from and after the date of the Notice of Substantial Completion, the Engineer will again inspect the work. The Contractor shall assist the Engineer, as may be required, to make the one year inspection. Cost to the Contractor, if any, to assist the Engineer in making the one year inspection shall be included in the appropriate bid item as selected by the Contractor and no additional payment will be made to the Contractor for this work. The Contractor shall provide any and all repairs, renewals or replacements which may be revealed as necessary in this Guarantee Inspection and which, in the opinion of the Engineer, are the responsibility of the Contractor. Should the Contractor fail to comply with written instructions of the Engineer regarding these remedies, the Owner will cause the remedies to be made by others and will pay the cost which will be reimbursed by the Contractor and/or their Surety.

8.20 **PAYMENTS** B. The Contractor and their Surety agree that the Contractor's Performance Bond (Labor & Materials Payment Bonds included) shall cover fully all guarantees as specified herein and in ARTICLE 00 07 52.01.

00 07 59.14 ACCEPTANCE OF PORTIONS OF THE WORK

- A. The Owner reserves the right to accept for their service and use any portion of the work at any time during the life of the Contract without prejudice to the Owner in enforcing any provisions of the Contract.
- B. The Owner may accept the portion or portions of the work which is substantially complete under the following agreed procedures:
 - 1. The Contractor will be notified by the Engineer in advance as to what portion or portions of the work the Owner intends to accept for their use and service.
 - 2. The retained percentage for the Substantially Completed portion or portions of work shall be released in accordance with ARTICLE 00 07 59.09.
 - 3. The guarantee period applicable to that portion or portions of the work shall start from the date of acceptance.
 - 4. The remaining minor items of the portion or portions of substantially completed work shall be finished or corrected to the satisfaction of the Engineer.
 - 5. The Owner will assume responsibility for maintenance, heat, utilities and insurance on accepted portion or portions of the work.
 - 6. All applicable provisions specified in this Section for work deemed substantially complete shall apply.

00 07 59.15 REPAIR OR REPLACEMENT OF DAMAGED, DEFECTIVE OR FAULTY WORK

- A. If any portion of the work is damaged in any way, or if defects or faults develop before the inspection at Substantial Completion, or before the expiration of the 12-month guarantee period, the Contractor shall repair, replace or otherwise make good the damage or defect to the satisfaction of the Engineer, regardless of whether the work may have previously passed the specified inspections and tests. No additional payment will be made for such remedial work.
- B. Failure on the part of the Engineer to condemn defective work shall not imply acceptance of the work, nor act to release the Contractor from their obligations to repair, replace or otherwise make good the work at their own expense,

notwithstanding that such work may have been estimated for payment or that partial or full payments may have been made therefor.

PAYMENT TO SUBCONTRACTORS BY CONTRACTOR 00 07 59.16

- Within fifteen calendar days of the receipt of the payment from the Owner, the Α. Contractor shall pay the Subcontractors, and/or material suppliers a sum equal to the value of the work performed less any amount necessary to satisfy claims, liens or judgements that have been discharged less any amount retained as hereafter described.
 - 1. The retained amount shall not exceed more than 5% on each payment except that 10% of each payment may be retained, if the Subcontractor(s) and/or material suppliers failed to provide a Performance Bond (Labor & Materials Payment Bonds included) in the full amount of the Sub-contract.
 - 2. The Contractor shall not retain any money from Subcontractor(s) and/or material suppliers, after receipt of the Certificate of Substantial Completion payment.
- B. Within fifteen calendar days of the receipt of the payment from the Contractor, the Subcontractor(s) and/or material suppliers shall pay each of their Subcontractors and/or material suppliers in same manner as the Contractor has paid the Subcontractor(s) and/or material suppliers.
- C. The Owner shall not be under any obligation to see that the Contractor makes any payment to a Subcontractor and/or material suppliers.

END OF SECTION

8.20 **PAYMENTS**

SECTION 00 07 60

CONTRACT TERMINATION

00 07 60.01 OWNER'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

- A. The Owner, by seven days written notice to the Contractor and without prejudice to any other rights or remedies it may have, may terminate the employment of the Contractor and their right to proceed, either as to the entire work or any portion thereof on which delay shall have occurred, and may take possession of and complete the work by contract or otherwise, as the Owner may deem expedient, in the event of any of the following:
 - 1. If the Contractor shall refuse or fail, after being warned by the Engineer, to supply enough competent workmen, equipment or proper materials, or
 - 2. If the Contractor shall refuse or fail to perform the work or any part thereof with sufficient diligence to insure its completion within the time specified, or shall fail to complete the work within said period, or
 - 3. If the Contractor shall fail to promptly pay persons supplying labor or materials for the work, or
 - 4. If the Contractor shall fail or refuse to regard laws, ordinances, permits or orders from the Engineer or otherwise substantially violate any provision of this Contract, or
 - 5. If the Contractor shall be adjudged bankrupt or make an assignment for the benefit of creditors, or
 - 6. If a receiver or liquidator shall be appointed for the Contractor or for any of their property and shall not be dismissed within 20 days after such appointment, or the proceedings in connection therewith shall not be stayed on appeal within the said 20 days.
- B. If the Owner so terminates or stops the Contractor, the Contractor shall not be entitled to receive any further payment until the work is completed. If the unpaid balance of moneys to be paid the Contractor hereunder shall exceed the cost of completing the work, including the cost of additional administrative, managerial, engineering, and inspection services and or delay, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor and the Surety shall be liable to the Owner for the excess.
- C. If the right of the Contractor to proceed is terminated as provided herein, the Owner may take possession of and use in completing the work such materials,

plant, equipment, supplies and appliances as may be on the Site and necessary to the work, provided that the termination was not made pursuant to paragraphs "E" or "F" above.

00 07 60.02 CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

A. In the event the work shall be halted by order of a Court or any other public authority having jurisdiction for a period of 90 days or more without act or fault of the Contractor or any Subcontractor, the Contractor, upon 10 days written notice to the Owner, may terminate the Contract or discontinue performance of the work. In either case the liability of the Owner to the Contractor shall be determined as provided in ARTICLE 00 07 60.01, except that the Contractor shall not be obligated to pay to the Owner any excess of the cost of completing the work over the unpaid balance of the payments to be made to the Contractor hereunder.

00 07 60.03 OTHER TERMINATION PROVISIONS

A. In addition to the provisions set forth in this Section 00 07 60, specific references relating to termination or cancellation of the Contract are contained elsewhere herein. These include but are not limited to:

00 01 50.03	NON-DISCRIMINATION AND LABOR PRACTICES
00 07 52.03.A	WORKER'S COMPENSATION INSURANCE
00 07 56.03	PROGRESS
00 07 58.03	ASSIGNMENT

SECTION 00 07 61

DESCRIPTION & DELINEATION OF THE WORK

00 07 61.01 INTENT OF PLANS AND SPECIFICATIONS

- A. The intent of the Plans, Specifications and other Contract Documents is to provide for the work outlined and delineated therein, complete in every detail for the purpose designated. The Contractor agrees to furnish everything necessary for the work as intended, any omission in the Plans or Specifications notwithstanding.
- B. The Contractor shall furnish all materials, tools, plant equipment and labor, except those specifically set forth herein as to be furnished by the Owner, required to construct and place in complete and satisfactory working order the work contemplated by the Contract Documents. The mention in any part of the Specifications of any specific liability, duty or responsibility of the Contractor will not be construed as a restriction, limitation or waiver of any general liability, duty or responsibility of the Contractor, such mention being merely for explanatory purposes. The Contractor shall be solely responsible for the adequacy of their plant, tools and equipment, approval of the Engineer notwithstanding.
- C. The Contractor shall do the work in a manner judged to best promote rapid construction consistent with due regard for the safety of life and the preservation of property, the satisfaction of the Engineer, and the intent of the Contract Documents.

D. The Contractor shall:

- 1. make all necessary excavations or embankments.
- 2. do all clearing and grubbing.
- 3. place all sheeting, shoring, bracing and supports.
- 4. furnish all underdrains.
- 5. provide draining, pumping bailing, ditching and diking for surface or below ground water.
- 6. provide all things necessary to protect, support and maintain structures, utilities, drains, conduits, culverts, trees, fences, poles, walls, earth banks, shrubbery, sidewalks, railways, roadways and drives.
- 7. repair all damage done to items in (6) above.
- 8. do all fencing, lighting and watching.
- 9. drive all piles and construct all foundations.
- 10. construct all concrete, brick, stone, tile and timber work.
- 11. place all iron and steel work and reinforcement.

- 12. lay all water pipes, sewers, drains and conduits and make all connections to or between such.
- 13. resurface and repave all streets, sidewalks, roads or drives open cut or damaged.
- 14. refill all trenches and excavations.
- 15. provide all fences, bridges, fills, detours and signs for maintenance of travel in public ways.
- 16. make all connections to or between existing structures and utilities.
- 17. construct all buildings and structures.
- 18. furnish and install equipment.
- 19. clean up and dispose of all rubbish and surplus materials.

00 07 61.02 INTERPRETATION OF PLANS & SPECIFICATIONS

A. The Engineer shall interpret the Plans and Specifications, and any Change Orders or Supplemental Agreements. Anything shown on the Plans but not included in the Specifications, or mentioned in the Specifications but not shown on the Plans, shall have the same effect as if set forth in both. In the event of a conflict between the Plans and Specifications, the Specifications shall govern. The attention of the Engineer shall be called to any discrepancies, as required by ARTICLE 00 13 40.06.

00 07 61.03 CONTRACT DRAWINGS

- A. The location, nature and many details of the work are shown on the Contract Drawings. The work shall be constructed as shown on these Plans and such other drawings as may be issued during the life of the Contract by the Engineer, or furnished by the Contractor and approved by the Engineer.
- B. The purpose of the Contract Drawings together with other Contract Documents, is to provide Bidders with sufficient information to prepare adequate and equitable Bids and to provide an adequate and equitable basis for the Agreement. The Contract Drawings may or may not provide sufficient detail for the actual construction of all segments of the work as shown and specified. The Contractor shall furnish Construction Drawings or other drawings, as specified or requested, or, as may be required to adequately delineate for their workers all details necessary for the work.
- C. The Contract Drawings were prepared on full-size prints. Reduced-size prints may have been prepared for the convenience of Bidders and others. During construction, the Contractor shall obtain data and information from full-size prints in preference to reduced-size prints.
- D. Unless otherwise stated in the Information For Bidders, the Contractor will be furnished, free of charge, three copies of the Contract Documents, including three sets of Contract Drawings. Any other copies of the Contract Documents which

- the Contractor may desire can be obtained by their from the Engineer at the cost of duplication thereof.
- E. The Contractor shall keep at least one set of Specifications and one full-size set of Plans on the Site, and shall at all times give the Engineer and the Owner access thereto.

00 07 61.04 ADDITIONAL OR SUPPLEMENTAL DRAWINGS

- A. The Engineer may prepare Additional Drawings or Supplemental Drawings during the course of the work, in connection with minor changes, Change Orders, Supplemental Agreements, or to augment or amplify the Contract Drawings or other drawings, or as part of orders or instructions, and the Contractor shall abide by such drawings in the same manner as specified for the Contract Drawings.
- B. Drawings required by the Contractor are discussed in Article 00 13 40.01.

SECTION 00 10 12

COLLATERAL WORK

00 10 12.01 COLLATERAL WORK

- A. The Owner may award other contracts in connection with the Project, the work under which may proceed concurrently with the work of this Contract. In this event the Contractor shall coordinate their operations with those of the other contractors, and shall cooperate with them in the arrangement for the storage of materials and performance of the work.
- B. The Contractor and their Subcontractors shall keep themselves informed of the progress of the work of other contractors and subcontractors and shall notify the Engineer immediately of defective workmanship or insufficient progress on the part of others, where such will interfere with their own operations. Either failure of the Contractor to keep themselves informed of the progress of work under other contracts on the Site, or failure of the Contractor to give proper notice of same, shall be deemed as acceptance by them of the status of the work under other contracts as it may affect their own work.
- C. See also ARTICLE 00 07 56.04, APPROVED WORK SCHEDULES, and ARTICLE 00 07 56.06, TIME EXTENSIONS.

SECTION 00 10 15

CONTRACTOR USE OF PREMISES

00 10 15.01 AREA AVAILABLE FOR CONTRACTOR'S USE

- A. The Contractor shall confine their operations to those portions of the Owner's property, and to the right-of-ways or easements, temporary or permanent, acquired or designated for the work of the Contract as shown on the Drawings. Private property adjacent the Site shall not be entered upon or used by the Contractor for any purpose without the written consent of the Owner thereof. A copy of such consent shall be filed with the Engineer.
- B. When required, the Contractor shall provide and maintain fences at their own expense, along the roadways and around the grounds occupied by them for the protection of adjoining property and all persons lawfully using same. Fences shall be of materials and construction suitable in the opinion of the Engineer for their intended purpose.
- C. All work within or abutting private property shall be performed in such ways as to create the minimum of inconvenience and disturbance to the private property and its users. Excavated materials or supplies of any kind shall not be stored on off-site public or private property without written consent of the Owner thereof, and all walks and drives shall be kept open to uninterrupted passage. A copy of each such written consent shall be filed with the Engineer.
- D. Materials delivered upon public streets shall be neatly stored between the sidewalk and the curb or ditch line, and at least 10 feet from any fire hydrant. A passageway of at least three feet shall be preserved on the sidewalk line.

00 10 15.02 TRAVEL NOT OBSTRUCTED

- A. The Contractor shall not needlessly hinder or inconvenience travel on any public or private way, nor shall they wholly obstruct same without written permission of the Owner. If they are permitted to obstruct a traveled way, the Contractor shall provide plain and appropriately worded signs and adequate barricades and lighting at the nearest cross streets, and at each end of the obstructed portion, announcing such obstruction and directing traffic to and along an approved detour.
- B. Unless otherwise specified or permitted, all entrances and exits of fire houses, industrial plants, commercial buildings and public buildings shall be kept open and maintained in passable condition at all times. The Contractor shall give notice to the owner of each traveled way before interfering therewith.

00 10 15.03 CLEANING UP

- A. The Contractor shall remove from the Site and dispose of, at their own expense, all rubbish, refuse and unused materials, as the work progresses. If such work is neglected, the Engineer will give written notice thereof to the Contractor. If the work is not performed within five days thereafter, the Owner will employ other persons to do such work, and the expense thereof shall be deducted from any monies due or to become due the Contractor.
- B. The Contractor shall clean and leave free from obstruction all pipes, buildings, manholes and other structures. This work shall be coordinated with the Engineer's Inspection at Substantial Completion, or as directed. All rubbish, refuse, unused materials, plant and equipment shall be removed from the Site, and the entire Site shall be left in a neat condition. All equipment installed in the work by the Contractor shall be cleaned and left in a bright and new-appearing condition.

SECTION 00 10 19

SITE CONDITIONS

00 10 19.01 PRE-BID INSPECTION & EXAMINATION

- A. The Contractor warrants and represents that they visited the Site prior to submitting their Bid, and that they have satisfied themselves as to the location and nature of the work and the quantity, quality, type and nature of both surface and subsurface structures and materials apt to be encountered.
- B. See also 00 07 53.01.B.

00 10 19.02 BORINGS

- A. Any data on subsurface conditions that may have been obtained by the Owner prior to the advertisement for bids, through test borings, test pits, seismic explorations, or other means, was obtained by the Owner for their sole use and only for their own purposes. Any such data, known or recalled as of the date of advertisement for bids, are shown on separate drawings or in separate schedules and reports which are <u>not</u> any part of the Contract Documents. All such data are made available to Bidders, the Contractor and other interested parties only as a convenience and without express or implied representation, assurance or guarantee that any of the information is complete, correct, or adequate or representative of a true or typical picture of subsurface conditions on the Site.
- B. The Contractor, both during their status as Bidder and after execution of the Contract, shall satisfy themselves as to the nature, character, quality and quantity of above ground and below ground conditions apt to be encountered. Any reliance on data made available by the Owner shall be at the Contractor's sole risk.
- C. No claim whatsoever shall be made by the Contractor against the Owner or Engineer for or on account of such data available, or neglected to be made available, by the Owner or Engineer.
- D. The Contractor at any time, and any holder of Contract Documents during the period between advertisement for and receipt of bids, will be permitted to make test borings, test pits, soundings or similar subsurface investigations on the Site. Prior to making these investigations the Contractor and/or any holder of Contract Documents must notify the Engineer when and where they propose to make such investigations.

- E. The locations where test boring samples, if any, may be examined are given in the Additional Instructions.
- F. See also ARTICLES 00 07 53.01.B, 00 07 53.07, 00 07 59.01, 00 10 19.04 and 00 10 19.06.

00 10 19.03 PROTECTION OF EXISTING STRUCTURES

- A. The Contractor shall at all times have on the Site suitable and sufficient plant and materials to adequately protect, support and sustain any and all existing structures and facilities, whether above or below ground, and shall use same as may be necessary or required to protect, support and sustain any and all such structures as may become weakened, endangered, undermined or uncovered.
- B. They shall, at their own expense, support and sustain in their places and protect from direct or indirect damage all water, gas, steam, air or other mains or pipes, sanitary and storm water sewers and drains, conduits, subways, service connections, buildings, poles, wires, fences, pavements, sidewalks, curbs, railways, trees and other structures and property and appurtenances thereto on or in the vicinity of the Site, and shall assume all liability for damage thereto, including damage arising out of settlement or lateral movement of walls of excavations, whether occurring during performance of the work or the 12-month period of guarantee.
- C. In the event of damage or danger to any such structure or facility the Contractor shall immediately notify the Engineer, and shall promptly repair or protect the structure as the Engineer may direct.

00 10 19.04 EXISTING STRUCTURES BELOW GROUND

A. The Contract Drawings show the location and character of certain existing subsurface structures and facilities apt to be encountered in excavations or located in such proximity to the work as to require precautions for their protection. The sizes, materials, locations and depths shown are only approximate, and the Contractor shall satisfy themselves as to the accuracy and completeness of such information. The Contractor shall not be relieved from any of their obligations, nor be entitled to claim for damages or additional compensation, sustained or arising out of inadequacy or inaccuracy of the information given.

00 10 19.05 ABANDONED STRUCTURES

A. Any structures, facilities or appurtenances therefor which are abandoned or become so by reason of the work, shall, at the Contractor's expense, be broken up and filled with approved material, if directed by the Engineer.

00 10 19.06 LATENT SUB-SURFACE CONDITIONS

A. In the event that latent sub-surface conditions are found to materially differ from those on which the Plans and Specifications are based, the Contractor shall immediately notify the Engineer before they are disturbed. After prompt investigation, the Engineer will determine what changes, if any, should be made in the Plans and Specifications because of the revealed conditions, and shall instruct the Contractor accordingly. Any change in the cost of the work resulting therefrom shall be adjusted as provided in Section 00 07 57.

00 10 19.07 ADJUSTMENT OR CHANGES OF EXISTING STRUCTURES

- A. If, in the opinion of the Engineer, an underground pipe or other structure requires realignment or relocation, and such realignment or relocation was not included in the Plans or Specifications, the Engineer will issue a Change Order for such work, and the Contractor shall be compensated therefor as provided in Section 00 07 57. The Contractor shall strip or uncover and support or sustain the structure at their own expense prior to such Change Order, as part of their work under the original Contract, and they shall not be entitled to claim for damage or delay due to its presence or discovery.
- B. Wherever existing utilities come within limits of the work, the Contractor shall notify both the Engineer and the Utility before in any way disturbing same. Any work of realignment, relocation, removal or extension of the utilities shall be done as mutually agreed by the Utility, the Contractor and the Engineer. The Contractor shall maintain satisfactory drainage of the excavation at all times from revelation of the structure until completion of its realignment or readjustment. Interruption of service by utilities shall be kept to a minimum.
- C. The Contractor shall not cause nor permit interference with or hindrance to any municipal department, individual, public service corporation, or other company in protecting its structures and facilities, nor in removing, replacing or relocating same.

00 10 19.08 MAINTENANCE AND RESTORATION OF SERVICE

- A. The Contractor shall, at their own expense, provide for the maintenance of flow in all water courses and all sanitary and storm sewers, drains, connections and appurtenances thereto. The contents of sewers, drains or service connections shall not be permitted to flow into excavations, sewers or other parts of the work without written permission of the Engineer, and the Contractor shall, at their own expense, immediately remove from the Site and adequately dispose of all offensive matter, in an approved manner.
- B. The flow of water, and normal water pressure, in all water mains, conduits and service connections encountered on the Site, shall be provided for and maintained by the Contractor at their own expense. When water mains or service connections

must be disturbed to the extent that service must be shut off, the Contractor shall give at least 24 hours notice to the Utility and all customers served by the lines involved. Such notice shall give the estimated times of shut-off, and restoration of service. If fire hydrants are involved, the fire department serving the area shall be similarly notified.

- C. In the event of accidental disruption of water service, it shall be deemed an emergency, and the Contractor shall proceed with the necessary repairs immediately and continuously, giving this work priority over all other operations, until service has been satisfactorily restored. The Contractor shall give immediate notice of such break or service interruption to the Engineer, the Utility, and all customers affected, and shall supply, at their own expense, assistance in supplying an emergency source of water when necessary by means of temporary lines, tank trucks, or other means. All lines and connections shall be restored to the satisfaction of the Engineer and the Utility.
- D. All portions of the foregoing provisions regarding water service which are applicable to sewer, gas, telephone or other services shall apply also to maintenance and emergency repair of such services.

00 10 19.09 POLES & POSTS ON-SITE

- A. Poles or posts of any Utility located within the lines of the work which, in the opinion of the Engineer, will impede progress of the work, shall be supported or removed and replaced by the Contractor at their own expense and in accordance with the requirements of the Utility involved. The Contractor shall remove, relocate, replace or support all other poles and posts at their own expense and to the satisfaction of the Engineer.
- B. The Contractor shall employ no equipment which will unduly interfere with wires or other overhead facilities.

00 10 19.10 NOTIFICATION OF OTHER PARTIES

A. In addition to notices to Utilities and others required elsewhere herein, the Contractor shall give written notice of their proposed construction operations to the owners of all public and private utilities at least seven days in advance of breaking ground in any area in which a utility is located. Copies of each such notice shall be simultaneously sent to the Engineer.

SECTION 00 10 51

LAYOUT OF WORK

00 10 51.01 INFORMATION PROVIDED BY ENGINEER

A. The Engineer will provide, on the Contract Drawings, sufficient information for the Contractor to establish baselines, offsets and other survey control points.

Unless otherwise noted, no additional survey work will be provided by the Engineer.

00 10 51.02 SERVICES PROVIDED BY CONTRACTOR

- A. Unless otherwise noted in the Additional Instructions or Specification, the Contractor will establish such additional lines, grades and elevations as they deem necessary and will include the following:
 - 1. Structures & Buildings: Corner stakes at all principal corners of exterior walls or foundations. Two bench marks in the vicinity of the structure or building.
 - 2. Sewers: Offset grade line stakes, on one side, with stations approximately forty linear feet on centers.
 - 3. Water Mains & Force Mains: When laid to grade, the same as for sewers. When not laid to grade, none.
 - 4. Roads & Runways: Offset center line grade stakes, on one side, with stations approximately fifty linear feet on centers.
 - 5. Embankments: Slope stakes on both sides at approximately one hundred linear feet on centers, with additional stakes at principal breaks in grade.
 - 6. Tunnels & Borings: Center line and offset baseline on the surface, on starting end. Also, one progress check every fifty linear feet of long tunnels.
 - 7. Other Types of Construction: The Contractor will provide control stakes as they deem necessary to properly layout their work.
 - 8. On Traverse or Cross-country type of construction, such as pipelines and roads, a temporary center line may be required for clearing purposes.

- 9. The Contractor will issue a grade letter for pipeline and road construction which is to be laid or installed to a predetermined grade. All other stakes will have the information marked on a witness stake beside the hub.
- B. The Contractor shall provide all the necessary materials for control points, including all: stakes, hubs, lath, grade boards, cleats, nails and such other materials as may be required.
- C. The Contractor shall also provide such non-technical assistance as may be required in the establishment of marks, other than primary or basic controls, such as clearing sight lines and driving stakes.
- D. The Contractor shall erect and establish all grade boards, batter boards and construction control lines from the information provided by the Engineer.
- E. The Contractor shall layout the work to best suit their methods of operations, using the Engineer's information provided to assure the construction will be in the position the design anticipated.

00 10 51.03 OBLIGATIONS OF THE CONTRACTOR

- A. The Contractor shall carefully preserve and protect all stakes, marks, monuments and points provided or described by the Engineer, and shall reimburse the Owner for any and all additional engineering costs incurred because of the replacement or reestablishment of any such items which may be moved, removed, obliterated or destroyed due to their construction operations. When directed, the Contractor shall provide suitable barricades for the protection of points.
- B. The Contractor shall bear the entire cost of rectifying work improperly done due to their own negligence in preserving and protecting marks, or to moving or removing same without approval of the Engineer.
- C. They shall inform the Engineer a reasonable time in advance of their operations of the times and places they propose to work, so that lines, grades and elevations may be established and necessary measurements for record and payment may be made with the minimum of inconvenience or delay to either themselves or the Engineer. No additional compensation will be paid the Contractor for any delay caused by insufficient notice.

00 10 51.04 LINES, GRADES AND ELEVATIONS

A. The terms "invert" or "grade" used in the Contract Documents in connection with pipes, sewers, channels, flumes and similar structures shall mean the inside bottom of the pipe or other surface on which the liquid flows along the center line of the completed work. "Subgrade" refers to the bottom line or surface to which excavations are necessarily made to construct the work as shown or specified,

- exclusive of any additional depth of excavation required for any special foundation.
- B. The term "Grade Letter" shall mean a data sheet giving the amount of cut or fill from offset stakes to the invert or grade.
- C. All work shall be constructed in accordance with the lines and grades shown, specified or directed. The Contractor shall be responsible for maintaining alignment and grade between points provided or described on the Contract Drawings.

00 10 51.05 MASONRY CHASES, OPENINGS AND INSERTS

- A. If the Owner awards other contracts for collateral work on the Site, it shall be the obligation and responsibility of the General Contractor to provide all openings and chases in their work to fit both their own work and that of the other contractors. The General Contractor shall provide all openings shown on the Contract Drawings, or reasonably implied thereby, as confirmed or modified by Additional Drawings or drawings submitted by Contractors and approved by the Engineer.
- B. Where pipes or conduits pass through slabs or walls, the sleeves or opening forms shall be provided by the installer of the pipes or conduits but shall be placed by the General Contractor.
- C. If hanger inserts or similar items are required, they shall be furnished by the installer of the pipe or other equipment for which the hangers are intended, but shall be placed by the General Contractor.
- D. Any expense resulting from mislocated, defective, or ill-timed work shall be borne by the Contractor responsible therefor. No Contractor shall alter the work of another Contractor without the consent of the Engineer and knowledge of the Contractor involved, and no Contractor shall endanger any work by cutting, excavating or other operations.

00 10 51.06 PAYMENT FOR LAYOUT OF WORK

A. The cost to the Contractor of providing the services and materials specified in this Section 00 10 51 shall be included in the price, or total of prices, given in the Bid on which the Agreement is based, and no separate payment will be made therefor. Any cost to the Owner for additional engineering layout work, as set forth in ARTICLE 00 10 51.03, will be deducted from monies due or to become due the Contractor.

SECTION 00 10 64

SAFETY AND HEALTH

00 10 64.01 SAFETY AND HEALTH REGULATIONS

- A. The Contractor shall comply with the U.S. Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596) and under Section 107 of the Contract Work Hours and Safety Standard Act (PL 91-54), latest revisions.
- B. In order to protect the general public and the lives and health of their employees under the Contract, the Contractor shall comply with all pertinent provisions of the latest issues of the Federal Register, Bureau of Labor Standards, Safety and Health Regulations; New York State Industrial Code Rule 30 pertaining to Tunneling Operations; New York State Industrial Code Rule 23 pertaining to Trenching Operations; and the "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Inc., and shall maintain an accurate record of all cases of death, occupational disease, and injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under this Contract. In case of a conflict between the above noted authorities, the most stringent shall prevail.
- C. The Contractor shall have on the project site at all times, while work is in progress, at least one person skilled in safety and health procedures and familiar with State and Federal safety and health regulations whose responsibility shall be to observe methods and procedures. They shall have the duty and authority to stop and/or correct all unsafe and unhealthy conditions.

00 10 64.02 SAFETY AND FIRST AID

- A. The Contractor shall at all times exercise caution in their operations and shall be responsible for the safety and protection of all persons on or about the Site. All hazards shall be avoided or guarded in accordance with the provisions of the Manual of Accident Prevention in Construction of the AGCA, unless such provisions contravene local law. The safety provisions of all applicable laws, codes and ordinances shall be observed.
- B. The Contractor shall provide and maintain at the Site, at each location where work is in progress, as part of their plant, an approved first aid kit. Ready access thereto shall be provided at all times when workers are employed on the work.

C. The Contractor shall take due precautions against infectious diseases, and shall arrange for the immediate isolation and removal from the Site of any employee who becomes ill or is injured while engaged on the work.

00 10 64.03 DUST HAZARDS

- A. If, in the construction of the work covered by the Contract, a harmful dust hazard is created for which appliances or methods for the elimination of dust have been approved by the Board of Standards and Appeals, such appliances or methods shall be installed and maintained and effectively operated by the Contractor at their expense.
- B. The Contract shall be void and of no effect unless the Contractor complies with the provisions of this subdivision of the Contract and Labor Law Section 222-a.

SECTION 00 13 40

SUBMITTALS

00 13 40.01 DRAWINGS FURNISHED BY THE CONTRACTOR

- A. The Contractor shall prepare, or cause to be prepared by their suppliers or Subcontractors, and submit to the Engineer for review, Shop Drawings, Setting Drawings, Working Drawings and Construction Drawings as may be specified or directed or necessary to the performance of the work. Deviations from the drawings and specifications shall be called to the attention of the Engineer at the time of the first submission of Shop Drawings, or other drawings, for consideration. Corrections or comments made on the Shop Drawings or other drawings during review do not relieve the Contractor from compliance with the requirements of the Contract Drawings and Specifications. Approval is only for general conformance with the design concept of the Project and with information set forth in the Contract Drawings and Specifications. Contractor is responsible for dimensions to be confirmed and correlated at the job site, information that pertains solely to the fabrication process or to the means and methods of construction, coordination with the work of all trades, and performing all work in a safe and satisfactory manner. Approval does not modify Contractor's duty to comply with the Contract Documents.
- B. Within thirty days of the execution of the Agreement, the Contractor shall submit a schedule of submittals which includes a complete list of products proposed for the work tabulated by Specification Section, including manufacturer or fabricator, model number or other identifying designation.
- C. Shop, Setting or Working Drawings shall be submitted for each type and model of fabricated materials and equipment. They shall provide complete and accurate working dimensions, weights, assembly and sectional views, details necessary to coordinating the work, anchor bolt and installation plans and instructions, parts lists and descriptions, materials and finishes lists, lists of any tools and spare parts required, diagrams of control wiring and piping, the location, sizes and types of connections to other work or other items, and any other data required to comply with the Contract or provide the workmen and the Engineer with information necessary to complete and inspect the work.
- D. Electrical equipment drawings and data shall show physical dimensions, installation details, elementary and connection diagrams for each motor controller, interconnection diagrams for all equipment, identification of components external to electrical equipment, the coordination of control circuits, and definition of the contract arrangement and control action of the primary and final control elements.

8.20 SUBMITTALS

- E. If the Contractor proposes to furnish and install equipment requiring a layout or arrangement materially changed from that shown on the Contract Drawings as illustrative of one acceptable arrangement, they shall submit, for review, drawings showing the proposed arrangement and the appertaining changes to wiring, piping, structures and other equipment.
- F. Submittals such as pre-printed manufacturers' installation instructions, maintenance data, parts lists, test results, or similar informational material are not considered Shop Drawings and will not be reviewed. Any submittal not required or otherwise requested will be returned to the Contractor.
- G. See also ARTICLE 00 13 40.08, ADDITIONAL ENGINEERING COSTS.

00 13 40.02 TRANSMITTAL, IDENTIFICATION AND RESUBMITTAL

- A. Unless otherwise approved, all Shop Drawings shall be submitted electronically. The Contractor shall accompany all drawings and other data submitted to the Engineer with a letter of transmittal to the attention of the designated Shop Drawing coordinator for the project.
- B. All drawings shall be suitably identified with the name of the Project, Contract Number, Contractor name, name of the equipment or materials manufacturer, specification section designation and item number (if applicable) date, and initials indicating approval of such submittal by the Contractor under the applicable specification.
- C. If the Engineer makes comments or corrections, they will be noted on the drawings, or explained in a letter of transmittal, or both. The Contractor shall make any requested revisions or additions and resubmit the drawings in the same manner as for the initial submittal.
- D. After the Engineer completes its review, the submittal will be marked with one of the following dispositions:
 - 1. Approved
 - 2. Approved as Noted
 - 3. No Action Required
 - 4. Revise and Resubmit
 - 5. Not Approved
- E. Submittals marked "Approved": Submittals that conform to the Contract Documents without comment will be issued a disposition of "Approved". The Contractor may order, fabricate, or ship the materials included in the submittal.
- F. Submittals marked "Approved As Noted": Submittals that conform to the Contract Documents with correction of minor clarifications or omissions will be issued a disposition of "Approved As Noted". The Contractor may order,

- fabricate, or ship the materials included in the submittal that incorporates the Engineer's comments.
- G. Submittals marked "No Action Required": Informational submittals will be issued a disposition of "No Action Required", acknowledging to the Contractor the Engineer's receipt of the submittal.
- H. Submittals marked "Revise and Resubmit": Submittals that include a named manufacturer or supplier, but contain insufficient information to determine conformance to the Contract Documents will be issued a disposition of "Revise and Resubmit". The Contractor shall make corrections to satisfy the deficiencies indicated and repeat the submittal procedure. The resubmittal shall conform to the submittal numbering procedure specified herein.
- I. Submittals marked "Not Approved": Submittals that do not conform to the Contract Documents will be issued a disposition of "Not Approved". The Contractor shall revise the submittal to incorporated equipment or products that comply with the requirements of the Contract Documents.
- J. Upon return of a submittal marked "Approved" or "Approved as Noted", the Contractor may order, ship or fabricate the materials so noted. A submittal marked "Approved as Noted" should not be resubmitted for further review. Submittals marked "Revise as Noted Resubmit" include extensive corrections or corrections of major importance affecting other items and require the submittal to be amended and resubmitted for a final review. Submittals marked "Rejected Resubmit as Specified" are reserved for materials or equipment which are unacceptable. The Contractor shall resubmit for materials or equipment which are acceptable and in accordance with the Specifications.
- K. More than one resubmittal per material or equipment will be considered an additional cost to the Engineer which shall be reimbursed by the Contractor. Refer to Article 00 13 40.08 for method of reimbursement.

00 13 40.03 DELAY THROUGH TARDY SUBMITTAL

- A. All submittals shall be made on such a schedule and at such time as to permit adequate review. The Contractor shall make due allowance for possible revisions and resubmittals. Delays caused by tardy submittal of drawings or data for review shall be the responsibility of the Contractor. No work covered by submitted drawings, or drawings specified to be submitted, shall be performed until such drawings and data have been reviewed.
- B. See also ARTICLE 00 07 56.04, APPROVED WORK SCHEDULES.

8.20 SUBMITTALS

00 13 40.04 CONTRACTOR RESPONSIBLE FOR ACCURACY

- A. The Contractor shall be responsible for the accuracy and completeness of the drawings and other data they submit, for their conformity to the Plans and Specifications, and for the proper fit and clearance of all construction work.
- B. The Owner retains for the Engineer the option to refuse to review submitted data that are improperly identified or incomplete or which have not been checked by the Contractor for compliance with the Contract Documents.

00 13 40.05 ADDITIONAL INSTRUCTIONS

- A. The Engineer may from time-to-time issue additional instructions to the Contractor as may be necessary to amplify, augment, modify or clarify the Contract Documents. These may be in the form of drawings, specifications, interpretations, orders and instructions, and may be in connection with or made a part of a Supplemental Agreement, Change Order, or Minor Change.
- B. See also SECTION 00 07 57, CHANGES IN THE WORK.

00 13 40.06 DRAWINGS TO BE CHECKED BY CONTRACTOR

A. The Contractor shall check all dimensions, quantities and representations in the Specifications, Contract Drawings, Additional Drawings and all Supplemental Agreements, Change Orders and Instructions, and shall immediately notify the Engineer of any and all errors, omissions, or discrepancies therein which they may find. The Contractor will not be permitted to take advantage of any such error, omission or discrepancy in any Contract Document or subsequent document, as full instructions will be provided by the Engineer in such case.

00 13 40.07 SUBSTITUTES AND "OR-EQUAL" ITEMS

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item, the Specification or description is intended to establish the type, function and quality required. Unless the Specification or description contains or is followed by words reading that no like, equivalent or "or-equal" item or no substitution is permitted, other items of material or equipment may be accepted by the Engineer under the following circumstances:
 - 1. "Or-Equal": If in Engineer's sole discretion an item of material or equipment proposed by Contractor is of similar quality and functionally equal to that named and sufficiently similar so that no change in related work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for acceptance of proposed equal items.

Substitute Items: If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, it will be considered a proposed substitute item. Contractor shall submit sufficient information as provided below in advance to provide adequate time to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. The procedure for review by the Engineer will include the following or as the Engineer may decide is appropriate under the circumstances. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor. If Contractor wishes to furnish or use a substitute item of material or equipment, Contractor shall first make written application to Engineer for review thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified and be suited to the same use as that specified. The application will state the extent, if any, to which the evaluation of the proposed substitute will prejudice Contractor's achievement of Substantial Completion on time, whether or not the substitute for use in the work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for work on the project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by Engineer in evaluating the proposed substitute. Engineer may require Contractor to furnish additional data about the proposed substitute.

00 13 40.08 ADDITIONAL ENGINEERING COSTS

2.

- A. In the event that the Contractor fails to submit acceptable Shop Drawings (i.e., Shop Drawings which are returned marked "Approved" or "Approved as Noted") within two submittals, further review of the Shop Drawings will be considered an Additional cost. Similarly, all Engineering Costs associated with the review of a substitution will be considered an Additional cost.
- B. Additional Engineering Costs include redesign, additional Shop Drawing reviews, investigations, consultant fees and revisions to the Contract Documents required because of the proposed substitution. Additional Engineering Costs will be the total of:

8.20 SUBMITTALS

- 1. Billing Rates Schedule
- 2. Direct Expenses Plus 10%
- 3. Consultant Fees Plus 10%
- C. Additional Engineering Costs shall be deducted from Contractor Payments by the Owner, in accordance with the Agreement for Engineering Services between the Owner and the Engineer.

SECTION 00 15 06

WORK UNDER UNUSUAL CONDITIONS

00 15 06.01 WORK AFTER DARK

- A. Unless specifically required elsewhere herein, the Contractor shall perform no work after dark except in emergencies. When time permits, they shall inform the Engineer in advance of such work and shall obtain the Engineer's approval. When time does not permit advance notice to the Engineer, they shall inform the Engineer at the earliest possible moment.
- B. The placing of concrete shall be so scheduled as to be started early enough in daylight hours to allow sufficient time for the completion of the section under construction before dark, including the work of finishers.
- C. When, in order to minimize interference with existing structures or utilities, or maintain traffic, it may, in the opinion of the Engineer, be expedient or necessary to do work after dark, such work shall be performed by the Contractor at no additional cost to the Owner, and the Contractor shall provide adequate lighting therefor.

00 15 06.02 WORK ON SUNDAYS OR HOLIDAYS

A. Unless specifically required elsewhere herein, the Contractor shall do no work on Sundays or locally recognized legal Holidays except in an emergency, and then shall confine their operations to only the work considered necessary to be performed at such time.

00 15 06.03 WORK IN STORMS

- A. If required by the Engineer, masonry work and the mixing and placing of concrete shall be halted during rain storms, and all fresh work shall be immediately protected with suitable coverings. The Contractor shall keep a sufficient quantity of such coverings at the Site as part of their plant and equipment.
- B. No paving, exterior painting, fine grading, seeding or roofing shall be done during rain or snow storms.

00 15 06.04 WORK IN COLD WEATHER

A. Certain Specifications contain provisions prohibiting the performance of certain work in cold weather, or outlining the conditions under which such work may be so performed. In the absence of specific mention elsewhere in the Contract Documents, the judgement of the Engineer shall govern in any case where temperature may adversely affect or prevent the performance of good work.

SECTION 00 15 10

SERVICES DURING CONSTRUCTION

00 15 10.01 SANITARY FACILITIES

- A. The Contractor shall provide on the Site, at their own expense, one or more toilets, suitably screened from public observation for the use of all persons employed on the work. They shall be provided, maintained and removed, when directed, by the Contractor, in such quantity, locations and manner as approved by the Engineer. Contents shall be removed and disposed of in a manner and at such times as shall be approved. Chemical toilets are to be preferred.
- B. The Contractor shall not permit or condone the committance of nuisances on or about the Site. Any employee found violating these provisions shall be discharged in accordance with the provisions of ARTICLE 00 07 54.02.
- C. The Contractor shall comply with any and all sanitary regulations as may have been established for the locality.
- D. If the Owner awards other contracts for collateral work on the Project, the provision of sanitary convenience shall be the responsibility of the General Contractor, and all such facilities shall be made available to other Contractors and all Subcontractors until the date of the Certificate of Substantial Completion of the General Contract. Each Contractor, however, shall be individually responsible for the acts of their employees and Subcontractors, and for all provisions of this Section after completion of the General Contract.

00 15 10.02 WATER

- A. The Contractor shall provide at all times sufficient drinking water from an approved source and by approved means, for all persons having reason to be on the Site in connection with the work.
- B. If an ample supply is owned or controlled by the Owner, and is available at or near the Site, such supply will be made available to the Contractor, subject at all times to the requirements of the Owner established therefor, and at a cost to the Contractor as determined by the current schedule of charges filed by the Utility for all customers. Permission to use the water must be obtained in writing.
- C. If water is obtained from a public or private supply not owned or controlled by the Owner, the Contractor shall make such arrangement for service with the owners thereof as they may require.

- D. Non-potable water for other than drinking purposes may be obtained at the Site from the ground or surface sources, at the Contractor's own expense. The water must, however, be suitable for the purpose intended and shall be approved by the Engineer. The Specifications, for instance, contain requirements for water for making concrete and mortar.
- E. If the Owner awards other contracts for collateral work on the Project, it shall be the responsibility of the General Contractor to obtain potable water for drinking purposes, and such water shall be made available to all Contractors, until the date of the Certificate of Substantial Completion for the General Contract. Each Contractor, however, shall be individually responsible for providing potable water for their own employees and their Subcontractors after completion of the General Contract.
- F. If the General Contractor provides water, whether potable or non-potable, for their own purposes during construction of the work, besides drinking water, such water shall be made available to other Contractors and their Subcontractors during the life of the General Contract. Removal of temporary facilities shall be by the General Contractor, but such installation and meters shall remain until need therefor by each Contractor has ceased, or until the date of the Certificate of Substantial Completion of the General Contract. Each Contractor shall provide their own services after completion of the General Contract.

00 15 10.03 TEMPORARY HEAT

- A. If the Owner awards other contracts for collateral work on the Project, it shall be the obligation and responsibility of the General Contractor to provide and maintain temporary heat in all above ground structures, and in all below ground structures other than manholes and similar pipeline appurtenances, by means of portable electric, oil or gas-fired appliances. The General Contractor shall provide and pay for all fuel and electric power used by such appliances, and any wiring or connections required, and shall provide suitable smoke pipes or other devices to prevent the deposit of smoke or smudge on building components or equipment.
- B. After their installation by the Heating & Ventilating Contractor, the permanent heating system facilities may be used for temporary heating purposes, the operation thereof, and any temporary wiring or piping required and all power consumed shall be the obligation and responsibility of the General Contractor, who shall also be responsible to the Heating & Ventilating Contractor for the repair of any damage of work of the Heating & Ventilating Contract suffered as the result of use by the General Contractor.
- C. After enclosure of all spaces to be heated, except for doors, windows and similar apertures, temporary enclosures for all apertures shall be provided. Temperatures in the entirety of such spaces shall be continuously maintained at not less than 50oF between October 15 and May 15, unless written permission is granted otherwise by the Engineer. The General Contractor shall securely install on each

- floor of each building near the center of the building, a suitable thermometer. Either the temporary or the permanent heating system shall be available for around-the-clock use during the season specified above.
- D. The Owner will supply all heat after the date of the Certificate of Substantial Completion of the General Contract.
- E. No portion of the Temporary Heat provisions herein contained shall be construed to waive or modify any provisions regarding maintenance of air or materials temperatures for the protection of the work contained elsewhere in the Contract Documents.

00 15 10.04 TEMPORARY ELECTRIC LIGHT AND POWER

- A. If the Owner awards other contracts for collateral work on the Project, it shall be the obligation and responsibility of the General Contractor to provide and maintain temporary facilities for furnishing light and power necessary for operations under the General Contract, and to make all necessary arrangements therefor, including all required conductors, outlets and connections, ordering the meter, paying all fees and inspection charges and pay for all power bills until the date of the Certificate of Substantial Completion of the General Contract.
- B. The facilities shall be available to other Contractors and their Subcontractors for their use in connection with their work. The installation and meters shall remain until need for same by each Contractor has ceased, or until the date of the Certificate of Substantial Completion of the General Contract. Each Contractor shall provide their own services after completion of the General Contract.
- C. It shall be the responsibility of the General Contractor to provide, prior to the completion of their Contract, temporary power of proper voltage and capacity necessary to test and operate all equipment installed under this Contract.

00 15 10.05 PAYMENT FOR SERVICES DURING CONSTRUCTION

A. The General Contractor will receive no direct payment for providing, maintaining or removing any of the temporary facilities or services specified in this Section 00 15 10, and compensation for same shall be included, in the price, or total of prices, given in the Bid on which this Agreement is based, and no separate payment will be made therefor.

SECTION 00 15 68

EROSION AND SEDIMENT CONTROL

00 15 68.01 GENERAL

- A. The Contractor shall control erosion and sediment caused by construction activities through the use of scheduling, phased construction and restoration, berms, dikes, dams, sediment basins, fiber mats, netting, gravel, mulches, grasses, slope drains and other erosion control devices or methods.
- B. In the event of conflict between these specification requirements and pollution control laws, rules or regulations of other Federal, State or local agencies, the more restrictive laws, rules or regulations shall apply.

00 15 68.02 CONTROL SCHEDULE

- A. At the preconstruction conference, or prior to the start of the applicable construction, the Contractor shall be required to submit, for acceptance, their schedules for the accomplishment of erosion and sediment control. They shall also submit, for acceptance, their proposed method of erosion and sediment control on haul roads and borrow pits and their plan for disposal of waste materials or control details for other potential sources of pollution.
- B. The Contractor shall schedule and conduct their operations to minimize erosion of soils and to prevent silting and muddying of streams, rivers, irrigation systems, impoundments (lakes, reservoirs, etc.) and lands adjacent to or affected by the work. Construction of drainage facilities and performance of other contract work which will contribute to the control of erosion and sedimentation shall be carried out prior to earthwork operations and maintained in conjunction with earthwork operations. The area of bare soil exposed at any one time by construction operations shall not exceed the maximum acreage allowable under applicable State and Federal laws.

00 15 68.03 CONTROL MEASURES

- A. In carrying out erosion control measures, the Contractor will be guided by, but not limited to, the following controls:
 - 1. When borrow material is obtained from other than commercially operated sources, erosion of the borrow site shall be so controlled both during and after completion of the work that erosion will be minimized and sediment will be prevented from entering streams or other bodies of water. Waste

- or disposal areas and construction roads shall be located and constructed in a manner that will prevent sediment entering streams.
- 2. Frequent fording of live streams will not be permitted; therefore, temporary bridges or other structures shall be used wherever an appreciable number of stream crossings are necessary. Unless otherwise approved in writing by the Engineer, mechanized equipment shall not be operated in live streams.
- 3. When work areas or gravel pits are located in or adjacent to live streams or other bodies of water, such areas shall be separated from the main stream by a dike or other barrier to prevent entry of sediment into a flowing stream. Care shall be taken during the construction and removal of such barriers to prevent the muddying of a stream or body of water.
- 4. All waterways shall be cleared as soon as practicable of falsework, piling, debris or other obstructions placed during construction operations and not a part of the finished work.
- 5. Ditches which are filled, or partly inoperative shall be cleaned, stabilized, and made operative before the Contractor stops work for any day, and shall be maintained in a condition satisfactory to the Engineer for the duration of the Contract.
- 6. Water from aggregate washing, dewatering or other operations containing sediment shall be treated by filtration, settling basin or other means sufficient to reduce the turbidity so as not to cause a substantial visible contrast to natural conditions in the receiving waters.
- 7. Pollutants such as fuels, lubricants, bitumens, raw sewage and other harmful materials shall not be discharged into or near rivers, streams, and impoundments or into natural or man-made channels leading thereto.

 Wash water or waste from concrete mixing operations shall not be allowed to enter live streams or other bodies of water.
- 8. All applicable regulations of environmental protection agencies, conservation agencies, and fish and wildlife agencies and statutes relating to the prevention and abatement of pollution shall be complied within the performance of the Contract.
- 9. Slopes exceeding 15 percent require special treatment such as water diversion berms, straw bale sediment barriers, sodding, fabric blankets or mesh, or the use of an approved mulch tacking agent over straw or hay mulch applied over seeded areas.

B. The erosion and sediment control features installed by the Contractor shall be acceptably maintained by the Contractor throughout the Contract period. When it becomes necessary, the Engineer will inform the Contractor of unsatisfactory construction procedures and operations insofar as erosion control, water and air pollution are concerned. If the unsatisfactory construction procedures and operations are not corrected promptly, the Engineer may suspend the performance of any or all of other construction until the unsatisfactory condition has been corrected.

00 15 68.04 PAYMENT

A. Unless a specific payment item is included in the Bid, payment for Erosion and Sediment Control shall be included in the price, or total of prices, given in the Bid on which this Agreement is based, and no separate payment will be made therefor.

SECTION 00 15 77

BASIC MAINTENANCE OF TRAFFIC

00 15 77.01 GENERAL

A. This work shall consist of basic maintenance and protection of traffic within the limits of and for the duration of the Contract.

00 15 77.02 TRAVEL NOT OBSTRUCTED DURING EXCAVATION

- A. The Contractor shall not needlessly hinder or inconvenience travel on any public or private way, nor shall they wholly obstruct same without written permission of the Owner. If they are permitted to obstruct a traveled way, the Contractor shall provide plain and appropriately worded signs and adequate barricades and lighting at the nearest cross streets and at each end of the obstructed portion, announcing such obstruction and directing traffic to and along an approved detour.
- B. Unless otherwise specified or permitted, all entrances and exits of fire houses, industrial plants, commercial buildings and public buildings shall be kept open and maintained in passable condition at all times. The Contractor shall give notice to the Owner of each traveled way before interfering therewith. A minimum of 24 hours notice shall also be given to local police and fire control agencies.

00 15 77.03 BASIC MAINTENANCE AND PROTECTION OF TRAFFIC

- A. Traffic shall be maintained over a reasonably smooth traveled way which shall be so marked by signs, delineators, guiding devices and other methods that a person who has no knowledge of conditions may safely and with a minimum of discomfort and inconvenience ride, drive or walk, day or night, over all or any portion of the highway and/or structure under construction where traffic is to be maintained.
 - 1. Surface. Maintain the surface condition of the traveled way so it is
 - consistent with the appropriate speed limit.
 - 2. Drainage. Maintain the drainage facilities and other highway

elements, old or new, including detours.

3. Bus Stops. Maintain existing bus stops, if any, so bus passengers are

reasonably accommodated.

4. Pedestrian Traffic.

Provide adequate protection for pedestrian traffic during all phases of construction.

5. Intersecting Highways.

Provide ingress and egress to and from intersecting highways, homes, businesses and commercial establishments.

6. Dust
Control and
Spillage.

Control dust and keep the traveled way free from materials spilled from hauling equipment. This shall also apply to dust control and spilled material resulting from the Contractor's operations in the areas outside the Contract limits. The Contractor shall provide for the control of dust, as necessary, during the construction period. Dust shall be controlled by water spray, or as approved by Engineer. Exposed soils shall be graded, seeded and mulched as soon as practicable.

7. Flaggers.

Provide the necessary traffic control equipment and flaggers for adequate traffic control on the traveled way.

8. Repairs.

Make the necessary repairs to existing pavement and structure—wearing surfaces as required to provide a reasonably smooth traveled way where vehicle operation is maintained.

9. Responsibility to the Public.

Protect the public from damage to person and property which may result directly or indirectly from any construction operation.

10. Snow and Ice Control.

Maintain the traveled way in such a condition and conduct operations in such a manner that snow and ice may be readily controlled by others as and when necessary, and in such a manner that proper drainage is provided for the melting of snow in the banks resulting from normal plowing. The Contractor shall not, however, be responsible for snow and ice control on the pavement or traveled way.

00 15 77.04 PAYMENT

A. Unless a specific payment item is included in the Bid, payment for Basic Maintenance of Traffic shall be included in the price, or total of prices, given in the Bid on which this Agreement is based, and no separate payment will be made therefor.

SECTION 00 15 80

PROJECT SIGN

00 15 80.01 GENERAL

If directed in the Additional Instructions, the Contractor shall provide and erect a Α. project sign or signs at the project site identifying the project and the applicable funding agencies participating in the project. The project sign(s) shall also indicate the title and description of the project, Owner, Engineer and Contractor. The sign(s) shall be erected within twenty-one (21) days after the construction contract is awarded, and shall be in accordance with the specifications and detailed drawing included in the Additional Instructions.

00 15 80.02 SIGN PANEL

Α. Each sign panel shall be constructed of 3/4" minimum thickness marine plywood rabbetted into a 2" x 4" lumber frame. All fasteners used in the construction of each sign shall be of a rustproof nature.

00 15 80.03 **PAINTING**

Α. Each sign face shall be painted with the proper paint colors for the background, lettering and emblem as specified in the Additional Instructions. All supports, trim and the back of the sign panel, shall be painted with at least two coats of the same color paint as used for each sign face. All paint used shall be exterior grade paint, suitable for use on wood signs.

00 15 80.04 **MISCELLANEOUS**

A. Sign(s) shall be located in a prominent position and aligned as determined by the Engineer. Adequate support for the project sign(s) shall be provided by the Contractor. The bottom edge of each sign shall be a minimum of 3 feet above grade. The project sign(s) shall be maintained in good condition by the Contractor for the duration of construction. The removal of the project sign(s) from the construction site by the Contractor shall be at the completion of construction, when ordered by the Engineer.

8.20 PROJECT SIGN

00 15 80.05 PAYMENT

A. Unless a specific payment item is included in the Bid, payment for Project Sign, including fabrication, erection, maintenance and removal of each sign, shall be included in the price, or total prices, given in the Bid on which this Agreement is based, and no separate payment will be made therefor.

SECTION 00 15 90

ENGINEER'S FIELD OFFICE TRAILER

00 15 90.01 DESCRIPTION

A. Unless waived by provisions within the Additional Instructions, the Contractor shall provide a field office trailer for the exclusive use of the Engineer and their assistants. The trailer shall be separate from that of the Contractor, and shall be ready for occupancy within ten days following execution of the Contract.

00 15 90.02 FACILITIES TO BE PROVIDED

- A. The name of the supplier and proposed layout shall be submitted to the Engineer and approved prior to delivery of the trailer.
- B. The trailer office shall be new or in first class condition and shall be not less than 12 feet by 56 feet, excluding the tongue.
- C. Washroom with hot water supply and toilet facilities within the trailer shall be supplied with potable water and connected to a sanitary sewage disposal system. The trailer shall be fully air conditioned. A gas or oil heat system shall be provided within the field office. A minimum of one month's fuel storage shall be provided, together with the necessary appurtenances to control heat and check fuel storage. Heating and air conditioning equipment shall be capable of maintaining an air temperature of 70°F.
- D. An individual, unlisted, direct line telephone service shall be provided for the exclusive use of the Engineer. Telephone service, local and toll charge calls, shall be paid by the Contractor.
- E. It shall be the responsibility of the Contractor to maintain the field office trailer and all facilities furnished with it. Maintenance shall include removal of snow, janitorial services, and adequate protection of pipes.
- F. It shall be the Contractor's responsibility to furnish adequate heat, electric power and light to the field office trailer at their expense. Adequate lighting shall consist of a minimum, of four, two lamp, 4' fluorescent lights.

G. The following office furniture and equipment shall be furnished with the trailer:

Two 8' flat top double desks with 2 sets of two drawer metal file cabinets in each desk.

- 1 built-in drafting table 36" x 72" with double storage cabinets underneath.
- 4 swivel chairs.
- 2 drafting stools.
- 1 four drawer, fireproof legal size filing cabinet with lock.
- 2 plan racks with space for 5 plan hangers each.
- 4 wall coat hooks.
- 2 large metal waste baskets.
- 1 refrigerator, minimum 2 cubic feet.

00 15 90.03 LOCATION

A. The trailer shall be erected on an approved location convenient for inspection of the work, as directed by the Engineer. The field office trailer shall be moved once if directed by the Engineer.

00 15 90.04 PAYMENT

A. Payment for the Engineer's Field Office Trailer, and all services to be provided with it, not included under other unit or lump sum price items shall be made at the price stated in the Bid.

SECTION 00 16 40

MATERIALS, EQUIPMENT AND WORKMANSHIP

00 16 40.01 MATERIALS AND WORKMANSHIP - GENERAL REQUIREMENTS

- A. All workmanship, materials, equipment and appliances shall comply in all respects with the applicable Specifications, unless specific exception is made.
- B. All materials furnished or incorporated in the work shall be new, unused and of the quality and characteristics specified. Used materials may be furnished or incorporated in the work only under special circumstances and only with the Engineer's prior written approval. If the quality or characteristics of any material are not specifically set forth in the Contract Documents, the material used shall be that customarily used in first class work of a similar nature and character.
- C. All workmanship in manufacture and construction not specifically covered in the Specifications shall be of the first class order and equal to that customarily used in first class work of a similar nature and character. The Contractor shall exercise special care during construction to make all structures watertight.
- D. See also ARTICLE 00 07 54.02 and 00 07 53.08.

00 16 40.02 SAMPLES, TESTS AND INSPECTIONS

- A. All materials, equipment and workmanship shall be subject to inspection, examination and tests by the Engineer, or persons or corporations designated by them, at any and all times during manufacture or construction and at any place or places where manufacture or construction are performed.
- B. If required by the Specifications, or if requested by the Engineer, the Contractor shall submit to the Engineer for examination, testing and approval, typical samples of materials and appliances. Samples shall be submitted sufficiently in advance of the time they are proposed to be used in the work so that neither rejections and re-submittals nor the time reasonably required for testing shall cause delay. Each unit, lot or batch of materials submitted shall be properly tagged or labeled and identified with the portion of the work for which they are intended. Transmittals shall be covered by a letter of transmittal in the manner specified for the submittal of drawings ARTICLE 00 13 40.02.
- C. All laboratory tests called for in the Specifications or requested by the Engineer shall be performed at the Contractor's expense. Documentary evidence that materials pass the required inspection and tests shall be furnished to the Engineer prior to the use of the materials in the work. Bureaus, laboratories and agencies

used for the inspection and testing of materials, equipment and appliances will be selected by the Contractor, who will submit their names to the Engineer for approval prior to the performance by them of any tests.

00 16 40.03 REMOVAL OF FINISHED WORK FOR INSPECTION

- A. If, at any time prior to the date of the Certificate of Substantial Completion, the Engineer considers it necessary or advisable to examine any portion of the work already completed by removing or tearing out materials or coverings, or by excavating or otherwise exposing the portion of the work to be examined, the Contractor, upon receipt of a written request from the Engineer, shall promptly perform such work as is necessary so to do.
- B. If the work in question is found to be defective, or not in conformance with the Specifications, due to the fault of or omission of the Contractor, or if any work shall be covered over without the consent or approval of the Engineer, whether or not defective, the Contractor shall bear all the expense of such removal, tearing out, excavating or exposing and of satisfactory reconstruction.
- C. If, however, such consent or approval shall have been given, and the work exposed is found to be satisfactory and in conformance with the Specifications, the Contractor shall be compensated for the expenses of such removal, examination and reconstruction as provided in ARTICLE 00 07 57.03.

00 16 40.04 FIELD TESTS

A. The Contractor, at their own expense, shall conduct all tests specified or required by law or permit of installed equipment and materials, when ordered by and under the supervision of the Engineer. The Engineer at their own discretion may make additional field tests of materials and equipment on the Site. The Contractor shall furnish, at their own expense, the materials required for all field tests and reasonable labor and plant to assist the Engineer in conducting the tests.

00 16 40.05 MANUFACTURERS AND SUPPLIERS

- A. Within 30 days following the execution of the Contract, the Contractor shall submit to the Engineer the name or names of the manufacturers or vendors from whom they propose to purchase the equipment and materials specified for the work. Following approval of the manufacturer or supplier by the Engineer, the Contractor shall submit complete and detailed drawings, bulletins, specifications and other data in connection with the equipment and materials and arrangement thereof they propose. See also ARTICLES 00 13 40.01 through 00 13 40.04 and 00 13 40.06.
- B. No award shall be made by the Contractor, and no work in connection with the equipment or materials shall proceed prior to review of the submitted data. All

items of equipment of like type shall be the product of one manufacturer, unless specified otherwise or specifically permitted by the Engineer.

00 16 40.06 EXPERIENCE AND EQUIVALENT CLAUSES

- A. Unless otherwise specified, shown or permitted, all equipment and materials shall be the product of manufacturers who have built equipment or produced materials of a like or similar type, character, size and capacity for at least three years prior to submittal for approval and who, if requested by the Engineer, shall submit evidence thereof.
- B. Wherever reference is made in the Contract Documents to any specific material, equipment, appliance or model, it is understood that any product considered to be equivalent by the Engineer may be used, and such reference is for the purpose of illustration and establishment of a standard. This provision is understood to hold true in all instances, use or omission of the term "or equal" notwithstanding.

00 16 40.07 INSTALLATION OF EQUIPMENT

- A. All equipment shall be installed in a neat and workmanlike manner as shown on the Plans or as directed, and shall be accurately leveled, aligned and adjusted for satisfactory operation and so installed that all necessary connections can be readily made.
- B. The Contractor shall furnish, install and protect all necessary bearing plates, guides, rails, anchor and attachment bolts and fastenings and all other appliances and appurtenances required for the installation of all components of the equipment specified. Adequate templates and installation drawings and instructions shall be provided. Anchor bolts shall be of the size, type and material recommended by the manufacturer or directed by the Engineer.
- C. The Contractor shall furnish all oils and greases for initial operation, and shall provide the Engineer with a list of the lubricants used on each item of equipment. Insofar as possible, all lubricants shall be obtained from one manufacturer, approved by the Engineer and by the equipment manufacturers. Each piece of equipment shall bear a substantial metal or plastic nameplate, securely fastened in a convenient place inscribed with the name of the manufacturer, the year of manufacture, model number, serial number and basic rating data.

00 16 40.08 TOOLS, ACCESSORIES AND MANUALS

8.20

A. Unless otherwise specified, the Contractor shall furnish for each type, model or size of equipment a complete set of any special tools and accessories, suitably identified, which may be required to adjust, operate, repair or maintain the equipment.

B. The Contractor shall also furnish and deliver to the Engineer five complete sets of bulletins, diagrams, parts lists, instructions, manuals and other data required for operation, maintenance and repair of the equipment.

00 16 40.09 CARE AND PROTECTION OF THE WORK

- A. During the life of the Contract, the Contractor shall be solely responsible for the care and protection of the work and for all materials, appliances, supplies and equipment to be used in the work, both during storage and after installation or incorporation in the work. They shall protect all materials to be used in the work, all work in progress, and all completed work from damage by flood, fire, freezing or other undesirable results of weather, accident, theft and vandalism. Any damage or loss shall be made good by the Contractor at their own expense before a Certificate of Substantial Completion will be issued.
- B. See also ARTICLES 00 07 59.07, 00 07 59.08 and 00 07 57.04.

00 16 40.10 ABSENCE OF ENGINEER

A. The Contractor shall perform no backfilling or covering operations of any underground portions of the work until after the Engineer or their inspector shall have inspected or tested and approved the work. If such work is covered in absence of an inspector, it shall be exposed by the Contractor for inspection as specified in ARTICLE 00 16 40.03.

END OF SECTION

SECTION 01 43 26

SPECIAL INSPECTIONS AND STRUCTURAL TESTING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. Special Inspections and Structural Testing shall be in accordance with Chapter 17 of the 2020 Building Code of New York State (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. This specification section is also intended to notify the Special Inspector, Testing Laboratory, and other Agents of the Special Inspector of their requirements and responsibilities.
- D. Where application is made to the building official for construction as specified in Section 105 of the BCNYS, the Owner or the Owner's authorized agent, other than the Contractor, shall employ one or more approved agencies to provide special inspections and tests during construction and identify the approved agencies to the building official. These special inspections and tests are in addition to the inspections by the Building Official and by the Contractor.

1.02 SCHEDULE OF INSPECTIONS AND TESTS

A. Required inspections and tests are described in the Schedule of Special Inspections provided in Part 3 of this specification and in the individual specification sections for the items to be inspected or tested.

1.03 OUALIFICATIONS

- A. The Special Inspector shall be a licensed Professional Engineer, Structural Engineer or as specified in the Schedule of Special Inspections and Chapter 17 of the BCNYS, and who is approved by the Code Enforcement Official (CEO).
- B. The Testing Laboratory and individual technicians shall be approved by the CEO.
- C. The Testing Laboratory shall maintain a full time licensed Professional Engineer or Structural Engineer on staff who shall certify all test reports. The Engineer shall be responsible for the training of the testing technicians and shall be in responsible charge of the field and laboratory testing operations.

D. The minimum qualifications for testing agency laboratory personnel, and the minimum technical requirements for equipment and procedures utilized in the testing and inspection of construction and materials used in construction shall comply with ASTM E329 (Latest Edition) Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

1.04 SUBMITTALS

- A. The Special Inspector and Testing Laboratory shall submit to the CEO for review a copy of their qualifications which shall include the names and qualifications of each of the individual inspectors and technicians who will be performing inspections or tests. The Testing Laboratory shall also submit to the CEO for review, in accordance with ASTM E329, a certificate of accreditation, including the scope of accreditation.
- B. Approved Fabricators: Special Inspections are not required for work done on the premises of a fabricator registered and approved to perform such work without special inspection. See Section 1704.2.5 of the Building Code of New York State for conditions of approval.
 - 1. Certificate of Compliance upon completion of fabrication. The "Fabricator's Certificate of Compliance" form is provided with the *Statement of Special Inspections*.

1.05 CONTRACTOR RESPONSIBILITIES

- A. The Contractor shall cooperate with the Special Inspector and his agents so that the Special Inspections and testing may be performed without hindrance.
- B. The Contractor shall review the *Statement of Special Inspections* and shall be responsible for coordinating and scheduling inspections and tests. The Contractor shall notify the Special Inspector or Testing Laboratory at least 5 days in advance of a required inspection or test. Uninspected work that required inspection may be rejected solely on that basis.
- C. The Contractor shall provide incidental labor and facilities to provide access to the work to be inspected or tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.
- D. The Contractor shall keep at the project site the latest set of construction drawings, field sketches, approved shop drawings, and specifications for use by the inspectors and testing technicians.
- E. 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. The Contractor's quality control personnel shall first review all work that is to be subjected to Special Inspections.

- F. The Contractor shall be solely responsible for construction site safety.
- G. When required by the *Statement of Special Inspection's* "Quality Assurance Plan" each Contractor responsible for the construction or fabrication of main seismic or wind force resisting systems, designated seismic systems, or seismic or wind resisting components shall submit to the CEO and the Owner a "Statement of Responsibility". If required the Contractor's "Statement of Responsibility" form is provided with the *Statement of Special Inspections*.

1.06 LIMITS ON AUTHORITY

- A. The Special Inspector or Testing Laboratory may not release, revoke, alter, or enlarge on the requirements of the Contract Documents.
- B. The Special Inspector or Testing Laboratory will not have control over the Contractor's means and methods of construction.
- C. The Special Inspector or Testing Laboratory shall not be responsible for construction site safety.
- D. The Special Inspector or Testing Laboratory has no authority to stop the work.

1.07 STATEMENT OF SPECIAL INSPECTIONS

- A. The *Statement of Special Inspections* will be prepared and maintained by the Registered Design Professional in Responsible Charge (RDP).
- B. The *Statement of Special Inspections* shall be submitted with the application for Building Permit.

1.08 RECORDS AND REPORTS

- A. Detailed daily reports shall be prepared of each inspection or test and submitted to the Special Inspector. Reports shall be submitted to the Special Inspector within 5 days of the inspection or test. The "Special Inspection Daily Report" form is provided with the *Statement of Special Inspections*. Daily reports shall include:
 - 1. Project Name and Location,
 - 2. Date of test or inspection,
 - 3. Time of Inspection start and end,
 - 4. Type of inspection "Continuous" or "Periodic",
 - 5. Name of inspector or technician,
 - 6. Location of specific areas tested or inspected,
 - 7. Description of test or inspection and results,
 - 8. Applicable ASTM standard(s),
 - 9. Weather conditions.
 - 10. Current item(s) of construction needing corrective action,
 - 11. Previously reported items of construction requiring corrective action that have been corrected,

- 12. Previously reported items of construction requiring corrective action that have not been corrected,
- 13. Changes to Contract Documents authorized by the RDP,
- 14. Engineer's seal and signature.
- B. The Special Inspector shall submit interim reports to the CEO, the Special Inspection Coordinator, the RDP, and the Contractor at the end of each week. The interim report(s) shall include all inspections and test reports received that week along with a completed "Special Inspection Weekly (Interim) Report" form provided with the *Statement of Special Inspections*.
- C. Any discrepancies from the Contract Documents found during a Special Inspection shall be immediately reported to the Contractor for correction. If the discrepancies are not corrected, the Special Inspector shall notify the CEO, Special Inspection Coordinator, and the RDP by telephone, email, or fax. Reports shall document all discrepancies identified, exact location, reference to applicable plan sheets, details and specifications and the resolution or corrective action taken.
- D. The Testing Laboratory shall immediately notify the Special Inspector, Special Inspection Coordinator, the RDP and the Contractor by telephone, email, or fax of any test results that fail to comply with the requirements of the Contract Documents.
- E. Upon completion of the work requiring Special Inspections, each inspection agency and testing laboratory shall provide a statement to the Special Inspector that all work was completed in conformance with the Contract Documents and that all appropriate inspections and tests were performed.

1.09 FINAL REPORT OF SPECIAL INSPECTIONS

- A. The "Final Report of Special Inspections" shall be completed by the Special Inspector and submitted to the CEO prior to the issuance of a Certificate of Use and Occupancy. Concurrent with submission of the "Final Report of Special Inspections" to the CEO, the "Final Report of Special Inspections" shall be submitted to the Special Inspection Coordinator, and the RDP. The "Final Report of Special Inspections" form is provided with the *Statement of Special Inspections*.
- B. The "Final Report of Special Inspections" will certify that all required inspections have been performed and the report will itemize any discrepancies that were not corrected or resolved.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

- 3.01 STATEMENT OF SPECIAL INSPECTIONS
 - A. See Statement of Special Inspections attached to this Section.
- 3.02 SCHEDULE OF INSPECTION AND TESTING AGENCIES
 - A. See Schedule of Special Inspection and Testing Agencies attached to this Section.

END OF SECTION

Statement of Special Inspections

Signature



<u> </u>	T	al Maur V - d		
Project:	Town of Vest	al, New York ol Renovations		
Location:	Vestal, New			
Owner:	Town of Vest			
Address:	1	Avenue, Vestal, New	/ York	
			e Charge: Matthew F	Fuller P.F.
Inspection and S schedule of Sp Coordinator and	Structural Testing pecial Inspection sold the identity of other	requirements of the 2020 services applicable to the approved agencies to encompasses the followi	Building Code of New York is project as well as the be retained for conducting	nce in accordance with the Special York State (IBCNYS). It includes a ename of the Special Inspection g these inspections and tests. This
	Architectural	I Other:		
Building Code I Discovered disc discrepancies a in Responsible	Enforcement Offic crepancies shall bure not corrected, t Charge and the S	ial (CEO) and the Regis be brought to the <u>imme</u> the discrepancies shall b	stered Design Profession ediate attention of the C e brought to the <u>immedia</u> nator. The Special Inspe	Il furnish inspection reports to the nal in Responsible Charge (RDP). Contractor for correction. If such ate attention of the CEO, the RDP ction program does not relieve the
				ge at a frequency as noted below. ector within (5) five days of item
construction or twind resisting c	fabrication of main components shall s	n seismic or wind force re submit to the CEO and t	esisting systems, designa	each Contractor responsible for the ted seismic systems, or seismic or of Responsibility. The Contractor's ons.
per section 170	04.2.5 of the IBC	NYS must submit a Fa	abricator's Certificate of	on and implementation procedures Compliance at the completion of atement of Special Inspections.
of any discrepar	ncies noted in the ir	nspections shall be subm	tion of all required Special iitted prior to issuance of a vith this <i>Statement of Spe</i>	Inspections, testing and correction a Certificate of Use and Occupancy. cial Inspections
Job site safety a	and means and me	ethods of construction ar	e solely the responsibility	of the Contractor.
Interim Report	Frequency:	Weekly (a weekly report with this Statement of S		or per attached schedule
Prepared by:				
Matthew C.				
(type or print nar	me)			
			D-4-	
Ciam at			Date	
Signature				İ
Signature				
Signature				
Signature Owner's Au	thorization		Building Code F	Design Professional Sec Enforcement Official's Accepta

Date

Signature

Date

Schedule of Inspection and Testing Agencies

This Statement of Special Inspections/Quality Assur	rance Plan includes the following building systems:
 Soils and Foundations Cast-in-Place Concrete Precast Concrete Masonry Structural Steel Cold-Formed Steel Framing 	 □ Spray Fire Resistant Material □ Wood Construction □ Exterior Insulation and Finish System □ Mechanical & Electrical Systems □ Architectural Systems □ Special Cases
_ =====================================	

Special Inspection Agencies	Firm	Address, Telephone, e-mail
Special Inspection Coordinator	BARTON & LOGUIDICE, D.P.C. (B&L)	443 Electronics Parkway Liverpool, NY 13088 (315) 457-5200
2. Geotechnical Testing Agency	TBD	
3. Concrete Testing Agency	TBD	
4. Masonry Testing Agency	TBD	
5. Fabricated Items	TBD	
6.	TBD	

Note: The inspectors and testing agencies shall be independent of the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official, prior to commencing work.

Qualifications of Inspectors & Testing Technicians

The qualifications of all personnel performing Special Inspection activities are subject to the approval of the Building Official. The credentials of all Inspectors and testing technicians shall be provided.

MINIMUM QUALIFICATIONS FOR SPECIAL INSPECTORS

	WIGHT GOALT TOATTONG TON OF EGIAL THOSE EGIAL
CATEGORY	MINIMUM QUALIFICATIONS
Reinforced Concrete	Current ICC Reinforced Concrete Special Inspector or ACI Concrete Construction Inspector Concrete field testing can be by an ACI Concrete Field Testing Technician with Grade 1 certification. Engineer-in-Training (EIT) with relevant experience. New York State Registered Design Professional Engineer (RDP) with relevant experience.
Prestressed Concrete	 Precast Concrete; Current ICC Reinforced Concrete certification, and ICC prestressed concrete certification, and ACI Concrete Field Testing Technician with Grade 1 certification plus one year of relevant experience. Engineer-in-Training (EIT) with relevant experience. RDP with relevant experience.
Welding	 Current AWS Certified Welding Inspector. Current ICC Structural Steel and Welding Certificate plus one year of relevant experience. Current Level II certification from the American Society for Non-Destructive Testing (NDT). Current NDT Level III provided previously certified as NDT Level II.
High-Strength Bolting & Steel Frame Inspection	 Current ICC Structural Steel and Welding certification and one year of relevant experience. Engineer-in-Training (EIT) with relevant experience. RDP with relevant experience.
Masonry	 Current ICC Structural Masonry certification and one year of relevant experience. Engineer-in-Training (EIT) with relevant experience. RDP with relevant experience.
Excavation and Filling; Verification of Soils	Current Level II certification in geotechnical engineering technology/construction from the National Institute for Certification in Engineering Technologies (NICET). Engineer-in-Training (EIT) with relevant experience. RDP with relevant experience.
Wood Construction	Special Inspector approved by the Building Code Enforcement Official. Engineer-in-Training (EIT) with relevant experience. RDP with relevant experience.
Inspection of Fabricators	Precast Concrete; Current ICC Reinforced Concrete certification plus one year of relevant experience. Structural Steel: see welding requirements. Pre-fabricated Wood Trusses: Special Inspector approved by the Building Code Enforcement Official.

Quality Assurance Plan

Quality Assurance for Seismic Resistance

Seismic Design Category

Quality Assurance Plan Required (Y/N)

N

Description of seismic force resisting system(s), designated seismic system(s), and additional seismic system(s) and component(s):

Seismic Force Resisting System(s): Ordinary Reinforced Masonry Shear Walls

Designated Seismic System(s): NA

Additional Seismic System(s) and Component(s): NA

Quality Assurance for Wind Requirements

Basic Wind Speed (3 second gust) 120 MPH

Wind Exposure Category

Quality Assurance Plan Required (Y/N)

N

Description of main wind force resisting system(s) and designated wind resisting component(s):

Main Wind Force Resisting System(s): Ordinary Reinforced Masonry Shear Walls

Designated Wind Resisting Components(s): NA

Statement of Responsibility:

Each contractor responsible for the construction or fabrication of a system or component designated above must submit a Statement of Responsibility.

Qualifications of Inspectors and Testing Technicians

The qualifications of all personnel performing Special Inspection and testing activities are subject to the approval of the Building Official. The credentials of all Inspectors and testing technicians shall be provided if requested.

Key for Minimum Qualifications of Inspection Agents:

When the Registered Design Professional in Responsible Charge deems it appropriate that the individual performing a stipulated test or inspection have a specific certification or license as indicated below, such designation shall appear below the *Agency Number* on the Schedule.

PE/SE Structural Engineer – a licensed SE or PE specializing in the design of building structures
PE/GE Geotechnical Engineer – a licensed PE specializing in soil mechanics and foundations
EIT Engineer-In-Training – a graduate engineer who has passed the Fundamentals of

Engineering examination with relevant experience.

American Concrete Institute (ACI) Certification

ACI-CFTT Concrete Field Testing Technician – Grade 1

ACI-CCI Concrete Construction Inspector

ACI-LTT Laboratory Testing Technician – Grade 1&2

ACI-STT Strength Testing Technician

American Welding Society (AWS) Certification

AWS-CWI Certified Welding Inspector AWS/AISC-SSI Certified Structural Steel Inspector

American Society of Non-Destructive Testing (ASNT) Certification

ASNT Non-Destructive Testing Technician – Level II or III.

International Code Council (ICC) Certification

ICC-SMSI	Structural Masonry Special Inspector with current registration, and one (1) year of
	relevant experience)
ICC-SWSI	Structural Steel and Welding Special Inspector
ICC-SFSI	Spray-Applied Fireproofing Special Inspector
ICC-PCSI	Prestressed Concrete Special Inspector
ICC-RCSI	Reinforced Concrete Special Inspector

National Institute for Certification in Engineering Technologies (NICET)

NICET-CT	Concrete Technician – Levels I, II, III & IV
NICET-ST	Soils Technician – Levels I, II, III & IV
NICET-GET	Geotechnical Engineering Technician – Levels I, II, III & IV

Soils and Foundations

ITEM	AGENCY # (QUALIF.	SCOPE	SPECIAL INSPECTION (CONTINUOUS)	SPECIAL INSPECTION (PERIODIC) ^a
Foundation Excavations	#_ PE/GE EIT NICET- GET	For Building Foundations/Structure Foundations verify soils below item of construction for conformance with the Contract Documents. Verify removal of unsuitable material and preparation of subgrade prior to placement of controlled fill. Verify excavations have extended to proper foundation design depths in accordance with the Contract Documents.		X
2. Controlled Fill Classification	#_ PE/GE EIT NICET- GET	Prior to controlled fill/backfill placement below and adjacent to Item 1 construction, perform classification and testing of each source of fill materials to verify compliance with the Contract Documents.		X
3. Controlled Fill Placement	#_ PE/GE EIT NICET- GET	Prior to controlled fill/backfill placement below and adjacent to Item 1 construction, and continuously during placement, verify placement lift thickness and compaction to verify compliance with the Contract Documents.	X	
4. Helical Piles	#_ PE/GE EIT NICET- GET	During pile installation continuously monitor installation, collect data and verify pile installation is performed and is in conformance with requirements of the Contract Documents	X	

a. "Periodic" rate of Special Inspection shall be defined as part-time or intermittent observation of work requiring Special Inspection by an approved Special Inspector who is present in the area where the work has been, or is being performed, and at the completion of work being observed, but prior to concealment. Specifically, "Periodic" Special Inspection shall begin at the commencement of an item to be inspected, at the mid-point of item construction, and at completion of item construction prior to concealment.

ITEM	AGENCY # (QUALIF.	SCOPE	SPECIAL INSPECTION (CONTINUOUS)	SPECIAL INSPECTION (PERIODIC) ^a
1. Mix Design	#_ ACI-CFTT ACI-CCI ICC-RCSI PE/SE EIT	Verify prior to concrete placement that concrete mix to be placed complies with the approved mix design and the Contract Documents for the item being constructed. Construction covered includes building and structure foundations and walls, elevated floor slabs and beams, and equipment pads.		X
2. Reinforcement Installation	#_ ACI-CCI ICC-RCSI PE/SE EIT	Verify prior to concrete placement that the size, spacing, cover, positioning, condition, splices, and grade of reinforcing for Item 1 construction complies with the Contract Documents.		X
3. Reinforcement Welding	#_ AWS-CWI AWS/AISC -SSI	Inspect single-pass fillet welds (5/16" max.) in accordance with AWS D1.4. and ACI 318: 26.6.4		Х
Reinforcement Welding	#_ AWS-CWI AWS/AISC -SSI	Verify reinforcing to be welded complies with ASTM A706, AWS D1.4. and ACI 318: 26.6.4		
5. Concrete Placement	#_ ACI-CCI ICC-RCSI PE/SE EIT	Verify that placement of concrete and concrete placement techniques for Item 1 construction are in compliance with the Contract Documents.	X	
6. Sampling and Testing of Concrete	#_ ACI-CFTT ACI-CCI ICC-RCSI PE/SE EIT	For Item 1 construction sample, test and report concrete slumps (ASTM C143), air-contents (ASTM C231 or C173) and temperatures (ASTM C1064) in accordance with the Contract Documents.	X	

Cast-in-Place Concrete

7. Sampling and Testing of Concrete	#_ ACI-CFTT ACI-CCI ICC-RCSI PE/SE EIT	For Item 1 construction sample, test and report concrete strengths in accordance with the Contract Documents.	X	
8. Formwork	#_ ACI-CCI ICC-RCSI PE/SE EIT	Verify prior to concrete placement for Item 1 construction that formwork shapes, locations, and dimensions for concrete elements being formed comply with the Contract Documents.		X
9. Curing and Protection	#_ ACI-CCI ICC-RCSI PE/SE EIT	Verify prior to concrete placement, and periodically during the specified period of curing and protection, the means, methods, and maintenance of curing and protection of placed concrete for Item 1 construction are in compliance with the Contract Documents.		X
10. Curing and Protection	#_ ACI-CCI ICC-RCSI PE/SE EIT	Verify maintenance of specified curing temperature and techniques		Х
11. In-place Concrete Strength	#_ ACI-CFTT ACI-CCI ICC-RCSI PE/SE EIT	Verify in-place concrete strength prior to removal of shores and forms from beams and structural slabs		X

Masonry

Required Inspection Level: \square 1 \square 2

ITEM	AGENCY # (QUALIF.)	SCOPE	SPECIAL INSPECTION (CONTINUOUS)	SPECIAL INSPECTION (PERIODIC)
1. Mixing of Mortar	#_ ICC-SMSI PE/SE EIT	Verify prior to beginning masonry work, and periodically during the course of masonry work, that the proportioning, mixing and retempering of mortar materials are in compliance with the Contract Documents.		X
2. Mixing of Grout	#_ ICC-SMSI PE/SE EIT	Verify prior to beginning masonry work, and periodically during the course of masonry work, that the proportioning, mixing of grout materials are in compliance with the Contract Documents.		X
3. Installation of Masonry	#_ ICC-SMSI PE/SE EIT	Verify prior to beginning masonry work, and periodically during the course of masonry work, that the masonry unit sizes, layouts, bonding, placements, and location of structural elements are in compliance with the Contract Documents.		X
4. Mortar Joints	#_ ICC-SMSI PE/SE EIT	Verify prior to beginning masonry work, and periodically during the course of masonry work, that the construction of mortar joints are in compliance with the Contract Documents.		X
5. Reinforcement Installation	#_ ICC-SMSI PE/SE EIT	Verify prior to beginning masonry work, and periodically during the course of masonry work, that the size, grade, placement, positioning and lapping of reinforcing steel are in compliance with the Contract Documents.		X
6. Grouting Operations I	#_ ICC-SMSI PE/SE EIT	Verify prior to beginning masonry work, and periodically during the course of masonry grouting, that the placement of reinforcement, connectors, and anchors, etc. are in compliance with the Contract Documents, grout spaces are clean.		X
7. Grouting Operations II	#_ ICC-SMSI PE/SE EIT	Verify prior to beginning masonry work, and continuously during the course of masonry grouting, that grout consolidation and placement are in compliance with the Contract Documents.	X	

Page	5	of	6

Masonry

Required Inspection Level: oximes 1

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8. Protection of Masonry Materials, and Constructed Masonry	#_ ICC-SMSI PE/SE EIT	Verify prior to masonry work, periodically during masonry construction, and periodically during the specified period of curing and protection, that the means, methods, and maintenance of curing and protection of masonry materials and completed masonry work is in compliance with the Contract Documents.		X
9. Evaluation of Grout Strength	#_ ICC-SMSI	Test compressive strength of grout samples in accordance with ASTM C1019 for each 5000 sq. ft. of masonry wall or fraction thereof, and whenever there is a change in mixture proportions, method of mixing, or materials used.	X	
10. Masonry Anchorage	#_ ICC-SMSI PE/SE EIT	Verify anchor/tie sizes, locations, spacings, embedments, and other details of anchorage of masonry to structural members.	X	
11. Other	#_ ICC-SMSI PE/SE EIT	Verify compliance with the required inspection provisions of the Contract Documents.		X

Structural Steel Page 6 of 6

ITEM	AGENCY # (QUALIF.	SCOPE	SPECIAL INSPECTION (CONTINUOUS)	SPECIAL INSPECTION (PERIODIC) ^a
Material Verification of Structural Steel	# ICC-SWS PE/SE EIT	Identify markings to conform to ASTM standards specified in the Contract Documents. Manufacturer's mill certificate of compliance is required.		Х
2. Special Inspections and nondestructive testing of structural steel elements shall	# As per AISC 360 Chapter N	See AISC 360 Chapter N	As per AISC 360 Chapter N	As per AISC 360 Chapter N

Contractor's Statement of Responsibility

Each contractor responsible for the construction or fabrication of a system or component designated in the Quality Assurance Plan must submit a Statement of Responsibility.
Project:
Contractor's Name:
Address:
License No.:
Description of designated building systems and components included in the Statement of Responsibility:
Contractor's Acknowledgment of Special Requirements
I hereby acknowledge that I have received, read, and understand the Quality Assurance Plan and Special Inspection program.
I hereby acknowledge that control will be exercised to obtain conformance with the construction documents approved by the Building Official.
Signature Date

Contractor's Provisions for Quality Control

Procedures for exercising control within the contractor's organization, the method and frequency of reporting and the distribution of reports are attached to this Statement.

Identification and qualifications of the person(s) exercising such control and their position(s) in the organization are attached to this Statement.

Fabricator's Certificate of Compliance

control manual

completion of fabrication. Project: Fabricator's Name: Address: Certification or Approval Agency: Certification Number: Date of Last Audit or Approval: Description of structural members and assemblies that have been fabricated: I hereby certify that items described above were fabricated in strict accordance with the approved construction documents. Signature Date Title Attach copies of fabricator's certification or building code evaluation service report and fabricator's quality

Each approved fabricator that is exempt from Special Inspection of shop fabrication and implementation procedures per section 1704.2 of the IBCNYS must submit a *Fabricator's Certificate of Compliance* at the

SPECIAL INSPECTION DAILY REPORT

City/County of	Permit No.:	Date:
Project Name/Address:		
Inspection type(s) coverage:		
□ Continuous	□ Periodic	:
Inspection time: Beginning:	Ending:	
Describe inspections made, including locations:	_	
-		
Tests performed:		
New items needing correction:		
Corrected items from previous reports:		
Item corrections remaining incomplete:		
Changes to approved plans authorized by regis	tered design professiona	al in responsible charge:
		1 of 2

omments:		
o the best of my knowledge oproved plans, specifications a pove.	e, work inspected was in accordance with the and applicable workmanship provisions of the IB	e building departm CNYS except as no
gned: int Full Name:	Inspection Agency:ID / Certificate Number:	
nt Full Name:	ID / Certificate Number:	· · · · · · · · · · · · · · · · · · ·

cc: Project Owner 2 of 2

SPECIAL INSPECTION WEEKLY (INTERIM) REPORT City/County of Permit No.: Date: Project Name/Address: Total inspection time each day: Date Hours Inspection Type Frequency (P or C) Location P – Periodic inspection C - Continuous inspection Describe inspections made, including locations: Tests performed: New items needing correction: Corrected items from previous reports: Item corrections remaining incomplete: Changes to approved plans authorized by registered design professional in responsible charge:

1 of 2

Comments:					
To the best of my knowledge, work inspected was in accordance with the building department approved plans, specifications and applicable workmanship provisions of the IBC except as noted above.					
Signed:Print Full Name:	Inspection Agency:ID /Certificate Number:				
cc: Project Owner		2 of 2			

Final Report of Special Inspections

Project:		
Location:		
Owner:		
Owner's Address:		
Architect of Record: Barton & Loguidice, D.P.C.		
Structural Engineer of Record: Matthew Fuller,	P.E.	
To the best of my information, knowledge and belief, to the best of my information, knowledge and belief, the temized in the Statement of Special Inspections submitted in the Statement of Special Inspections submitted in the Statement of the best of the statement of Statement	ed for permit, have be	
Comments:		
Attach continuation sheets if required to complete the d	escription of correctio	ns.)
nterim reports submitted prior to this final report form a his final report.	basis for and are to b	pe considered an integral part of
Respectfully submitted,		
Special Inspector		
(Type or print name)		
Signature	Date	Licensed Professional Seal

SECTION 02 40 00

DEMOLITION AND REMOVAL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Demolition and Removal, as shown on the Plans, as specified and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. American National Standards Institute, Inc. (ANSI) Publications:
 - a. A10.4 Safety Requirements for Personnel Hoists and Employee Elevators for Construction and Demolition Operations
 - b. A10.6 Demolition Operations Safety Requirements
 - 2. National Fire Protection Association (NFPA) Publication:
 - a. 241 Safeguarding Construction, Alteration and Demolition Operations
 - 3. New York Code Rule and Regulations/Department of Labor:
 - a. 12 NYCRR Protection in Construction, Demolition and Part 23 Excavation Operations
 - 4. Occupational Safety and Health Administration (OSHA) Regulations:
 - 29 CFR Part 1926 Regulations for Construction

1.03 GENERAL REQUIREMENTS

A. Do not begin demolition until authorization is received from the Engineer. Remove rubbish and debris from the project site daily; do not allow accumulations inside or outside the buildings. Store materials that cannot be removed daily in areas specified by the Engineer. Demolish and remove materials containing asbestos in accordance with Section 02 82 00, "Removal and Disposal of Asbestos".

1.04 SUBMITTALS: Submit the following:

A. Statements:

1. Demolition plan

Submit proposed demolition and removal procedures to the Engineer for approval before work is started. Include procedures and coordination with other work in progress and, disconnection schedule of utility services, a detailed description of methods and equipment to be used for each operation and of the sequence of operations.

1.05 REGULATORY AND SAFETY REQUIREMENTS

A. Comply with Federal, State, and local hauling and disposal regulations. In addition to the requirements of the "General Requirements", safety requirements shall conform with ANSI A10.4, ANSI A10.6, NFPA 241, 12 NYCRR Part 23 and OSHA 29 CFR Part 1926.

1.06 DUST AND DEBRIS CONTROL

A. Prevent the spread of dust and debris to occupied portions of the building and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Vacuum and dust the work area daily.

1.07 PROTECTION

- A. Traffic Control Signs: Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Notify the Engineer prior to beginning such work.
- B. Facilities: Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities.

1.08 BURNING

A. Burning will not be permitted.

1.09 RELOCATIONS

A. Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Repair items to be relocated which are damaged or replace damaged items with new undamaged items as approved by the Engineer.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 EXISTING FACILITIES TO BE REMOVED

- A. Structures: Remove indicated existing structures four feet below existing grade (minimum), unless specifically indicated otherwise on the Contract Documents.
- B. Utilities and Related Equipment: Remove existing utilities, as indicated and uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Engineer. Remove meters and related equipment and deliver to a location in accordance with instructions of the Engineer. If utility lines are encountered that are not shown on drawings, contact the Engineer for further instructions.
- C. Paving and Slabs: Remove concrete and asphaltic concrete paving and slabs including aggregate base as indicated and required for installation of new work and associated aggregate bases.

3.02 DISPOSITION OF MATERIAL

A. Title to Materials: Except where specified in other sections, all materials and equipment removed, and not reused, shall become the property of the Contractor and shall be removed from Owner's property. Title to materials resulting from demolition, and materials and equipment to be removed, is vested in the Contractor upon approval by the Engineer of the Contractor's demolition and removal procedures, and authorization by the Engineer to begin demolition. The Owner will not be responsible for the condition or loss of, or damage to, such property after notice to proceed. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.

3.03 CLEANUP

A. Debris and Rubbish: Remove and transport debris and rubbish in a manner that will prevent spillage on pavements, streets or adjacent areas. Limit to 3/8-cubic yard capacity buggies or other conveyances used on roofs and within the building to transport removed debris. Clean up spillage from pavements, streets and adjacent areas.

END OF SECTION

SECTION 02 82 00

REMOVAL AND DISPOSAL OF ASBESTOS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies the removal and disposal of asbestos-containing materials (ACM), and asbestos-contaminated materials to accommodate planned building renovations at the Vestal Memorial Pool, 209 Clayton Avenue, Vestal, New York.

1.02 WORK INCLUDED

- A. The Contractor shall furnish all labor, materials, supervision, construction tools, and equipment necessary to perform the following work:
 - 1. Provide continuous on-site supervision by personnel knowledgeable in all aspects of asbestos removal and disposal.
 - 2. Provide and maintain environmental protective measures, equipment, and procedures at the work site.
 - 3. Provide and maintain personnel protective measures, equipment, and procedures at the work site.
 - 4. Provide and maintain personnel and waste decontamination facilities as required. Coordinate location of these facilities with Owner's personnel or representative.
 - 5. Package, transport, and dispose of all asbestos in accordance with all applicable Federal, State and local regulations.
 - 6. Contractor and his employees and subcontractors shall cooperate with the Owner's site specific policies and procedures. Additionally, Contractor shall fully cooperate with designated representatives with regard to air monitoring and observation of procedures.
 - 7. Remove all ACM and PACM as identified in the Pre-Renovation Investigation for Asbestos Containing Materials attached to this specification. The work includes the removal and disposal of roofing materials on the Bath-house roof covered with an asbestos containing silver coating (paint).
 - 8. Contractor must satisfy himself as to quantities, locations, and conditions, and base his bid accordingly. Coordination of all removals with other trades, if necessary, shall be the responsibility of the Contractor.

1.03 RELATED WORK

A. Coordinate all removals with Owner, Construction Manager, Engineer, and other trades as applicable.

2.01 BIDDING

- A. At the time of bidding, the Contractor shall provide evidence of the following:
 - 1. Contractor's NYSDOL Asbestos License.
 - 2. The Contractor shall submit a **notarized statement**, signed by an officer of the company, containing the following information:
 - a. A record of any citations, penalties, orders to comply, notices of deficiency, or notices of violations issued by Federal, State, or local regulatory agencies relating to asbestos abatement activity. Include projects, dates and resolutions.
 - b. Situations in which an asbestos related contract has been terminated including projects, dates and reasons for terminations.
 - c. A listing of any asbestos-related legal proceedings/claims in which the Contractor (or employees scheduled to participate in this project) have participated or are currently involved. Include descriptions of role, issue and resolution to date.

2.02 PRIOR TO CONSTRUCTION

- A. Prior to commencement of work, the Contractor shall submit the following:
 - 1. Abatement work plan, including the following:
 - 2. Phase, area, sequencing and timetable.
 - 3. Size, length and number of work shifts per day/per week.
 - 4. Mobilization Schedule.
 - 5. Use of applicable variances or approved specific variances obtained by the Contractor.
 - 6. Work plan shall additionally identify detailed aspects of how the Contractor will handle, containerize, transport, and dispose of materials.
- B. Satisfactory proof that written notification has been provided to the EPA regional office with jurisdiction over the project area in accordance with Title 40 CFR Part 61 Sub-parts A & M, National Emission Standards for Hazardous Air Pollutants, U.S. EPA, and the New York State Department of Labor in accordance with Part 56, Title 12 of the New York Code of Rules and Regulations.
- C. A written description and plan of an emergency alarm system which would alert workers in the work area to fire or other emergency situation.
- D. Documentation certifying that all employees have received appropriate medical examinations and have successfully passed a fit test for the respirator to be worn. As a minimum, medical exams must be consistent with requirements in OSHA Regulation 1926.1101.

- E. Provide copies of valid Asbestos Handling Certificates for all personnel demonstrating compliance with Code Rule Part 56, Title 12 of the New York State Department of Labor. Provide evidence of each employee's most recent training in accordance with Federal regulations. All employees must have completed initial or refresher training within one year of the dates of this work.
- F. Written approval and/or permits, as necessary, from the local sanitary district office for the discharging of wastewater into the sanitary sewer system. Documentation must be submitted if permits are not required.
- G. A written Hazard Communication Program that complies with the OSHA Regulation 29 CFR 1910.1200. Material Safety Data Sheets (OSHA Form 174 or equivalent) for all chemicals used during work performed under this Section.
- H. A written description of plans for providing temporary power.
- I. Manufacturers' certification that vacuums, ventilation equipment, and other equipment required to contain airborne fibers conform to HEPA filtration requirements.
- J. Manufacturers' certification for all materials used in the abatement project meet the requirements of these Specifications (as applicable).
- K. A copy of the form(s) used by the Contractor for maintenance of waste shipment records in compliance with EPA NESHAPS regulations.

PART 3 - EXECUTION

3.01 REMOVAL OF ASBESTOS-CONTAINING MATERIALS

- A. All asbestos abatement work to be conducted under this Contract shall be in compliance with but not limited to all Federal Regulations and Part 56 of Title 12 of the Official Compilation of Codes, Rules and Regulations of the State of New York (cited as 12 NYCRR Part 56), and Title 40 CFR Part 61 Sub-parts A & M, National Emission Standards for Hazardous Air Pollutants, and local laws and regulations.
- B. No site specific removal variance has been obtained for this project.
- C. The Contractor is responsible for obtaining any variance not issued to date that he feels may be applicable to the policies/procedures as set forth in Code Rule 12 NYCRR Part 56 to complete this work in an efficient and timely manner. Any variance obtained by the Contractor shall be reviewed and approved by the Owner/Engineer prior to use.

D. It is the responsibility of the Contractor to determine current waste handling, transportation and disposal regulations for the work site and for each waste disposal landfill. The Contractor must comply fully with these regulations, all appropriate U.S. Department of Transportation, EPA and Federal, State and local entities' regulations and all other current legal requirements.

3.02 AIR MONITORING REQUIREMENTS

- A. The Owner shall contract the services of an Independent Air Monitoring firm to conduct all air monitoring, as applicable, by NYSDOL Industrial Code Rule (ICR) 56.
- B. Air Monitoring Tests: The Owner shall contract the services of an independent testing laboratory to perform air sample laboratory analysis. The laboratory shall use the methods described in standards referenced in ICR 56.
- C. The Contractor shall be responsible to conduct all personal air sampling and analysis as required by the OSHA Construction Standard. All costs associated with these samples and analyses shall be assumed by the Contractor.

3.03 PROJECT MONITORING

- A. The Owner will hire an independent project monitor to advise the Owner in matters pertaining to the work performed in accordance with these and related specifications and requirements.
- B. The project monitor is authorized by the Owner to have free access to all asbestos and related work areas, to assist in interpretation of procedures, and to advise on provisions of the Contract Documents pertaining to the control of asbestos and related work.
- C. The project monitor may stop the Abatement Contractor's work if in the course of performing their monitoring duties, they observe an instance of non-conformance with the Contract Documents and/or a situation presenting a health hazard to workers or Owner's employees. Work shall not resume until corrective measures have been carried out.
- D. Any stop work orders issued by the Owner or the project monitor pursuant to the above provisions will not be grounds for claims to be made by the Contractor for damages caused by the associated delay nor will it extend the Contract completion date.
- E. The project monitor will act as the Owner's liaison in technical matters involving the work.

- F. The project monitor's role in advising the Owner on environmental health matters does not relieve the Contractor's obligation to comply with all applicable health and safety regulations promulgated by the Federal, State, and local governments.
- G. When visual inspections are required, the Contractor shall notify the Owner and the project monitor 24 hours, excluding weekends and holidays, in advance of the day and time when the Contractor will be ready for such inspections.

3.04 PROJECT CLOSEOUT

- A. Prior to the final payment, and before the issuance of a final certificate for payment in accordance with the provisions of the Contract Documents, Contractor shall comply with the requirements set forth herein.
- B. The work under this Section shall include but is not limited to the execution of the following principal items as they apply to Prime Contractors for Project Closeout:
 - 1. Submittal of all waste shipment record forms signed by the Contractor, transporter, and landfill operator for each shipment of asbestos waste.
 - 2. Assurance, satisfactory to the Owner, that unsettled claims will be settled and that work not actually be completed and accepted will be completed without any undue delay.
 - 3. Guarantees, Warrantees and Bonds required by the General Conditions and any other extended guaranties or warranties stated in the Specifications.
 - 4. Temporary facilities, services, surplus materials, rubbish and similar appurtenances have been removed and/or restored.

END OF SECTION

Attachment A

Pre-Renovation Asbestos Survey



April 18, 2022

Mr. Vernon Meyers, Engineer Town of Vestal 133 Front Street Vestal, New York, 13850-1486

Re: Investigation for Asbestos Containing Materials

Town of Vestal

Vestal Memorial Pool, 209 Clayton Avenue

File: 409.005.001

Dear Mr. Meyers:

We have completed sampling and investigation for asbestos containing materials for Vestal Memorial Pool. The focus of the investigation was to identify asbestos containing materials potentially impacted by the proposed demolition project.

We have provided a list of materials sampled below with results of the laboratory analysis.

Introduction

B&L was retained by the Town of Vestal to conduct a pre-demolition asbestos material survey for the Vestal Memorial Pool. The survey was necessary in anticipation of the proposed demolition project.

The survey was conducted by Jeff Brandon of B&L on April 8, 2022. Mr. Brandon is a New York State Department of Labor (DOL) certified asbestos inspector. A copy of the inspector's certification and B&L's company license are provided in Attachment A.

Survey Methods

Representative sampling was conducted based upon the planned renovations of interior and exterior building components. Friable samples were collected in triplicate and submitted for analysis by polarized light microscopy (PLM) with dispersion staining. Friable samples were analyzed utilizing serial analysis. Non-friable organically bound (NOB) materials are analyzed in accordance with New York State Department of Health requirements. NOBs are first subjected to an ashing and acid washing procedure to properly break down the material. The sample is then analyzed by PLM for asbestos content. If asbestos is found, the analysis is complete. However, a negative result must be confirmed by using transmission electron microscopy (TEM). All samples were analyzed by AmeriSci of New York, Inc. located in New York, New York.





Asbestos Sample Results

Vestal Memorial Pool						
Sample I.D.	Material Description	Estimated Quantity	Condition/ Friability	Results (% Asbestos)	Comments/Location	
SHINGLE- 1-1,2	Gray/Black Roof Shingles	NA	Fair/Non-friable	NAD	Pump House and Shed Roofs	
SHINGLE- 2-1,2	Gray/Black Roof Shingles	NA	Good/Non- friable	Trace	Bath-house Roof, Underneath SR-3	
SR-3-1,2	Silver Roof Paint	~240 ft²	Fair/Friable	4.6%	Bath-house Roof, Front Areas	
FLASH-4- 1,2	Black Roof Flashing	NA	Good/Non- friable	NAD	Bath-house Roof	
GLAZE-5- 1,2	White Window Glazing	NA	Good/Non- friable	NAD	Bath-house Office Windows	
ASP-6-1,2	Gray Asphaltic Pool Decking	NA	Good/Non- friable	NAD	Entire Pool Deck and Surrounding Structures	

NAD - No Asbestos Detected

Trace: Less than 1.0 % asbestos

Of the suspect materials sampled from the pool buildings, only the silver roof paint was found to be asbestos containing. No vermiculite was found in exterior walls.

In accordance with NYSDOL Industrial Code Rule 56, materials determined to be asbestos-containing must be removed by a licensed asbestos abatement contractor prior to renovation or demolition activities affecting them. This regulation also requires that a copy of this report be provided on site for all contractors to review during the work. A copy must also be sent to the local NYSDOL asbestos control bureau office, the government entity charged with issuing demolition permits or, if no such permit is required, to the town or city clerk where the building is located. Should unidentified or concealed materials be discovered during the renovation/demolition work that were not addressed by this survey the owner and contractor will be liable to follow the procedures identified in ICR56.

Applicable certifications are provided in Attachment A. Sample locations, laboratory reports and sample chain-of-custody are provided in Attachment B.

If you have any questions or comments, please feel free to call us at 457-5200.

Sincerely,

BARTON & LOGUIDICE, D.P.C.

Jeff Brandon Industrial Hygienist 1 John E. Rigge Vice President

JDB/JER/tlh Attachments Attachment A

Certifications

Attachment B

Laboratory Reports & Sample Chain-of-Custody Documentation

SECTION 03 21 00

REINFORCING STEEL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for installing all Reinforcing Steel, welded wire reinforcement and accessories for cast-in-place concrete as shown on the Plans, as specified, and/or directed.

1.02 REFERENCES

- A. Reference to standard specifications for the following organizations is intended to specify minimum standards for quality of materials and performance of workmanship, and for standard test methods.
 - 1. American Society for Testing and Materials (ASTM) Publications, Latest Edition
 - 2. American Concrete Institute (ACI) Standards, Latest Edition
 - 3. American Welding Society (AWS) Publications, Latest Edition
 - 4. American National Standards Institute (ANSI) Publications, Latest Edition
 - 5. Concrete Reinforcing Steel Institute (CRSI) Publications, Latest Edition

1.03 SUBMITTALS

- A. Shop Drawings: Indicate bar sizes, spacings, locations and quantities of reinforcing steel and welded wire reinforcement sheets, bending and cutting schedules, and supporting and spacing devices. No work on fabricating or placing steel shall be done until such drawings and schedules have been approved.
- B. Manufacturer's Certificate: Submit certified copies of mill test report of reinforcement materials analysis.
- C. Welder's Certificate: Submit certification from welders employed on the work, verifying AWS qualification within the previous twelve months.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Reinforcing steel bars shall be free from defects, kinks, bends, rust, scale or other irregularities. Welded wire reinforcement shall be of the electrically welded type, with wires arranged in rectangular or square patterns.

- B. Reinforcing bars shall be deformed billet steel meeting the requirements of ASTM A615 Grade 60.
- C. Steel welded wire reinforcement (WWR) shall meet the requirements of ASTM A1064.
- D. Stirrup steel shall be cold drawn steel wire meeting the requirements of ASTM A82.
- E. Where indicated, epoxy coated reinforcing bars shall be deformed billet steel meeting the requirements of ASTM A775, Grade 60.
- F. Where indicated, galvanized reinforcing bars shall be deformed billet steel meeting the requirements of ASTM A767, Grade 60.
- G. Accessory materials shall include: tie wire, minimum 16 gage annealed type. Epoxy-coated reinforcing bars shall be tied with plastic-; epoxy-; or nylon-coated tie wire. Chairs, bolsters, bar supports, and spacers shall be sized and shaped for strength and support of reinforcement during concrete placement conditions.

2.02 IDENTIFICATION AND PROTECTION OF REINFORCING BARS AND WELDED WIRE REINFORCEMENT:

- A. Reinforcing steel shall be delivered to the work in strongly tied bundles identified with metal tags corresponding to the bar schedules and diagrams. Identification marks shall show quantity, producing mill, bar size, type of steel and grade mark.
- B. All bars and WWR shall be stored off the ground and shall, at all times, be protected from moisture and be kept free from dirt, oil, or injurious coatings. Epoxy-coated reinforcing bars shall be stored on protective cribbing. If concreting is delayed for any considerable number of days after the reinforcing is placed in position, it shall be protected by covering with canvas or other satisfactory covering, or, if directed, shall be painted with a coat of neat cement grout.
- C. Any bar or WWR having a scaly rust shall be cleaned. Epoxy-coated reinforcing bars that are cut, welded or otherwise damaged shall be repaired with patching material conforming to ASTM A775 and done in accordance with the Material Manufacturer's recommendation. Galvanized reinforcing bars that are cut, welded or otherwise damaged shall be repaired with patching material conforming to ASTM A767 and done in accordance with the Material Manufacturer's recommendation. The Contractor will be required to replace bars exhibiting severely damaged coatings.

PART 3 - EXECUTION

3.01 FABRICATION AND INSTALLATION:

- A. Metal reinforcing shall be properly fabricated in accordance to references specified.
- B. Metal reinforcing shall be properly placed in accordance to CRSI, ACI 301, ACI 318, ACI SP-66, as shown on the approved Shop Drawings and as herein directed.
- C. Bars shall be bent in the shop to the shapes shown or required. Field bending shall be done only with the written approval of the Engineer. Field welding shall not be allowed without direct approval and supervision of the Engineer.
- D. Unless otherwise shown, splices in tension reinforcement shall not be permitted, and splices in compression reinforcement shall be lapped 40 diameters. All bar splices shall be staggered, wherever possible. Locate splices not indicated on drawings, at point of minimum stress. Splice locations must be approved by the Engineer.
- E. Reinforcing shall be securely tied and supported and must not be displaced during concrete placing operations. Epoxy-coated reinforcing bars shall rest on coated wire bar supports, or other acceptable materials. Dowels must be wired in place before concreting begins. All metal shall be kept away from exposed surfaces of concrete.
- F. Conduit in slabs on grade shall be placed in a depression below the slab and the reinforcement run continuous over conduit. Conduit in slabs on forms shall be above the bottom reinforcing and below the top reinforcing. No conduit is permitted in thin joist slabs.
- G. Cutting of bars to clear openings in walls or slabs is strictly prohibited. Warp bars around such openings.
- H. Provide two #5 diagonal bars at each corner of every rectangular opening in walls, unless otherwise shown on the Plans.
- I. All slabs, unless otherwise shown on the Plans, to be reinforced with not less than 6 x 6 W2.9 x W2.9 WWR (welded wire reinforcement), supported on approved fabricated, corrosion resistant chairs and located as specified. Supports shall be spaced as required to continuously maintain the specified reinforcement location within the slab thickness prior to and during slab concrete placement.

- J. Placing of concrete shall not be scheduled until all of the reinforcing for the section is secured in place and the reinforcing and forms have been approved by the Engineer or his representative. Contractor shall notify the Engineer 24 hours prior to a concrete pour.
- K. Welded wire reinforcement in slabs is to be placed in the upper third of the depth of the slab. Lap 6" minimum. Reinforcement sheets shall be straightened as required before placement.
- L. Provide bent bars 6'-0" long of same size and spacing as horizontal bars for all corners of foundation walls, unless otherwise shown on the Plans.
- M. Do not displace or damage vapor barrier.
- N. For footing reinforcement support bars on small precast concrete blocks; space at intervals as shown on the Plans and within minimum height specified above underside of slab or footing.
- O. Reinforcement shall not be bent after being partially embedded in hardened concrete.

3.02 CONCRETE PROTECTION FOR REINFORCEMENT:

- A. Unless otherwise shown or directed, concrete protection, measured from the surface of the bar, shall be the following:
- B. Exposed reinforcing bars intended for bonding with future extensions shall be protected from corrosion by a covering of concrete or other approved material.

3.03 FIELD QUALITY CONTROL

A. Field inspection will be performed under the provisions of Section 03 30 00.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for plain and reinforced Cast-In-Place Concrete work including accessory items of work herein described, as shown on the Plans, as specified, and/or directed.

1.02 REFERENCES

- A. Reference to standard specifications for the following organizations is intended to specify minimum standards for quality of materials and performance of workmanship, and for standard test methods.
 - 1. American Society for Testing and Materials (ASTM) Publications, Latest Edition.
 - 2. American Concrete Institute (ACI) Standards, Latest Edition.
 - 3. Standard Specifications Construction and Materials, New York State Department of Transportation (NYSDOT), Latest Edition, including Addenda thereto.

1.03 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301 and ACI 302.
- B. Acquire cement and aggregate from same source for all work.
- C. Conform to ACI 305R when concreting during hot weather, except as herein modified.
- D. Conform to ACI 306R when concreting during cold weather, except as herein modified.

1.04 SUBMITTALS, SAMPLES AND TESTS

A. Product Data: Provide data on joint devices, attachment accessories and admixtures.

B. Concrete:

1. Samples and tests of all materials to be incorporated in the concrete shall be submitted in ample time for testing before delivery. All materials are subject to inspection and testing by a commercial testing laboratory approved by the Engineer at the Owner's expense. All materials are subject to approval by the Engineer prior to their delivery to the site.

- 2. The Contractor shall obtain from the manufacturer, prior to the actual delivery of the concrete, a statement giving the sources, specific gravities, and sieve analyses of the aggregates and the dry weights of cement and saturated-surface-dry weights of fine and coarse aggregate and quantities, type and name of admixture (if any) and of water per cubic yard of concrete that will be used in the manufacture of each class of concrete to be provided. This data shall be sent to the Engineer for review and approval.
 - a. Aggregates shall be tested for gradation, purity and accelerated soundness. Tests shall comply with ASTM C33, C136, ASTM C40, and ASTM C88. The source of the material shall not be changed without retesting.
 - b. Cement shall have representative mill test reports on physical and chemical requirements. All cement stored at job site or at concrete supplier's place for over 60 days shall be tested for compliance with ASTM C150.
 - c. Contractor shall submit concrete mix design to be reviewed by the Engineer.
 - d. Tests of other materials may be required by the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All materials shown, specified or required to be incorporated in cast-in-place concrete shall be of finest quality, and shall be delivered, stored and handled so as to prevent damage. Damaged or inferior materials will be rejected. Approved brands or sources must be used, without change for the entire project. All materials shall be proportioned to produce a well graded mixture of high density and maximum workability.
- B. <u>Portland Cement</u> shall be a standard brand in compliance with ASTM C150 Type I. Only one brand shall be used for exposed work. Generally, Type I cement shall be used; however, Types II or III may be employed with the approval of the Engineer or if shown, or specified.
- C. <u>Fine Aggregates</u> shall be clean, sharp, natural sand, free from loam, clay, organic impurities or frozen materials and shall conform to ASTM C33 in all respects. Sand shall be tested for impurities in accordance with ASTM C40.
- D. <u>Coarse Aggregates</u> shall consist of strong, clean, crushed limestone or crushed gravel, free from harmful material and meeting all of the requirements of ASTM C33. Coarse aggregate shall also comply with New York State Department of Transportation Material Designation 703-02. Crushed limestone and crushed gravel shall meet the Physical Requirements (Testing) Designation 703-0201 and 703-0202, respectively.

- E. <u>Water</u> used in mixing concrete shall be clean and free from all acid, alkali or organic matter and shall be obtained from a public water supply unless specifically permitted otherwise by the Engineer.
- F. <u>Ready Mix Concrete</u> shall comply with ASTM Specification C94, this Specification, and used subject to the Engineer's approval.
- G. Admixtures, where shown or specified, shall be as follows:
 - 1. Air entraining agent shall be "Daravair" or "Darex AEA" as manufactured by W.R. Grace Co., or Master Builder's "MBVR", or equal meeting the requirements of ASTM C260.
 - 2. Water reducing agent shall be Sika "Plastiment", Master Builder's "Pozzolith", W.R. Grace's "WRDA", or equal meeting the requirements of ASTM C494.
 - 3. High range water reducers or superplasticizers shall be Sika "Sikament-FF", W.R. Grace's "Daracem-100" or "WRDA-19", or equal meeting the requirements of ASTM C494.
- H. <u>Bonding Agent</u>, where shown or specified, shall be "Dural 104" bonding compound manufactured by Dural International Corporation, "Sikadur 32 Hi Mod" by Sika Corporation, or equal.
- I. <u>Anchorage Items</u>, where shown or specified, shall be as follows:
 - 1. Inserts for fastening shelf angles shall be malleable iron adjustable wedge type, with bolt and washer, if required, as manufactured by Hohman & Barnard, Inc., Richmond Screw Anchor Co., Inc., or equal.
 - 2. Threaded inserts for fastening of soffits of concrete beams shall malleable iron, as manufactured by Hohman & Barnard, Inc., Richmond Screw Anchor Co., Inc., or equal.
 - 3. Ceiling hanger inserts shall be standard type wire as manufactured by Hohman & Barnard, Inc., Heckman Building Products, Inc., or equal.
 - 4. Masonry anchor slots shall be galvanized sheet metal, felt filled, as manufactured by Hohman & Barnard, Inc., Heckman Building Products, Inc., or equal.
 - 5. Flashing reglets shall be O'Keefe's Inc., PVC "Watertite Type P", or equal to size and shape shown.
- J. <u>Flexible Sleeve</u>, where shown or specified, shall be of resilient rubber with a flanged, serrated waterstop and shall be cast directly into the walls of the concrete structure as shown on the Contract Documents. Flexible sleeve shall conform to the following physical requirements:

PROPERTY	ASTM TEST REQUIREMENTS			
	METHOD	MIN.	MAX.	
Tensile Strength, psi	D412	1500	-	
Ultimate Elongation, percent	D412	450	-	
Hardness, Type A durometer	D2240	45	55	

- 1. Flexible sleeve must permit a minimum of 10 degrees deflection in all directions. Flexible sleeve shall be "Lockjoint Flexible Manhole Sleeve" as manufactured by Chardon Rubber Company, or equal.
- K. <u>Forms</u> shall be wood, metal, or other approved materials as follows:
 - 1. Plywood shall be Commercial Standard Douglas Fir, moisture resistant, concrete form plywood, at least 5-ply 5/8" thick.
 - 2. Metal forms shall be as approved, and must produce surfaces equal to those specified for wood forms.
 - 3. Form oil shall be an approved non-staining mineral oil, such as "Duogaurd II" by W.R. Meadows, or equal.
 - 4. Form ties shall be of approved design, adjustable length and free of devices that will leave hole or depression larger than 7/8" diameter. When forms are removed no metal shall be left within 1" of finished surface.
- L. <u>Waterstops</u>, where shown or specified, shall be minimum 3/8-inch thick across their entire section, heavy duty, serrated type manufactured from virgin polyvinyl chloride compound, "Model RB6-38H" as manufactured by Vinylex Corporation, or equal. They shall have a tensile strength of minimum 1800 psi and an elongation of minimum 200%.
 - 1. Waterstops shall be open bulb type, 6-inch wide unless otherwise shown or directed by the Engineer. The waterstops shall be supported during concrete placement to prevent dislodgement and to insure that the ends remain at right angles to the joint. Field joints shall be butt welded with an electric iron in accordance with the manufacturer's instructions.
 - 2. Sample of the waterstops to be used shall be submitted to the Engineer for approval.
- M. <u>Premolded Joint Filler</u>, where shown or specified, shall be premolded, resilient, non-extruding type, 1/2-inch thick unless shown otherwise, full depth of concrete section as manufactured by Celotex Corporation, "Fibre Expansion Joint Filler" by W.R. Meadows, or equal.
 - 1. Sample of the premolded filler proposed to be used shall be submitted to the Engineer for approval.

- N. <u>Joint Sealant</u>, where shown or specified, shall be elastomeric polyurethane sealant material, black in unexposed locations, and grey in exposed locations, and have balanced properties of elongation recovery and tensile strength, and shall be Sonneborn "Sonolastic NP1", Sika "Sikaflex 1A", or equal.
- O. <u>Protective Covering</u> for concrete finish slabs, where shown or specified, shall be "Orange Label Sisalkraft", Polyethylene Film as manufactured by Fortifiber Corp., or equal.
- P. Non-Shrink Grout, where shown or specified, shall be premixed compound consisting of non-metallic aggregate, natural aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days; such as "Masterflow" as manufactured by Master Builders, "SikaGrout 212" as manufactured by Sika, or approved equal.
 - 1. Non-Shrink grout shall be used under structural steel column baseplates and all equipment baseplates. All work shall be done in strict accordance with the manufacturer's recommendations. At the request of the Engineer, the manufacturer's representative shall be called to the job site for consultation regarding detailed use of the grout.
- Q. Grout for fillets, channels, or other non-structural applications shall consist of one (1) part cement (Portland Cement Type 2) and three (3) parts fine aggregate (sand) with sufficient mixing water for the intended application.
- R. <u>Cementitious Coating Materials</u>, where shown or specified, shall be "Thoroseal" with "Acryle 60" bonding agent, as manufactured by Thoro System Products, "Anchor Masonry Surfacer" as manufactured by Anti Hydro Waterproofing Company, or equal.
- S. <u>Curing Compound</u> shall be acrylic based "Kure-N-Seal" as manufactured by Sonneborn, acrylic based "CS-309", or water based "VOCOMP-20" as manufactured by W.R. Meadows, or equal.
- T. <u>Vapor Retarder</u>, where shown or specified, shall be "Moistop" as manufactured by Fortifiber Corp. <u>Vapor Barrier</u> shall be "Premoulded Membrane Vaporseal" as manufactured by W.R. Meadows, or equal.
- U. <u>Perimeter Insulation</u>, where shown or specified, shall be "Styrofoam Square Edge" as manufactured by the Dow Chemical Corporation, "Foamular 250" as manufactured by UC Industries, or equal.
- V. <u>Penetrating Sealer</u>, where shown or specified, shall be two components, 50% solids penetrating epoxy sealer. The penetrating sealer shall be fully compatible with the types of form oil, curing compound and joint sealant used.

- 1. Concrete surfaces to be treated must be dry, cured for a minimum of 21 days, free from surface accumulations of dust, dirt, oil, debris, concrete curing compounds, bond breakers, or other compounds which would prevent penetration and intimate contact between the concrete surface and the penetrating sealer. Concrete surfaces require preparation per manufacturer's directions prior to sealer installation.
- 2. Penetrating sealer shall be "Spec-Seal" as manufactured by Conspec, Inc., or equal.
- W. <u>Metal Slab Joints</u>, where shown or specified, shall be keyed type, minimum 18 gauge, galvanized steel by Heckmann Building Products, or equal.
- X. <u>Vapor Barrier</u>: 10 mil 0.254 mm) thick clear polyethylene film type recommended for below grade application.

2.02 CONCRETE MIX DESIGN

- A. The Contractor shall submit concrete mix designs to be reviewed by the Engineer. The mix designs shall be confirmed by making and testing trial mixes for each class of concrete to be incorporated in the work. All testing shall be made by an approved testing laboratory at the expense of the Contractor. Mix designs shall conform to the ACI 301, except as may be modified in the Plans and/or Specifications.
- B. No job concrete shall be poured until the mix design for that concrete has been approved by the Engineer. Once the mix has been approved, it shall not be changed, except when requested by the Engineer, or if requested by the Contractor and approved by the Engineer.
- C. Ready-mixed concrete from an established company will be approved, if conforming to ASTM C94, and to this specification. All concrete shall be batched, mixed, delivered to the site, and shall conform to these requirements and be controlled in a manner to assure uniform concrete for the quality specified.
- D. Water/cement ratios of all mixes shall be determined from w/c curve plotted from tests of the cement and aggregates used on the job. If necessary to increase the water content of the mix due to field conditions, sufficient cement must be added to maintain the design water/cement ratio. Accelerating or retarding admixtures may be permitted by the Engineer if requested by the Contractor to compensate for adverse weather conditions.
 - 1. The various classes of concrete shall be designated as follows:

MAXIMUM PERMISSIBLE WATER-CEMENT RATIOS FOR CONCRETE (WHEN STRENGTH DATA FROM TRIAL BATCHES OR FIELD EXPERIENCE ARE NOT AVAILABLE)

Maximum permissible water-cement ratio

CLASS	MIN. 28-DAY COMPRESSIVE	NON-AIR-ENTRAINED CONCRETE		AIR-ENTRAINED CONCRETE	
	STRENGTH IN PSI*	ABSOLUTE RATIO BY WEIGHT	US GAL. PER 94-LB. BAG OF CEMENT	ABSOLUTE RATIO BY WEIGHT	US GAL. PER 94-LB. BAG OF CEMENT
A	5,000	**	**	**	**
В	4,000	0.44	5.0	0.35	4.0
С	3,000	0.58	6.6	0.46	5.2
D	2,500	0.67	7.6	0.54	6.1
E	2,000	0.71	8.0	-	-

^{*28-}day strength. With most materials, water/cement ratios shown will provide average strengths greater than indicated in Section 5.4 of ACI 318R as being required.

Unless otherwise specified, all concrete shall be Class "B", non-air-entrained except exposed concrete which shall be air-entrained. When foundation walls or grade beams are exposed to weather above grade, the entire wall shall be considered exposed concrete.

2. Maximum size aggregates shall be used as follows unless otherwise designated by the Engineer.

1-1/2"	general work
3/4"	thin sections; heavy reinforcing
3/4"	columns, beams and slabs
Over 1-1/2"	massive structures, with approval
3/8"	floor toppings

3. Slump - Maximum:

Reinforced concrete – general	4"
Reinforced concrete - thin walls, columns	5"
Non-reinforced concrete	3"
Pavements, including sidewalks	3"
Heavy mass concrete	3"

- 4. Air Content: Use an approved air entraining admixture. The entrained content shall be controlled between 4% 6%. See Plans for concrete work requiring air entrainment.
 - a. For mixes containing coarse aggregate with a top size of 3/4" or smaller and for exposed concrete subject to frost and salt action, air contents shall be increased to the range of 5% 7%.

^{**}For strength above 4,500 psi (non-air-entrained concrete) and 4,000 psi (air-entrained concrete) proportions shall be established by methods of Section 5.3 of ACI 318R.

- 5. Should the Contractor feel it advantageous to employ concrete additives to improve workmanship or facilitate his work, he shall obtain the approval of the Engineer prior to his use of additives.
- 6. Use of accelerating admixtures in cold weather will not relax cold weather placement requirements.

2.03 STORAGE OF MATERIALS

- A. Portland cement shall be stored in a weather-tight structure. No cement that has taken a warehouse set shall be used and any stored over sixty (60) days shall be rejected unless tested for soundness and setting time under ASTM C150. Such tests shall be at the Contractor's expense.
- B. Fine and coarse aggregates shall be kept separated and free from deleterious substances. All topsoil shall be removed from the storage area. Materials shall be stockpiled in layers to prevent segregation; however, re-mixing may be required if gradation is not maintained. Care shall be taken not to inter-mix materials in the area with the aggregates.
- C. Any materials that have deteriorated or become contaminated will be rejected for use in the concrete and must be promptly disposed of by the Contractor.

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Before each pour, forms and reinforcing shall be inspected and approved by the Engineer. The Contractor shall give at least 24 hours' notice before such an inspection is required. No pour shall be started until the Engineer has given approval. No concreting may be done in the absence of the Engineer without written permission of the Engineer.
- B. Concrete Batch Ticket:
 - 1. The Contractor shall require the manufacturer of the concrete to furnish to the Engineer with each batch of concrete before unloading at the site, a delivery ticket on which is printed, stamped, or written, information concerning said concrete as follows:
 - Name of ready-mix batch plant
 - Serial number of ticket
 - Date
 - Truck number
 - Name of purchaser
 - Specific designation of job (name and location)
 - Designation of the concrete by compressive strength
 - Amount of concrete in cubic yards
 - Time loaded or of first mixing of cement and aggregates
 - Reading of revolution counter at the first addition of water

- Type and brand, and amount of cement
- Type and brand, and amount of admixtures
- Total water added by producer (and W/C ratio)
- Water added at job site (upon approval of the Engineer)
- Maximum size of aggregate
- Weights of fine and coarse aggregate
- Ingredients certified as being previously approved
- Signature or initials of ready-mix representative

C. Concrete Testing:

- 1. The Contractor shall employ an approved commercial testing laboratory at its own expense to provide field sampling, testing and inspection of all concrete for slab-on-grade floors and pavements, and pool construction. Continuous inspection by the approved testing laboratory shall be provided during all concrete pours. The Contractor shall maintain a record set of plans at the site showing date and amount of each pour, test results and temperature. If any portion of the work shows low test results, the Engineer may require batch plant inspection, additional testing, load tests, cored samples, and/or replacement of the faulty work, etc., at the Contractor's expense.
- 2. The Contractor, through its approved testing laboratory, shall make all laboratory or field tests as required and shall furnish all necessary equipment. The Contractor, through its approved testing laboratory, shall transport all test cylinders from the site to the laboratory.
- 3. Field concrete inspection: The Contractor, through its approved testing laboratory, shall provide a competent field concrete inspector whose minimum duties shall be as follows:
 - a. Check each truck on arrival to make sure that the concrete is not retempered.
 - b. Make necessary slump tests for uniformity control.
 - c. Make air tests and yield tests as required.
 - d. Make any and all test cylinders as may be required in the Specifications.
 - e. Notify the Engineers and/or his representative if any test results vary from the specified limits.

4. Tests:

- a. Concrete shall be tested by an approved testing laboratory as follows:
 - Standard 6" x 12" compression cylinders shall be in compliance with ASTM C39 in sets of six and shall be moist cured. Break 2 at 7 days, 2 at 28 days, and hold two for 56 day break. One set shall be made for approval of each mix design, one set for first pour of 50 cubic yards or less, and one set for each additional pour of 50 cubic yards. If less than 50 cubic yards are placed in one day, one set shall be made for each day's pour.

- All test cylinders shall be cast, moist cured and broken under laboratory conditions in accordance with the ASTM C31 and ASTM C39. All four cylinders of a test shall be taken from the middle third of a single load. Each cylinder shall be properly labeled with an identifying mark, the mix proportions, air content, amount of water, slump, and the location in the structure where the concrete was placed. Test reports shall include all this information. Distribute copies of reports as requested by the Engineer. Should any results be questionable, the Engineer shall be notified immediately so that corrective measures can be taken. Any test cylinder which has broken and fails to meet requirements shall be preserved for inspection by the Engineer.

D. Records:

Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.

3.02 BATCHING AND MIXING

- A. All Batching and Mixing shall conform to the following and the ACI 304, "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".
- B. Aggregates and bulk cement shall be measured to within 1% by weight. Cement in standard sacks need not be weighed. Water shall be measured by volume or by weight to within 1/2%. Aggregate weights shall be corrected for moisture content. Admixtures shall be added through appropriate dispensing equipment to an accuracy of 3%.
- C. The complete plant assembly shall be approved by the Engineer and shall conform to the following requirements:
 - 1. Provide ready adjustment of aggregate weights for varying moisture contents
 - 2. Provide means of accurately controlling and easily checking water-cement ratio.
 - 3. Provide accurate control of all materials with positive shut-off.
 - 4. Facilities shall be provided for prompt removal of excess materials in hoppers.
 - 5. Each specified size of aggregate shall be measured separately with a separate beam scale.
 - 6. Bulk cement shall be dropped through canvas drop chutes or telescopic flexible hose tremie.

- D. Concrete mixers or mixer trucks shall not be loaded to more than the rated capacity of the truck.
- E. All concrete shall be mixed not less than 60 revolutions in the drum of a modern power mixer, at the rated speed of rotation. Mix not less than an additional 30 revolutions after the addition of any further water to the mix.
- F. Do not add raw materials to the drum until all of the preceding batch has been discharged. For transit mixers, the wash water shall be discharged and not used as part of the mix water for the next batch.
- G. Transit-mixed concrete shall be transported to the job site unmixed and only after arrival at the job site shall mixing begin. All concrete shall be unloaded from the mixer within 45 minutes after completion of mixing. All concrete still remaining in the truck shall be rejected.
- H. The total time interval from the time the cement makes contact with the aggregate to the complete unloading from the mixer shall not exceed 90 minutes, unless such time is extended by the Engineer. The time may be reduced in hot weather or under unusual conditions, if unsatisfactory results are obtained.

3.03 FORMWORK

- A. The Contractor shall design and construct suitable and adequate formwork in conformance with ACI 347R. All shoring shall be properly braced to safely withstand all vertical, moving and lateral forces during the construction period. Responsibility for adequacy and safety rests with the Contractor. Materials shall be as stated in Paragraph 2.1.
- B. General requirements for all forms shall be as follows:
 - 1. Forms shall be constructed of wood, plywood, or steel.
 - a. All forms shall be set true to line, plumb, and properly braced so as to maintain the desired position and shape during and after pouring concrete. Forms shall be sufficiently tight to prevent leakage.
 - b. All joints between sheets shall be backed up to assure that both sheets are in the same plane. Edges of abutting sheets shall be straight and true and shall be forced tightly together to minimize fins. Quality of form contact surfaces shall be subject to Engineer's approval.
 - c. Form ties shall be designed for the specific wall thickness required, and after removal of the external portion, no metal shall remain closer than one inch (1") from the surface. Ties to be left in place shall be equipped with washers or other approved devices to prevent seepage of moisture along the tie. The removable portion shall be oil or grease coated.

- d. Immediately following the removal of forms, the projecting ties shall be removed and all holes filled with grout flush with the wall. Care shall be taken to use the same brand of cement and same mix proportions used in the wall to prevent color differences.
- e. Forms for walls and columns shall be provided with removable cleanout panels, to allow removal of chips and debris. All plywood forms must be new when first used on this job, but may be reused if kept in good condition. All forms shall be swept or flushed clean of shavings, debris, and other loose material. Loose earth and rock shall be scraped from footing trenches before pouring concrete.
- f. Provide 3/4" chamfer strips, unless noted otherwise on the drawings, at all exposed corners of columns, beams and walls where later finish is not to be applied.
- g. All forms and shores for floor and roof slabs and beams shall be "crowned" or "cambered" 1/4" for each 12 feet of span to eliminate dead load deflection. All forms shall be oiled with a non-staining mineral form oil before placing reinforcing.
- h. Build into forms all hangers, anchors, bolts, inserts, sleeves, etc., required to be set as part of this work, place and secure in exact position.

C. Form removal shall be as follows:

1. It shall be the Contractor's responsibility to determine the time at which forms may be removed without endangering the structure, subject to the following limitations, unless documentation is provided to modify these requirements:

Footing forms - 24 hours minimum; continue curing as specified.

Wall forms - 2 days minimum for ten (10) feet high. Add one (1) day for each additional five (5) feet of height; continue curing as specified.

Superstructure slabs, beams and columns shall not be stripped until the concrete attains at least 75% of its design strength as proven by test cylinders, and until a minimum of 14 days has elapsed.

Reshoring - immediately after stripping, fully reshore all slabs which are to be used to support shores for upper slabs. All forms for upper floor pours must be supported by shoring to at least two levels of full strength concrete.

3.04 JOINTS FOR CONCRETE

- A. Joints for concrete shall include all expansion joints, construction joints and contraction joints.
- B. All joints shall be constructed at locations shown on the drawings, or as directed by the Engineer. Additional joints may be constructed by the Contractor subject to the approval of the Engineer.

C. Expansion Joints:

- Expansion joints shall be constructed where shown and as directed.
 Reinforcement, corner protection angles or other fixed items embedded or
 bonded into concrete shall not be run continuously through expansion
 joints. Reinforcement shall be discontinued 2 inches from the joint face.
 A slightly rounded edging shall be provided to finish neatly all edges
 around expansion joints.
- 2. Preformed expansion joint filler material, sealant and waterstops, where shown on the drawings, shall be as specified in Paragraph 2.1.

D. Construction Joints:

- 1. The location of construction joints shall be chosen by the Contractor and shall be subject to the Engineer's approval except where specifically located on the Plans.
- 2. Horizontal construction joints in walls will not be permitted, except with the approval of the Engineer. In order to minimize shrinkage, long continuous walls shall not be poured at one time. No more than 50 feet in horizontal direction shall be poured without a construction joint, unless prior approval is obtained from the Engineer.
- 3. Reinforcing shall be discontinuous through a construction joint, unless otherwise noted on drawings. As shown or specified on the drawings, additional No. 3 reinforcing bars spaced at 12-inches on center shall be placed horizontally in each construction joint at the center of the section. These bars shall be 4-feet long and shall extend 2-feet on each side of the joint. Reinforcement projecting through joint shall be kept clean.
- 4. As indicated on the drawings, all construction joints shall be provided with a keyway and a PVC waterstop as specified in Paragraph 2.1. The joint surface of the concrete previously placed shall be cleaned of all foreign matter and laitance by means of sandblasting with steam and sharp sand, or by other approved methods, until coarse aggregate is exposed. The concrete surface shall be saturated for a period of 6 hours and excess water then removed.
- 5. The new concrete shall be preceded by about 1/2-inch of soft mortar of the same proportions as that in the concrete. When accessible, this shall be scrubbed into the surface of the joint with wire brooms. When waterproofing is required, the entire joint shall be parged with a grout of approved mixture as recommended by the manufacturer of the waterproofing admixture, or one composed of one part integral

waterproofing, three parts water and sufficient Portland Cement to form a thick, creamy mixture. This grout shall be fresh when followed by the new concrete. In column forms and deep narrow forms, the concrete placement shall be started with an oversanded mix with 5/8-inch maximum aggregate, and extra sack of cement per cubic yard, and a 5-inch slump. This mix shall be placed maximum 2 inches deep on the construction joint. A mortar layer shall not be used.

6. As indicated on drawings, a metal keyed floor slab joint may be used in lieu of above method.

E. Contraction (Control) Joints:

- 1. Contraction joints shall be located as shown on the drawings or as directed. Reinforcement through the joint shall be continuous as shown on the drawings and/or as directed by the Engineer.
- 2. Sawcut contraction joints (Type "A") shall be made by cutting the concrete surface and filling with the sealant material as specified under paragraph 2.1. Cutting shall be done after the surface is firm enough not to be damaged by the cutting blade. Time of cutting shall be approved by the Engineer.
- 3. Formed contraction joints (Type "B") shall be made by tooling with a 1/4-inch radius edging tool and filled with the sealant material as specified under paragraph 2.1.
- 4. Premolded Contraction Joints (Type "C") shall be "Kold-Seal Zipper Strip" by Vinylex or "Zip Cap Control Joint" by Greenstreak Products, or equal.
- 5. As indicated on drawings, a metal keyed floor slab joint may be used in lieu of above method.

3.05 INSERTS AND SLEEVES

- A. The Contractor shall cooperate with all other Contractors in permitting the placing of all necessary sleeves, conduit, or inserts for hangers for their trades. The Contractor shall notify the trades of all pours in ample time for the responsible Contractor to place all embedded items, sleeves, slots, holes or chases.
- B. Accurately set all slots, chases, anchor bolts, opening, etc. All inserts for hanging mechanical equipment shall be provided and set by the Contractor for the trade involved. All sleeves for piping passing through floors and walls shall be provided by the Contractor for the trade involved and set by the General Contractor.
- C. All conduit which must be placed in concrete slabs shall be installed after, and above the bottom reinforcing, but before, and under the top reinforcing. Where conduit cross-overs are necessary, they shall be located so that reinforcing is not displaced from its specified position.

- D. All anchor bolts for the structural steel shall be carefully set as shown on the fabricator's approved anchor bolt plan.
- E. If, in the judgement of the Engineer, embedded items are located or grouped in a manner that will weaken the structure, the Contractor shall take the necessary corrective steps.
- F. All inserts and sleeves where the outside diameter is greater than the spacing between the reinforcing steel, the reinforcing bars shall be warped around such inserts and sleeves. Unless shown otherwise on the drawings, provide, as a minimum, two #4 diagonal bars per face at 90 degrees to each other all around the inserts and sleeves.
- G. Where openings are left in new concrete or are made in existing concrete for the insertion of wall castings, pipes or other fixtures, the space around these fixtures shall be made watertight by completely filling with a non-shrinking concrete containing an admixture of "SikaSet-C", "Anti-Hydro" Concrete Waterproofing Agent, or equal.

3.06 CONVEYING AND PLACING CONCRETE

- A. The placing or depositing of all concrete shall be done in accordance with ACI 304, and as modified herein.
- B. Preparation Prior to Placing Concrete:
 - 1. Prepare previously placed concrete surfaces by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
 - 2. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
 - 3. Before placing concrete, all debris, water, snow and ice shall be removed from places to be occupied by concrete. Wood forms shall be wetted except in freezing weather or oiled, and the reinforcement cleaned of ice or other coatings.
- C. Conveying, transporting, and placing shall be done as rapidly as practicable and without segregation, loss of ingredients, and without unnecessary rehandling. The tempering of concrete will not be permitted.
- D. Concrete shall be deposited as nearly as practical to its final position to avoid segregation due to rehandling or flowing. The concreting shall be carried on at such a rate that the concrete is at all times plastic and workable and flows readily into the spaces between the reinforcing bars. No concrete that has partially hardened or been contaminated by foreign material shall be deposited on the work, nor shall retempered concrete be used. Once the concreting is started, it shall be carried on as a continuous operation until the placing of the panel or

section is completed. All concrete shall be compacted by suitable means during the placing operation, and thoroughly worked around reinforcement and embedded fixtures and into corners of the forms. Tremies shall be used for deep forms, and concrete shall not be dropped more than 6'-0".

E. Vibrating:

- 1. During and immediately after depositing, all concrete shall be thoroughly compacted by vibrating the concrete internally with mechanical vibrating equipment. Care must be taken not to over-vibrate the concrete. Maintain spare vibrator(s) at the site for use in the event of breakdowns.
- 2. Spade and work the coarse aggregate away from forms, and work concrete around reinforcement to avoid air pockets, voids, and honeycombed sections. Hand spading slabs will be required in addition to mechanical vibration.
- F. During concreting, check shoring frequently with level. Strengthen or adjust shoring as required. Ensure reinforcement, inserts, embedded parts and formed joints are not disturbed during concrete placement.
- G. Placing of concrete in supported elements shall not be started until the concrete previously placed in columns and walls is no longer plastic and has been in place at least two hours.
- H. Screed all work to level surfaces at the proper elevations. Rake surfaces to provide bond for floor finishes where specified.
- I. No concrete shall be deposited under water without written permission of the Engineer and then only in accordance with his directions. Proper tremie equipment and techniques must be used, should the need arise.
- J. The Contractor shall have available at all times, sufficient approved materials such that, when started, concrete shall be continuous operation until placement of panel or section is complete. Should placing of concrete be suspended or unavoidably interrupted once a pour has been started, provide bulkheads and keyways at formed surface at which to stop pour.
- K. All laitance shall be removed from previous pours before additional concrete is placed.
- L. Place concrete continuously between predetermined expansion, control and construction joints.

3.07 PROTECTION AND CURING

- A. All concrete shall be protected against injury by sun, rain, freezing, mechanical damage, or premature drying. All concrete shall be maintained above 50°F in a moist or wet condition for at least the first 7 days after placement.
- B. On vertical surfaces keep forms on, or cover with burlap blankets, kept wet. When forms are exposed to the sun, minimize moisture loss by keeping the forms wet until they can be removed safety.
 - 1. For the preservation of moisture, apply one of the following procedures to concrete not in contact with forms, immediately after completion of placement and finishing:
 - a. continuous sprinkling
 - b. application of absorptive mats or fabric kept continuously wet
 - c. application of waterproof sheet materials as specified in Part 2, herein
 - d. application of the curing agent specified in Part 2, herein
- C. On horizontal surfaces and floors to receive later finishes, cover with wet burlap, wet sand, or curing paper and keep saturated. Cement finish floors shall be covered with protective covering material with lapped and sealed edges after the concrete has set sufficiently to carry worker's weight. Covering shall remain in place until floor is cleaned. Weight covering with planks as required to hold it in place.
- D. Cold weather protection shall conform to A.C.I. 306R, except as modified herein.
 - 1. Prior to pouring, it shall be the Contractor's responsibility to keep the forms free from snow, ice, mud or debris at all times, by means of covers, enclosures, live steam or heating below the forms, as necessary. Use of torches, open flames, salts, straw, hay or chemical is prohibited.
 - 2. When air temperature is 40°F, or less, use only heated concrete, delivered to the forms at temperatures between 65°F and 85°F. All portions of freshly poured concrete shall be continually maintained at a temperature of not less than 50°F for seven days. Specified temperature shall be maintained by heated enclosures, insulating blankets, insulated forms, or whatever approved methods are required to attain the specified result.
 - 3. Concrete shall not be poured on frozen soil. After pouring, protect against freezing and heaving of subgrade. Any frozen concrete will be rejected and removed at the Contractor's expense. Accelerating admixtures shall not be accepted in lieu of winter protection.
- E. Hot weather protection shall conform to ACI 305R, except as modified herein.
 - 1. During warm dry weather special care and precautions should be taken to prevent premature setting which may cause shrinkage and surface checking. No concrete shall be placed at temperatures above 90°F without approval of the Engineer.

- F. No water (except curing spray) shall be allowed to come in contact with the concrete or masonry surface for a minimum of 24 hours. Should the rising water place a stress on the concrete, proper bracing shall be provided. Loading shall not occur without prior approval by the Engineer, and proper safety precautions shall be the responsibility of the Contractor.
- G. Curing compound may be used as specified in Paragraph 2.1 provided discoloration does not occur and application is in accordance with manufacturer's direction and is compatible with concrete finish.

3.08 FOOTINGS AND MATS

- A. Hand trim excavation to required levels.
- B. Where shown on the drawings provide concrete mud mat to the thickness indicated.
- C. Support reinforcing on bricks or precast blocks, or where mud mat is used, on chairs or bolsters, 3" clear of soil.
- D. Columns and wall dowels shall be positioned, supported and tied in place before concrete is poured. Footing bottoms shall be inspected and approved by the Engineer before placing mud mat or footings.

3.09 SUPPORTED SLABS ON FORMS

- A. Forms shall be built to required dimensions and camber as specified above. Reinforcing shall be located as shown on approved placing plans. Support bars at specified heights with bolsters, chairs, etc., so that reinforcing will not be moved from the specified position during placing of concrete.
- B. Refer to Article 3.5 for installation of conduits.

3.10 SLABS ON GROUND

- A. Subgrade and base to be prepared as specified in Contract Documents.
- B. Form depressed ribs under partitions as required by sloping gravel, or provide permanent side forms to retain gravel.
- C. Trench subgrade for electric conduit as detailed on Plans. All reinforcing shall be above electric conduit.
- D. Place slabs of thickness shown on Plans, vibrate, screed, float level, and finish as specified below.

3.11 CONCRETE FINISHES - FORMED SURFACES

- A. After the forms are removed, all concrete surfaces shall be inspected, and any poor joints, voids, stone pockets or other defective areas noted by the Engineer shall be repaired immediately at the Contractor's expense by cutting away the unsound area to a minimum depth of 1 inch, and refilling with mortar mixed using the same brand of cement as the original pour. Edges of the patch shall be square with the face, with feather-edging prohibited. Obtain approval of corrective action prior to repair.
- B. Care shall be taken to saturate the patched area and holes shall be filled in 1/2-inch layers with a delay for an initial set to take place before the succeeding layer is applied. If, in the opinion of the Engineer, improper consolidation is too extensive, or if the structure appears weakened by the voids, complete removal of the concrete in question may be required. Patches shall be kept moist for a minimum of three days.
- C. Rubbed finishes shall be as follows:
 - 1. <u>Type A</u>: Surfaces shall be rubbed until all marks are obliterated and a uniformly smooth finish is obtained.
 - 2. <u>Type B</u>: Surfaces shall be rubbed until they are uniformly smooth, but the complete obliteration of all marks is not required.
 - 3. <u>Type C</u>: All fins, burrs and projections shall be removed, any honey-comb or tie-holes shall be filled and patched.
- D. The type of finish to be used shall be as scheduled or as noted on the Plans.

 Where the type of finish is not shown or scheduled, exposed faces shall be given a

 Type B finish and unexposed faces shall be given Type C finish.
- E. Rubbing shall begin as soon as practicable after removal of forms and shall be expedited to completion as rapidly as practicable.
- F. Surfaces shall be rubbed with carborundum and water until all fins, bubbles, hollows and other defects are removed. Grout or mortar shall not be used in the rubbing process, and plastering of surfaces will not be permitted. Power tools shall be used for rubbing with hand work limited to inaccessible corners or very small areas.

3.12 FLOOR AND SLAB FINISHING

A. Finished floors and slabs shall be level to within 1/8" of finish floor elevation in ten feet. If this variation occurs, it must not be abrupt, but must taper so that the 1/8" variation takes place in not under 4 feet. Areas with drains shall have the surfaces sloped uniformly and true to the effect that no surface ponding occurs. If required by the Engineer, replace, grind or furnish underlayment to correct the variation, at the Contractor's expense. All floors and slabs shall be cured and protected as specified.

- B. Troweled Finish: Provide a floated finish, followed by a power troweling and then a hand troweling thoroughly consolidating the surface. Provide a finished surface essentially free from trowel marks and uniform in texture and appearance.
 - 1. Where exposed concrete finish is specified, provide a steel troweled finish.
 - 2. Under quarry tile and ceramic tile screed to accurate lines and levels as required to receive these materials. Floors receiving tile are to be steel troweled finished and are indicated on the Plans.
- C. Float Finish: A float finish shall be applied to all exterior concrete and those areas not intended for occupancy, such as culvert inverts, bottoms of manholes and catch basins, pads, etc.
- D. Broom Finish: Provide a floated finish. While the surface is still plastic, provide a textured finish by drawing a fiber bustle broom uniformly over the surface in one direction only. Provide "medium" texturing unless noted otherwise on the Contract Drawings. Sidewalks, walkways, or exterior ramps shall be given a broom finish, perpendicular to traffic, sufficient to leave marks without appreciable disturbance of the surface.
- E. Dusting with dry cement or cement sand mixtures, to hasten drying, is prohibited. Dry time shall be controlled by controlling the water content and slump of the concrete when placed.

3.13 BONDING

- A. For the bonding of new and old concrete, such provisions shall be made by means of steps, dovetails, bonding agents as specified in Paragraph 2.1, or other devices as shown, or directed.
- B. When placing of concrete is suspended or unavoidably interrupted, all necessary grooves for bonding future work shall be made before the concrete has attained its initial set. When the work is resumed, concrete previously placed shall be roughened, cleaned of all foreign material and laitance by means of sandblasting with steam and sharp sand or other approved methods, until coarse aggregate is exposed, and thoroughly wetted and slushed with mortar containing the same proportion of cement and fine aggregate as used in the concrete to be placed. Follow manufacturer's preparation recommendations when using a bonding agent.

3.14 MISCELLANEOUS CONCRETE WORK

A. Pour all sump pits, canopies, copings and provide all other miscellaneous concrete and cement work shown on the drawings. All such concrete shall be reinforced as shown. Provide all cement filled stair treads as detailed. Place bottoms and walls of pits and trenches monolithically or provide waterstops and keys.

- B. Concrete Walks: Provide 4 inches thick minimum. Provide contraction joints spaced every 5 linear feet, unless otherwise indicated. Cut contraction joints 3/4-inch deep with a jointing tool after the surface has been finished. Provide 1/2-inch thick transverse expansion joints at changes in direction, where sidewalk abuts curb, steps, rigid pavement, or other similar structures. Provide a transverse slope of 1/4-inch per foot, and limit variation in cross section to 1/4-inch in 5 feet unless otherwise indicated.
- C. Curbs and Gutters: Provide contraction joints spaced every 10 feet maximum, unless otherwise indicated. Cut contraction joints 3/4-inch deep with a jointing tool after the surface has been finished. Provide expansion joints 1/2-inch thick and spaced every 100 feet maximum, unless otherwise indicated. Provide a broom finish.
- D. Equipment Bases: Unless otherwise shown, all equipment shall be erected on bases of Class "B" concrete. Thickness shall be as noted on the Plans, but at no time shall it measure less than 1 inch.
- E. Concrete Stairs, Steps and Platforms: Stairs, steps and platforms shall be formed to required profiles shown on the Plans. Place reinforcing as required. Finish of stairs and steps shall be monolithic. Where shown on Plans, provide for nosings. Exterior stairs, steps and platforms shall have a non-slip finish. Before final troweling, embed abrasive grits, as specified in Paragraph 2.1, in the surface.

3.15 CEMENTITIOUS COATING

- A. Cementitious Coating shall be applied to all exposed exterior and interior Cast-In-Place Concrete surfaces except concrete floors and walking surfaces in accordance with the schedule shown on the Plans, or otherwise directed.
- B. The surfaces to be coated shall be clean, free of all laitance, dirt, grease, curing compound, form treatments, efflorescence, paint and other foreign matter. All formed tie-rod holes and honeycombed areas shall be patched flush with the surrounding area using mortar as recommended by cementitious coating manufacturer.
- C. All areas scheduled to be coated will receive two coats of cementitious coating as specified in Paragraph 2.1, applied at a minimum rate of 2 pounds per square yard per coat. The first coat shall be allowed to set before the second coat is applied. Sufficient materials shall be applied to fully seal all pores and voids. All coatings shall be done strictly in accordance with the manufacturer's recommendations.

END OF SECTION

SECTION 03 37 13

SHOTCRETE (WET MIX)

PART 1 - GENERAL

1.01 SUMMARY

- A. Under this Section the Contractor shall furnish all labor, materials, and equipment for the supply and installation of wet mix shotcrete as shown on the Plans, as specified, and/or directed.
- B. This Section includes the requirements for wet mix shotcrete including requirements for materials, proportioning, application and testing of structural and nonstructural wet mix shotcrete.
- C. Shotcrete work shall conform to all requirements of ACI 506.2-13, Specification for Shotcrete, published by the American Concrete Institute, Farmington Hills, Michigan, except as modified by this Section.

1.02 REFERENCES

- A. The following is a list of standards that may be referenced in this Section:
 - 1. ASTM International (ASTM):
 - a. A185/A185M-07—Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - b. A615/A615M-12—Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - c. A706/A706M-09b—Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - d. C33/C33M-13—Standard Specification for Concrete Aggregates.
 - e. C42/C42M-13—Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - f. C94/C94M-13a—Standard Specification for Ready-Mixed Concrete.
 - g. C127-12—Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.
 - h. C128-12—Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
 - i. C150/C150M-12—Standard Specification for Portland Cement.
 - j. C171-07—Standard Specification for Sheet Materials for Curing Concrete.
 - k. C231/C231M-10—Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - 1. C309-11—Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

- m. C494/C494M-13—Standard Specification for Chemical Admixtures for Concrete.
- n. C457/C457M-12—Standard Test Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete.
- o. C618-12a—Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- p. C642-13—Standard Test Method for Density, Absorption, and Voids in Hardened Concrete.
- q. C685/C685M-11—Standard Specification for Concrete made by Volumetric Batching and Continuous Mixing.
- r. C928/C928M-09—Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs.
- s. C989/C989M-12a—Standard Specification for Slag Cement for Use in Concrete and Mortars.
- t. C1059/C1059M-99 (2008)—Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
- u. C1064/C1064M-12—Standard Test Method for Temperature of Freshly Mixed Hydraulic -Cement Concrete.
- v. C1077-13b—Standard Practice for Laboratories Agency Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.
- w. C1140/C1140M-11—Standard Practice for Preparing and Testing Specimens from Shotcrete Test Panels.
- x. C1141/C1141M-08—Standard Specification for Admixtures for Shotcrete.
- y. C1240-12—Standard Specification for Silica Fume Used in Cementitious Mixtures.
- z. C1315-11—Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
- aa. C1385/C1385M-10—Standard Practice for Sampling Materials for Shotcrete.
- bb. C1436-08—Standard Specification for Materials for Shotcrete.
- cc. C1480/C1480M-12—Standard Specification for Packaged, Pre-Blended, Dry, Combined Materials for Use in Wet or Dry Shotcrete Application.
- dd. C1583/C1583M-13—Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull off Method).
- ee. C1602/C1602M-12—Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
- ff. C1604/C1604M-05(2012)—Standard Test Method for Obtaining and Testing Drilled Cores of Shotcrete.

- B. Related work specified elsewhere:
 - 1. Section 03 21 00 Steel reinforcement.
 - 2. Section 03 30 00 Cast-In-Place Concrete.
 - 3. Section 07 92 00 Joint Sealants.
 - 4. Section 13 11 00 PVC Membrane Swimming Pool Lining System
 - 5. Section 13 11 43 Swimming Pool Perimeter Gutter System

1.03 SUBMITTALS

- A. Comply with Division 00, GENERAL REQUIREMENTS, Section 00 13 40 Submittals.
- B. Submit data showing compliance with requirements of the following.
 - 1. Material safety data sheets (MSDS) for all materials.
 - 2. Shotcrete mixture proportions. Show constituent proportions by mass in the case of batching by weight, or proportions by volume in the case of volumetric batching, and water-cementitious materials ratio (w/cm).
 - 3. Suppliers' technical data showing compliance with requirements for prepackaged materials meeting ASTM C1480/C1480M.
 - 4. Compressive strength test results.
 - 5. Admixture types, brand names, producers, manufacturer's technical data sheets describing technical properties and performance in shotcrete and showing compatibility with the project cementitious materials. If hydration control admixtures are proposed by the Contractor, the use of such admixture shall be assessed in a preconstruction, prequalification test program.
 - 6. Cementitious materials types, test reports showing manufacturing location, and compliance with applicable ASTM standards.
 - 7. Aggregate source, producers' names, gradations, specific gravities, in compliance with ASTM C33/C33M, and evidence that data submitted is not more than 1 year old.
 - 8. Aggregate absorption in accordance with ASTM C127 for coarse aggregate and ASTM C128 for fine aggregate.
 - 9. Qualifications and experience of the proposed workers including the supervisor, nozzlemen, and crew.
 - 10. Current ACI certification of nozzlemen.
 - 11. Shotcrete qualification experience of the Contractor and crew foreman shall include at least five projects of similar size and complexity. Proof shall include a description of previous project's size; density of reinforcing materials; volume of shotcrete placed; and the name, address, and current phone number of person(s) representing the project's Owner or Architect/Engineer.
 - 12. Shotcrete qualification experience of the Contractor and crew foreman shall include proof acceptable to the Engineer that the Contractor and crew foreman have at least 5 years' experience in shotcrete applications similar to that shown on the Plans.

- 13. Mill certificates showing conformance of bar reinforcing steel, and welded wire reinforcement.
- 14. Test reports for shotcrete boiled absorption and volume of permeable voids showing compliance with the specified properties and ASTM C642.
- 15. Repair procedure(s) for shotcrete defects. The submittal shall include proposed materials, surface preparation, bonding procedures, protection and final surface finish.
- 16. Curing materials and curing procedures for shotcrete.
- 17. Name of Contractor's proposed testing agency and documentation of the agency's certification in compliance with ASTM C1077.

1.04 QUALITY ASSURANCE

- A. Preconstruction and Construction Testing:
 - 1. Testing of materials required as part of the preconstruction and construction testing programs shall be conducted by the Contractor's testing agency. Contractor's proposed testing agency shall be acceptable to the Engineer.
 - 2. The Contractor shall notify the Engineer of the time and place of preconstruction testing and provide the Engineer with copies of testing reports as specified in this Section.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cement: Unless otherwise specified, cement shall comply with ASTM C150/C150M.
- B. Supplementary Cementitious Materials: When specified, supplementary cementitious materials shall comply with ASTM C618 for fly ash and natural pozzolans, ASTM C989/C989M-12a for slag cement, and ASTM C1240 for silica fume.
- C. Aggregate: Unless otherwise specified, aggregates shall comply with ASTM C33/C33M for normal weight aggregates. The combined aggregate gradation shall comply with grading No. 1 or No. 2 of ASTM C1436, unless otherwise specified.
- D. Water: Unless otherwise specified, water shall be potable.
- E. Admixtures: When admixtures are permitted or required, the admixtures shall comply with ASTM C1141/C1141M or, for hydration control admixtures, with ASTM C494/C494M.

- F. Reinforcement: Reinforcement shall be the grades, types, and sizes required by the Contract Documents and, unless otherwise specified, shall conform to one of the following:
 - 1. Deformed steel reinforcement: ASTM A615/A615M;
 - 2. Welded wire reinforcement: ASTM A185/A185M;
 - 3. Weldable reinforcement: ASTM A706/A706M.
- G. Curing materials shall conform to the following:
 - 1. Sheet Materials: Unless otherwise specified, sheet materials for curing shall comply with ASTM C171.
 - 2. Curing Compounds: Unless otherwise specified, curing compounds shall comply with ASTM C309 or C1315. Volatile organic compounds (VOC) content shall be in compliance with local air quality standards if those requirements are more stringent.
 - 3. Do not use curing materials that cause stains for shotcrete having an architectural finish.
- H. Delivery, Storage, and Handling: Deliver, store, and handle materials to prevent contamination, segregation, corrosion, or damage. Store and protect liquid admixtures as required to prevent evaporation and freezing.
- I. Packaged Shotcrete Materials: When permitted, packaged, preblended, dry combined materials shall comply with ASTM C1480/C1480M.
- J. Shotcrete Properties: The 28-day compressive strength shall be 4000 psi minimum. The compressive strength shall be assessed in accordance with ACI 301.
- K. Air content for shotcrete shall be within the limits specified in the Contract Documents. Test frequency in accordance with the Contract Documents.
- L. Water-Soluble Chloride Ion Content In Mixture: Water-soluble chloride ion content shall not be greater than that specified in Contract Documents.
- M. Limitations on Supplementary Cementitious Materials: Contract Documents shall specify limits on type and quantity of supplementary cementitious materials as defined in paragraph 2.01.B of this Section.
- N. Shotcrete boiled absorption and volume of permeable voids: When required, conduct testing of shotcrete absorption and volume of permeable voids in accordance with ASTM C642.
- O. Bond Strength: Testing for bond strength, when specified, shall be on a minimum of three core samples and the strength shall be the average of all samples.
- P. Proportioning: Proportion shotcrete mixture by mass complying with ASTM C94/C94M, or by volume complying with ASTM C685/C685M, to satisfy the specified properties.

Q. Batching, Mixing, And Delivery: Batch, mix, and deliver wet-mixture shotcrete in accordance with ASTM C94/C94M, C685/C685M, or C1116/C1116M as applicable.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Forms shall be to line and grade and have adequate support to remain rigid during shooting.
- B. Formwork, substrata preparation, and cleanliness shall comply with Contract Documents.
- C. Reinforcement type, size, grade, amount, placement, cleanliness, and other requirements shall comply with Plans.
- D. Placement of and clearance around reinforcement shall permit complete encasement of reinforcement.

3.02 PREPARATION

- A. The Contractor shall have on-site redundancy (back-up) of all equipment, labor and tools necessary to continue with uninterrupted placement of shotcrete once shotcrete placement begins during a shotcrete placement event.
- B. The Contractor shall verify all equipment and tools, including back-up equipment and tools, are in good working order prior to start of shotcrete operations on any given day of work.
- C. Earth Surfaces: Earth surfaces shall be prepared to line and grade. Dampen surfaces immediately prior to shooting. No standing water shall be visible.
- D. Concrete, Masonry, and Shotcrete Surfaces: Remove all deteriorated, loose, unsound material or contaminants that will inhibit bonding. Receiving surface shall be dampened and allowed to dry to a saturated surface-dry (SSD) condition just prior to shotcrete application.
 - 1. Chip surfaces to receive shotcrete to remove offsets causing abrupt changes in thickness.
 - 2. Roughen receiving surfaces that have been sawcut.
- E. Rock Surfaces: Remove loose material, mud, or other foreign material that will inhibit bonding. Clean surface prior to shotcrete placement. Dampen surface in accordance immediately prior to shooting. No standing water shall be visible.

- F. Reinforcement Surfaces: Surface of the reinforcement shall be free of overspray or other deleterious materials that inhibit development of bond with the shotcrete.
- G. Reinforcement shall be ties and secured to prevent movement after reinforcement is installed in its final position as specified in accordance with the Contract Documents.
- H. Reinforcement Lap Splices: Lap splices shall be noncontact and shall be separated with a clearance of at least three times the diameter of the largest reinforcing bar; three times the maximum size aggregate; or 2 in., whichever is least, unless otherwise specified.
 - 1. Noncontact lap splices in flexural members shall not be spaced transversely farther apart than the smaller of 1/5 the required lap splice length and 6 in.
 - 2. The use of contact lap splices necessary for support of the reinforcing is permitted when approved by the Engineer. Lap spliced bars shall be in the same plane and parallel to the direction of shooting.
 - 3. The use of mechanical and welded splices are permitted upon approval of the Engineer.
- I. Forms: Use material of adequate thickness for formwork to resist movement during shooting. Reinforce, secure, and brace forms to minimize the effects of vibration during shooting. Construct forms to allow escape of placement air, overspray, and rebound. Use form-release coating material on removable forms unless the formed surface is to subsequently receive an additional coating.

J. Joints

- 1. Construction Joints: Taper construction joints at approximately 45 degrees from receiving surface. Form joints by cutting the shotcrete in a plastic condition. Joints at slab intersections shall be made at 90 degrees. Roughen shotcrete in the joint face while it is still plastic.
- 2. Contraction Joints: Where specified, place control joints as indicated in Contract Documents. Discontinue reinforcement at control joints unless otherwise specified.

K. Alignment Control

- 1. Establish thickness and plane of required surfaces, install taut ground wires or other means to guide the nozzleman.
- 2. Install alignment control means at corners or offsets not established by forms.

3.03 INSTALLATION

A. Shoot shotcrete within the time limits in ASTM C94/94M.

- B. Placement Techniques
 - 1. Use the same shotcrete mixture and equipment that was used during nozzleman qualification and mixture design acceptance for the production shotcrete.
- C. Use temporary coverings to protect adjacent surfaces from the deposit of overspray or impact from the nozzle stream.
- D. Use sufficient lighting and ventilation to provide the shotcrete crew with a clear view of the shooting area.
- E. The Contractor shall suspend work and adopt corrective measures if visibility is unsuitable for the application of quality shotcrete.
- F. Provide working surfaces that permit nozzlemen with unobstructed access to the receiving surface. Shotcrete shall be placed in a manner that does not allow rebound or overspray to collect in corners and recesses.
- G. The supply of shotcrete material and air pressure at the nozzle shall be uniform, providing a steady, continuous flow of shotcrete with no detrimental surging or pulsing. Maintain the velocity and consistency of shotcrete exiting the nozzle at a uniform rate appropriate for the given job conditions so that satisfactory material consolidation and minimum rebound is achieved.
- H. Apply shotcrete using a circular or elliptical motion of the nozzle while building the required thickness.
- I. Place shotcrete perpendicular to the receiving surface using sufficient material velocity, material consistency, and distance from the end of the nozzle to the receiving surface to produce maximum consolidation of the shotcrete and full encapsulation of the reinforcing steel.
- J. Apply shotcrete so sagging or sloughing does not occur. Where there is potential for accumulated rebound or overspray material to be incorporated into the work at congested areas of steel reinforcement, embedded obstructions, corners, and recesses, use a compressed air blow pipe to remove loose material from the work.
- K. Reuse of rebound or overspray in the work will not be allowed.
- L. Discontinue placement of shotcrete or shield the nozzle stream if wind causes separation of ingredients in the nozzle stream.
- M. Remove laitance from shotcrete surfaces that are to receive additional shotcrete layers.
- N. Do not apply shotcrete to surfaces with standing or flowing water.

O. Remove hardened overspray and rebound from adjacent surfaces, including exposed reinforcement.

P. Intermediate Surfaces

- 1. When applying more than one layer of shotcrete, use a cutting rod, brush with a stiff bristle, or other suitable equipment to remove all loose material, overspray, laitance, or other material that may compromise the bond of the subsequent layer of shotcrete. Conduct removal immediately after shotcrete reaches initial set.
- 2. Allow shotcrete to stiffen sufficiently before applying subsequent layers.
- 3. If shotcrete has hardened, clean the surface of all loose material, laitance, overspray, or other material that may compromise the bond of subsequent layers. Bring the surface to a saturated surface-dry condition at the time of application of the next layer of shotcrete.

Q. Encasement of Reinforcement

- 1. Place shotcrete to encase reinforcement and other embedments, and provide the cover required by Contract Documents.
- 2. Adjust air volume, material feed volume, and distance of the nozzle from the work as necessary to encase reinforcement.
- 3. Keep the front face of the reinforcement clean during shooting operations so that shotcrete builds up from behind to encase the reinforcement without the formation of shadows or voids.
- R. Shotcrete crew shall continuously remove accumulations of rebound and overspray using a compressed air blowpipe, or other suitable device, in advance of deposition of new shotcrete.
- S. Hot Weather Shotcreting: Unless otherwise specified, do not place shotcrete when shotcrete temperature is above 95°F. The temperature of reinforcement and receiving surfaces shall be below 90°F prior to shotcrete placement.
- T. Cold Weather Shotcreting: Unless otherwise specified, shooting may proceed when ambient temperature is 40°F and rising. Stop shooting when ambient temperature is 40°F and falling, unless measures are taken to protect the shotcrete. Shotcrete material temperature, when shot, shall not be less than 50°F. Do not place shotcrete against frozen surfaces.

U. Shotcrete Temperature

- 1. When the average of the highest and lowest ambient temperature during the period from midnight to midnight is expected to drop below 40°F for more than 3 consecutive days, deliver shotcrete to meet the following temperatures in place immediately after placement:
 - a. Between 55°F and 75°F for sections less than 12 inches in the least dimension:
 - b. Between 50°F and 70°F for sections to 36 inches in the least dimension.

2. The minimum requirements of paragraph 3.03.U.1.a and b may be terminated when ambient temperatures greater than 50°F occur during more than half of any 24-hour duration.

V. Finish

- 1. Gun Finish: Leave finished shotcrete surface as gun finish unless otherwise specified. Proceed to rod, rubber float, wood float, or troweled finish.
- 2. Troweled or Rod Finish: Do not initiate cutting or finishing until the shotcrete is sufficiently set to avoid sloughing or sagging.
- 3. Curing: When the daily mean temperature is above 40°F, curing shall be continuous for a minimum of 7 consecutive days.
- 4. If shotcrete is placed with daily mean temperatures 40°F or lower, cold weather protection shall be provided until the shotcrete achieves 70 percent of the specified strength.
- W. Complete moist curing for a minimum of 7days by one of the following methods:
 - 1. Ponding or continuous sprinkling;
 - 2. Covering with an absorptive mat or sand that is kept continuously wet;
 - 3. Use approved curing compound; apply twice the rate for formed surfaces as recommended by manufacturer if the surface is a gun finish.
- X. Do not use natural curing in lieu of that specified in this Section unless the relative humidity of the air in contact with the shotcrete remains at or above 85 percent and such curing is authorized by Architect/Engineer.

Y. Protection

- 1. After placement Unless otherwise specified, immediately after placement, protect shotcrete from premature drying or excessively hot or cold temperatures and mechanical injury.
- 2. Maintain shotcrete protection to prevent freezing of the shotcrete and to ensure the necessary strength development for structural safety. Remove protection in such a manner that the maximum decrease in temperature measured at the surface of the shotcrete in a 24-hour period shall not go below the following:
 - a. 50°F for sections less than 12 in. in the least dimension;
 - b. 40°F for sections from 12 to 36 in. in the least dimension.
- 3. Protect surfaces not intended for shotcrete placement against deposit of rebound and overspray or impact from nozzle stream.

Z. Tolerances

1. Dimensional tolerances of shotcrete shall comply with the Contract Documents.

AA. Repair of shotcrete

- 1. General
 - a. Repair defects in shotcrete in accordance with an approved procedure submitted in accordance with this Section.
 - b. Remove voids, shadows, sagging, or other defects in the hardened shotcrete using light-duty chipping hammers (maximum 18 lb) followed by high-pressure water blasting or grit blasting to remove bruised shotcrete surface.
 - c. Conduct removal of defective shotcrete without the creation of feather edges.
- 2. In the repair of core hole surfaces and sawcut edges, roughen the core hole or cut surface and pre-dampen prior to repair.
- BB. Shotcrete repair with commercial patching products including:
 - Portland cement mortar, modified with a latex bonding agent conforming to ASTM C1059/C1059M, Type II;
 - 2. Packaged, dry concrete repair materials conforming to ASTM C928/C928M.
- CC. Removal of stains, rust, efflorescence, and surface deposits
 - 1. Remove stains, rust, efflorescence, and surface deposits considered objectionable by Architect/Engineer by methods acceptable to the Architect/Engineer.

3.04 TESTING AND COMMISSIONING

- A. Preconstruction Testing
 - 1. Construct preconstruction test panels for examination by the Engineer prior to project shotcrete placement. Preparation and testing shall comply with ASTM C1140/C1140M. Mixture proportions shall meet the requirements of this Section.
 - 2. Construct test panels for each proposed shotcrete mixture, each anticipated shooting orientation, and each proposed nozzleman.
 - 3. Testing required as part of the preconstruction test program shall be provided by the Contractor's testing agency.
 - 4. Test specimens cored, or sawed from the panels for compliance with the specified compressive strength in accordance with ASTM C1604/C1604M.
 - 5. Complete testing to determine other specified shotcrete properties.
 - 6. When the degree of encasement of reinforcement, or severity of defects within the shotcrete sample is specified, prepare additional panels with the specified reinforcement. Core panels in accordance with ASTM C1140/C1140M. Cores containing reinforcement shall be provided to the Engineer for visual examination to determine acceptance. Cores for examination shall have a minimum diameter of 3.75 in., and be the full thickness of the panel.

7. When an initial prequalification test panel is rejected, a second panel shall be shot and tested. If the second panel is acceptable, work may proceed. If the second panel is not acceptable, the Contractor shall change procedures, mixture proportions, nozzlemen, or shotcrete equipment as necessary before repeating the preconstruction testing. Do not proceed with work until preconstruction test results are satisfactory to the Engineer.

B. Construction Testing

- 1. Quality assurance testing shall be by the Contractor.
- 2. The quality assurance testing agency shall be certified to ASTM C1077.
- 3. The Contractor shall provide the Owner and the quality assurance testing agency with 2 working days' notice prior to the commencement of shotcreting.
- 4. When material, or workmanship fails to comply with the Contract Documents, the agency will immediately report deficiencies to the Owner, Engineer, and Contractor.
- 5. Testing shotcrete
 - a. Test Samples: Sample shotcrete in accordance with ASTM C1385/C1385M. The Contractor is responsible for the curing and protection of test panels on site prior to the time that they are transported to the testing agency's laboratory.
 - b. Compressive Strength Samples: Obtain test specimens from jobsite test panels unless Contract Documents stipulate that in-place shotcrete test specimens are to be used.
 - c. Air content testing of shotcrete mixture, when air entrainment is required, shall be performed at discharge from the truck chute in accordance with ASTM C231/C231M prior to placement.
 - d. Air content testing of hardened shotcrete shall be performed in accordance with ASTM C457/C457M.
 - e. Temperature of Shotcrete Mixture: Determine the temperature of the mixture using material sampled prior to discharge from the truck chute into the pump. Testing shall be performed in accordance with ASTM C1064/C1064M.
- 6. Test panels for testing during construction:
 - a. Construct a test panel for each mixture, each work day or for every 50 yd3 placed, whichever results in the most panels. The face dimensions of a test panel shall be a minimum of 16 x 16 in. with a minimum depth of 5 in. For toughness testing in accordance with ASTM C1550, the face dimension shall be 30.5 in. in diameter and 3 in. thick. Shoot test panels in a vertical orientation.
 - b. Condition test panels in accordance with ASTM C1140/C1140M until transported to the testing agency's laboratory.
 - c. Obtain test specimens from test panels using procedures outlined in ASTM C1140/C1140M or C1604/C1604M. Cores shall be a nominal 3 in. diameter.
 - d. Test shotcrete specimens for compliance in accordance with ASTM C1604/C1604M for compressive strength.

- e. Test boiled absorption and volume of permeable voids in accordance with ASTM C642.
- 7. Testing in-place shotcrete:
 - a. Obtain core specimens from locations designated by the Engineer in accordance with ASTM C1140/C1140M.
 - b. Unless otherwise specified, condition test specimens by soaking as specified in ASTM C1604/C1604M.
 - c. Testing shotcrete bond to substrate in accordance with ASTM C1583/C1583M.
- 8. Reporting of Quality Assurance Test Results: Provide copies of any test results generated for quality assurance to the Contractor, Owner, Engineer, and concrete supplier.

3.05 ACCEPTANCE OF WORK

- A. Remove and replace shotcrete that exhibits laminations, voids, or sand pockets exceeding the specified quality, or otherwise does not comply with the Contract Documents.
- B. Shotcrete work that fails to meet one, or more requirements, and that cannot be brought into compliance will not be accepted.
- C. The basis for acceptance, or rejection of shotcrete properties shall be the specified compressive. When additional testing is required in the Contract Documents, acceptance criteria shall include compliance with the requirements of the additional tests.
- D. Compliance with test properties
 - 1. Compressive Strength: Compressive strength shall be adequate if the average of the three cores from a test panel or from in-place shotcrete exceeds 85 percent of the specified compressive strength and no single core is less than 75 percent of the specified compressive strength.
- E. Boiled Absorption and Volume of Permeable Voids: The average of tests on three specimens from a test panel, or from in-place shotcrete, shall be less than or equal to the specified boiled absorption and specified volume of permeable void limits at the specified test age with no single test greater than the specified boiled absorption plus 1 percent.
- F. Bond: The average of the bond strength of the specified number of cores shall exceed the specified minimum strength with no single core bond strength less than 75 percent of the specified strength.

END OF SECTION

SECTION 04 22 01

UNIT MASONRY

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Unit Masonry, including accessory items of work herein described, as shown on the Plans, as specified and/or directed.

1.02 APPLICABLE SPECIFICATIONS, CODES AND STANDARDS

- A. Reference to standard specifications for the following organizations is intended to specify minimum standards for quality of materials and performance of workmanship, and for standard test methods.
 - 1. American Society for Testing and Material (ASTM) Latest Edition.
 - 2. American Concrete Institute (ACI) and American Society of Civil Engineers (ASCE), Building Code Requirements For Masonry Structures, Latest Edition.
 - 3. National Concrete Masonry Association (NCMA) Specifications, Latest Edition.

1.03 SUBMITTALS: Submit the following.

- A. Design Data:
 - 1. Pre-mixed mortar mix design
 - 2. Grout mix design
- B. Manufacturer's Catalog Data:
 - 1. Masonry accessories
 - 2. Reinforcement
 - 3. Pre-mixed mortar
 - 4. Control joints
 - 5. Expansion joints
 - 6. Water-repellent admixture
 - 7. Flashing
 - 8. Grout

Submit for each type.

- C. Drawings:
 - 1. Reinforcing steel
 - 2. Accessories

4.23 409.005.001 Indicate splicing, laps, shapes, dimensions, and details of reinforcing bars and accessories. Include details of anchors, adjustable wall ties, positioning devices, bond beams, and lintels. Do not scale drawings to determine lengths of bars.

D. Manufacturer's Instructions:

1. Masonry cement

If masonry cement is used, submit the manufacturer's printed instructions on proportions of water and aggregates and on mixing to obtain the type of mortar required.

E. Samples:

- 1. Masonry units
- 2. Mortar colors
- 3. Wall reinforcement
- 4. Anchors
- 5. Wall ties

Submit five representative full size masonry units showing full range of color, texture, finish, and dimensions, two samples of each color of mortar, and two samples of each type of wall reinforcement, anchor, and wall tie.

F. Sample Panel:

1. Masonry panel

At the job site submit for approval by the Engineer, a sample masonry panel approximately 6 feet long by 4 feet high showing the workmanship, coursing, bond, weep holes, flashing, thickness, anchors, joint reinforcing, wall ties, rigid-board insulation, intersection of walls, bond beams, expansion and control joint, and tooling of joints, range of color, texture of masonry, and mortar color.

G. Factory Test Reports:

1. Efflorescence test

Submit efflorescence test reports on masonry units that are to be exposed to weathering. Schedule tests far enough in advance of starting masonry work to permit retesting if necessary. Test five pairs of specimens of each type of masonry unit for efflorescence in accordance with ASTM C67. If any pair is rated "effloresced," reject the units represented by the samples.

- H. Certificates of Compliance: The Contractor shall submit to the Engineer prior to delivery, manufacturer's or supplier's certification of compliance of units with specified standards, as determined by an acceptable testing agency conforming to the applicable requirements of ASTM.
 - 1. Masonry cement
 - a. Grout
 - b. Pre-mixed mortar
 - c. Compressive strength tests for block

1)

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1.04 QUALITY ASSURANCE

A. Appearance: Do not change source or supply of materials after the work has started if the appearance of the finished work would be affected. Units should be sound and free from cracks or other defects that would interfere with proper setting, impair strength and performance of construction, or be objectionable in appearance.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver cementitious materials to the site in unbroken containers, plainly marked and labeled with manufacturers' names and brands. Store cementitious materials in dry, weathertight sheds or enclosures and handle so as to prevent entry of foreign materials and damage by water or dampness. Store masonry units off the ground and handle with care to avoid chipping and breakage. Protect materials from damage and, except for sand, keep dry until used. Cover sand to prevent intrusion of water and foreign materials and to prevent drying. Do not use materials containing frost or ice.

1.06 ENVIRONMENTAL CONDITIONS

- A. Cold Weather Construction: During cold weather, that is when the air temperature is below 40 degrees F and falling, or when it appears that the air temperature will drop to 40 degrees F or below within 24 hours, do not lay masonry unless the work is protected from freezing as specified below. Surfaces receiving mortar shall be free of ice and frost. Comply with the requirements specified below for the respective air temperatures:
 - 1. Air Temperature 40 to 25 Degrees F: Heat sand or mixing water to produce mortar temperature between 40 and 120 degrees F.
 - 2. Air Temperature 25 to 20 Degrees F: Heat sand and mixing water to produce mortar temperature between 40 and 120 degrees F. Use salamanders or other heat sources on both sides of walls under construction. Use windbreaks when wind is in excess of 15 mph.
 - 3. Air Temperature 20 Degrees F and Below: Heat sand and mixing water to produce mortar temperature between 40 and 120 degrees F. Provide enclosures and auxiliary heat to maintain air temperature above 32 degrees F on both sides of walls under construction. Ascertain that temperatures of masonry units are not less than 20 degrees F when units are laid.
- B. Cold Weather Protection: Protect newly laid masonry as specified below for the respective mean daily air temperature (MDAT), that is, the average of the daytime high temperature and the forecasted nighttime low temperature.
 - 1. MDAT 40 to 25 Degrees F: Protect masonry from rain and snow by covering with weather-resistive membrane for 24 hours after laying.
 - 2. MDAT 25 to 20 Degrees F: Completely cover newly-laid masonry with insulating blankets and weather-resistive membrane for 24 hours.

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3. MDAT 20 Degrees F and Below: Maintain temperature of masonry above 32 degrees F for 24 hours by providing enclosures and supplementary heat or other approved means.

1.07 SCHEDULING:

A. Coordinate masonry work with the work of other trades to accommodate built-in items and to avoid cutting and patching.

PART 2 - PRODUCTS

2.01 MASONRY UNITS

- A. Concrete Masonry Units: Units shall be of modular dimensions and be steam cured, or approved equal. Exposed surfaces of units shall be texture. Exterior concrete masonry units shall have water-repellant admixture added during manufacture.
 - 1. Hollow and Solid Load-Bearing Units: ASTM C90, made with normal weight aggregate. Provide load-bearing units for exterior walls, foundation walls, load-bearing walls, and shear walls. Minimum compressive strength shall not be less than 2,000 psi.
 - 2. Hollow Non-Load-Bearing Units: ASTM C129, made with normal weight aggregate. Load-bearing units may be provided in lieu of on-load-bearing units.
 - 3. Concrete Building Brick: ASTM C55, Grade S-I or S-II, except brick exposed to weather shall be made with normal weight aggregate. Concrete brick shall match the concrete masonry units as closely as practicable in color and surface characteristics.
 - 4. Special Shapes: Provide special shapes such as closures, header units, and jamb units as necessary to complete the work. Special shapes shall conform to the requirements for the units with which they are used.
- B. Water-Repellant Admixture: Polymeric type formulated to reduce porosity and water transmission. Construct panels of masonry units and mortar which contain the water-repellant admixture. When tested in accordance with ASTM E72, such panels shall be flexural strength not less than 20 percent greater, and compressive strength not less than 3 percent greater, than similar panels which do not contain the admixture. When tested in accordance with ASTM E514, panels shall exhibit no water visible on back of test panel and no leaks through the panel after 24 hours, and not more than 25 percent of wall area shall be damp after 72 hours.

2.02 MORTAR

A. Portland Cement: ASTM C150, Type I, II, or III.

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- B. Hydrated Lime: ASTM C207, Type S.
- C. Masonry Cement: ASTM C91, except that for masonry cement used in mortar for exterior walls, the air content of the mortar specimen shall be not more than 16 percent by volume in lieu of 22 percent. Containers shall bear complete instructions for proportioning and mixing to obtain the required types of mortar.
- D. Sand: ASTM C144. The sand in combination with the cementitious materials shall produce a mortar of the specified color.
- E. Water: Clean, potable, and free from substances which could adversely affect the mortar.
- F. Mortar Types: ASTM C270, Type M for foundation walls, bearing walls, exterior walls, basement walls, and piers; Type N or S for non-load-bearing, non-shear-wall interior masonry; and Type S for all other masonry work; except where higher compressive strength is indicated on structural drawings. Air content shall be limited to 12 percent.
- G. Pre-Mixed Mortar: ASTM C270, Type N, compressive strength of 750 psi in 28 days. Type S, compressive strength of 1800 psi in 28 days. Type M, compressive strength of 2500 psi in 28 days. Air content shall be limited to 12 percent.
- H. Admixtures: No air-entraining admixtures, anti-freeze compounds or calcium chlorides shall be included in mortar. Where colored mortar is indicated, add pigment to obtain the color indicated. Mortar colors shall consist of inorganic compounds not to exceed 15% of the weight of the cement. Admixtures may be used in mortar to retard curing and provide up to 36 hours of workability, provided the admixture does not adversely affect bonding or compressive strength.

2.03 GROUT

A. Grout for reinforced masonry shall be proportioned and mixed in accordance with ASTM C476. Fine grout (with sand aggregate) shall be used in grout spaces where minimum horizontal dimension is less than 4 inches. Coarse grout (with pea gravel) may be used elsewhere. Samples shall be tested in accordance with applicable portions of ASTM C1019 and shall exhibit a minimum ultimate compressive strength of 3,000 psi at 28 days. Do not use admixtures that contain calcium chlorides, air-entrainment or antifreeze compounds.

2.04 ACCESSORIES

A. Fastenings: Build in bolts, metal wall plugs, and other metal fastenings furnished under other sections for securing furring and other items.

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B. Reinforcing Bars: Vertical steel and dowel reinforcing shall be 60,000 psi and conform to ASTM A615 as specified in Section 03 21 00.

PART 3 - EXECUTION

3.01 PREPARATION

A. Protection:

- 1. Stains: Protect exposed surfaces from mortar and other stains. When mortar joints are tooled, remove mortar from exposed surfaces with fiber brushes and wooden paddles. Protect base of walls from splash stains by covering adjacent ground with sand, sawdust, or polyethylene.
- 2. Loads: Do not apply uniform loads for at least 12 hours or concentrated loads for at least 72 hours after masonry is constructed.
- 3. Provide temporary bracing as required to prevent damage during construction.
- 4. Polyester Embossed Film: Provide protective boards for polyester film during job installation to ensure no damage from building debris.
- B. Surface Preparation: Surfaces on which masonry is to be placed shall be smooth, clean, and free of foreign substances when mortar is applied.

3.02 WORKMANSHIP

A. Carry masonry up level and plumb. Furnish and use story poles or gauge rods throughout the work. Changes in coursing or bonding after the work is started will not be permitted. Do not carry one section of the walls up in advance of the others. Step back unfinished work for joining with new work. Toothing will not be permitted. Check heights of masonry with an instrument at each floor and at sills and heads of openings to maintain the level of the walls. Build in door and window frames, louvered openings, anchors, pipes, ducts, and conduits as the masonry work progresses. Fill spaces around metal door frames solidly with

UNIT MASONRY 4.23 04 22 01-6 409.005.001 mortar. Handle masonry units with care to avoid chipping, cracking, and spalling of faces and edges. Drilling, cutting, fitting, and patching to accommodate the work of others shall be performed by masonry mechanics. Cut masonry with masonry saws for exposed work. Structural steelwork, bolts, anchors, inserts, plugs, ties, lintels, and miscellaneous metalwork specified elsewhere shall be placed in position as the work progresses. Provide chases of approved dimensions for pipes and other purposes where indicated and where necessary. Inspect scaffolding regularly to ensure that it is amply strong, well braced, and securely tied in position. Do not overload scaffolding.

3.03 MORTAR MIXING

- A. Measure mortar materials in 1 cu. ft. containers to maintain control and accuracy of proportions. Do not measure materials with shovels. Mix mortar in a mechanical batch mixer for not less than 3 nor more than 5 minutes after all ingredients are in so as to produce a uniform mixture. Add water gradually as required to produce a workable consistency. Do not load mixer beyond its rated capacity. Keep mortar boxes, pans, and mixer drums clean and free of debris and dried mortar. Retemper mortar which has stiffened because of evaporation by adding water and mixing to obtain a workable consistency. Do not use or retemper mortar which has not been placed in final position within 2-1/2 hours after the initial mixing. Do not use antifreeze compounds, salts, or other substances to lower the freezing point of mortar.
 - 1. Mortar: Mix mortar in accordance with ASTM C270 to obtain type mortar required. Where colored mortars are required, pigments may be added at the site or provided as part of prepackaged mortar mix. When masonry cement is used, conform to printed mixing instructions of the masonry cement manufacturer. During mixing, add water-repellant admixture in quantity recommended by the admixture manufacturer to mortar which will be used in exterior concrete masonry unit walls.
 - 2. Grout: ASTM C476. Provide fine grout in grout spaces less than 2 inches in any horizontal dimension or in which clearance between reinforcing and masonry is less than 3/4 inch. Provide coarse grout in grout spaces 2 inches or greater in all horizontal dimensions provided the clearance between reinforcing and masonry is not less than 3/4 inch.

3.04 MORTAR JOINTS

A. Uniform thickness of 3/8 inch unless otherwise indicated. Tool exposed joints slightly concave with a round or other suitable jointer when the mortar is thumb print hard. For horizontal joints, jointers shall be at least 12 inches long for brickwork and 16 inches long for concrete masonry. Jointers shall be slightly larger than the width of the joint so that complete contact is made along the edges of the units, compressing and sealing the surface of the joint. Strike flush joints that will not be exposed. Tool vertical joints first. Brush joints to remove all

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loose and excess mortar. Horizontal joints shall be level; vertical joints shall be plumb and in alignment from top to bottom of wall within a tolerance of plus or minus 1/2 inch in 40 feet.

3.05 TOLERANCES

- A. Masonry work shall be within the following limits:
 - 1. Pilasters and Columns: 1/4 inch from true line.
 - 2. Face of Brick: 1/32 inch from face of adjacent brick.
 - 3. Face of Concrete Masonry Unit: 1/16 inch from face of adjacent unit.
 - 4. Variation From True Plane: 1/4 inch in 10 feet and 1/2 inch maximum in 20 feet or more.
 - 5. Variation From Plumb: 1/4 inch in each story, noncumulative and 1/2 inch maximum in two stories or more.
 - 6. Variation From Level: 1/8 inch in 3 feet, 1/4 inch in 10 feet, and 1/2-inch maximum.
 - 7. Variation in Wall Thickness: Plus or minus 1/4 inch.

3.06 CONCRETE MASONRY UNIT WORK

- A. Lay the first course in a full bed of mortar for the full width of the unit. Lay succeeding courses in running bond unless otherwise indicated. Form bed-joints by applying the mortar to the entire top surfaces of the inner and outer face shells. Form head joints by applying the mortar for a width of about 1 inch to the ends of the adjoining units. The mortar shall be of such thickness that it will be forced out of the joints as the units are placed in position. Where anchors, bolts, and ties occur within the cells of the units, place metal lath in the joint at the bottom of such cells, and fill the cells with mortar or grout as the work progresses. No wetting of concrete masonry units is permitted.
 - 1. Select units for uniformity of size, texture, true plane, and undamaged edges and ends of exposed surfaces. Place units plumb, parallel, and with properly tooled joints of maximum 3/8-inch thickness. Keep exposed surfaces clean and free from blemishes or defects. Lay units in the bond pattern indicated.
 - a. Reinforced Concrete Masonry Unit Walls: Where vertical reinforcement occurs, fill cores solid with grout. Lay units in such a manner as to preserve the unobstructed vertical continuity of cores to be filled. The cells to be grouted must be fully bedded in mortar, including the webs to prevent leakage. Remove mortar fins protruding from joints before grout is placed. Minimum clear

UNIT MASONRY 4.23 04 22 01-8 409.005.001 dimensions of vertical cores shall be 2 by 3 inches. Position reinforcing accurately as indicated before placing grout. As masonry work progresses, secure vertical reinforcing in place at vertical intervals not to exceed 160 bar diameters. Grouting shall be performed as soon as possible after placing units so shrinkage cracking at the joints is minimized and so the grout bonds with the mortar. Use puddling rod or vibrator to consolidate the grout. Minimum clear distance between masonry and vertical reinforcement shall be not less than 1/2 inch. Unless indicated or specified otherwise, form splices by lapping bars not less than 40 bar diameters and wire tying them together.

3.07 BONDING AND ANCHORING

- A. Unless indicated otherwise, extend partitions from the floor to the bottom of the construction above. Structurally bond or anchor walls and partitions to each other. Securely anchor non-load-bearing partitions and interior walls to the construction as indicated in a manner that provides lateral stability while permitting unrestricted deflection of construction above. Completely embed anchors in mortar joints. Partial height partitions, less than height of ceiling, should be capped with solid (not filled) masonry units.
 - 1. Corners of Walls: Provide a true masonry bond in each course, except where indicated or specified otherwise.
 - 2. Intersections of Walls: Provide a true masonry bond in each course, or anchor with rigid steel anchors not more than 2 feet apart vertically, unless otherwise indicated.
 - 3. Masonry Walls Facing or Abutting Concrete Members: Anchor masonry to the concrete with dovetail or wire-type anchors inserted in slots or inserts built into the concrete, unless otherwise indicated. Locate anchors not more than 18 inches o.c. vertically and not more than 24 inches o.c. horizontally.

3.08 HORIZONTAL JOINT REINFORCEMENT

A. Provide reinforcement in first bed joint above foundation walls or grade beams, in first and second bed joints above and below openings and extending 24 inches beyond openings each side in walls of concrete masonry units. Provide additional reinforcement where indicated. Unless noted otherwise on the Plans, reinforcement shall be continuous except at control joints and expansion joints. Reinforcement above and below openings shall extend not less than 24 inches beyond each side of openings. Provide reinforcement in the longest available lengths, utilizing the minimum number of splices. Overlap ends not less than 6 inches. Provide welded L-shaped assemblies and welded T-shaped assemblies to match the straight reinforcement, at corners and intersections of walls and partitions. Provide mortar cover for the wire of at least 5/8 inch for exterior face of wall and 1/2 inch for interior face of wall.

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3.09 CONCRETE MASONRY UNIT LINTELS AND BOND BEAMS

A. Provide special units, fill cells solidly with grout, and provide not less than two No. 5 reinforcing bars, unless indicated otherwise. Reinforcing shall overlap a minimum of 40 bar diameters at splices. Terminate bond beams and reinforcing on each side of expansion joints and control joints except control joints and expansion joints through bond beams at top of walls. Concrete masonry units used for lintels and bond beams shall have exposed surfaces of the same material and texture as the adjoining masonry units. Lintels shall be straight and true and shall have at least 8 inches of bearing at each end. Cells under lintel bearing on each side of openings shall be filled solid with grout full height. Allow lintels to set at least 6 days before shoring is removed. During mixing, add water-repellant admixture in quantity recommended by the admixture manufacturer to concrete and grout which will be used to fill lintels and bond beams in exterior walls.

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3.10 CONTROL JOINTS

A. Provide where indicated in concrete masonry-unit walls. Provide built-in type as required and shown on Plans. Joints shall occur directly opposite each other on both faces of the wall and shall be filled with sealant as specified in Section 07 92 00, "Joint Sealants".

3.11 GROUT PLACEMENT

- A. Grouting is required at voids where reinforcing is provided and in below grade foundation walls. Refer to Plans for locations.
- B. Place grout from the interior side of walls, except as approved otherwise. Protect sills, ledges, offsets, and other surfaces from grout droppings. Remove grout from such surfaces immediately. Grout shall be well mixed to prevent segregation and shall be sufficiently fluid to flow into joints and around reinforcing without leaving voids. Place grout by pumping or pouring from buckets equipped with spouts in lifts not exceeding limits identified in TMS 602-13 / ACI 530.1-13/ASCE 5-13. Waiting time before subsequent pours of grout shall be thirty (30) to sixty (60) minutes, to prevent rupture of the masonry due to hydraulic pressure on the lower mortar joints and/or concrete blocks and to allow for settlement, shrinkage and absorption of excess water by the units. Keep pours at 1-1/2 inches below the top of masonry units in top course, except at the finish course. Puddle or agitate grout thoroughly to eliminate voids. Remove masonry displaced by grouting operation and re-lay in alignment with fresh mortar.

3.12 FORMS AND SHORING

A. Construct to the shape, lines, and dimensions of members indicated and make sufficiently rigid to prevent deflections which may result in cracking or other damage to supported masonry. Do not remove until members have cured.

3.13 CLEANING

- A. Protection: Protect work which may be damaged, stained, or discolored during cleaning operations.
- B. Pointing: Upon completion of masonry work and before cleaning, cut out defective mortar joints and tuck point joints and all holes solidly with prehydrated mortar.
- C. Cleaning: Clean exposed masonry surfaces with clear water and stiff fiber brushes and rinse with clear water. Where stains, mortar, or other soil remain, continue scrubbing with warm water and detergent. Immediately after cleaning each area, rinse thoroughly with clear water. Restore damaged, stained, and discolored work to original condition or provide new work.

END OF SECTION

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SECTION 06 10 01

ROUGH CARPENTRY

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall provide all labor, materials and equipment required to furnish and install Rough Carpentry, as shown on the Plans, as specified, and/or as directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. American Institute of Timber Construction (AITC) Publication:
 - a. A190.1 Structural Glued Laminated Timber (ANSI/AITC A190.1)
 - 2. American National Standards Institute, Inc. (ANSI) Publications:
 - a. B18.2.1 Square and Hex Bolts and Screws, Inch Series Including Hex Cap Screws and Lag Screws
 - b. B18.2.4 Square and Hex Nuts
 - c. B18.5 Round Head Bolts (Inch Series)
 - d. B18.6.1 Wood Screws (Inch Series)
 - 3. American Plywood Association (APA) Publications:
 - a. E30-F APA Design/Construction Guide, Residential and Commercial
 - b. E445-J Performance Standards and Policies for APA Structural-Use Panels (APA PRP-108)
 - 4. American Society for Testing and Materials (ASTM) Publications:
 - a. A525 Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements for
 - b. A687 High-Strength Non-headed Steel Bolts and Studs
 - c. C79 Gypsum Sheathing Board
 - d. C208 Insulating Board (Cellulosic Fiber), Structural and Decorative
 - e. D2277 Fiberboard Nail-Base Sheathing
 - 5. American Wood-Preservers' Association (AWPA) Publications:
 - a. C1 All Timber Products Preservative Treatment by Pressure Process
 - b. C2 Standard for the Preservative Treatment of Lumber, Timber, Bridge Ties, and Mine Ties by Pressure Treatment
 - 6. C9 Plywood Preservative Treatment by Pressure Process

- 7. C28 Structural Glued Laminated Members and Laminations Before Gluing, Pressure Treatment
- 8. M2 Standard for Inspection of Treated Timber Products
- 9. M6 Brands Used on Forest Products
- 10. American Wood Preservers Bureau (AWPB) Publication:
 - a. LP22 Standard for Softwood Lumber, Timber, and Plywood Pressure Treated with Waterborne Preservatives for Ground Contact Use
- 11. Northeastern Lumber Manufacturers Association (NELMA) Publication:
 - a. SGRNL Standard Grading Rules for Northeastern Lumber
- 12. National Forest Products Association (NFP) Publications:
 - a. NDS National Design Specification for Wood Construction,
 Design Values for Wood Construction
 - b. WCD1 Manual for House Framing
- 13. U.S. Department of Commerce Product Standards (PS):
 - a. PS-1 Construction and Industrial Plywood
 - b. PS-2 Performance Standard for Wood-based Structural-use Panels
 - c. PS-20 American Softwood Lumber Standard
 - d. PS-56 Structural Glued Laminated Timber
 - e. PS-58 Basic Hardboard
- 14. Truss Plate Institute (TPI) Publications:
 - a. DSB Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses
 - b. TPI 1 National Design Standards for Metal Plate Connected Wood Truss Construction
 - c. BCSI 1 Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses

1.03 SUBMITTALS: Submit the following.

- A. Design Data:
 - 1. Modifications of structural members

Submit calculations for all proposed modifications of structural members. Do not proceed with modifications until the submittal has been approved.

- B. Drawings:
 - 1. Modifications of structural members
 - 2. Structural glued laminated members
 - 3. Fabricated wood trusses
 - 4. Fabricated structural members
 - 5. Fabricated wood trusses

Indicate materials, details of construction, methods of fastening, and erection details. Include reference to design criteria used and stress computations. Submit drawings for all proposed modifications of structural members. Do not proceed with modifications until the submittal has been approved. The design of the wood trusses shall be in accordance with the Building Code of New York State and TPI 1. Manufacture and installation of the wood trusses shall be in accordance with DSB, TPI 1 and BCSI 1. All drawings shall be signed and sealed by a Professional Engineer licensed to practice in the State of New York.

C. Statements:

1. Certificates of grade

Submit certificates attesting that products meet the grade requirements specified in lieu of grade arkings where appearance is important and grade marks will deface material.

D. Factory Test Report:

1. Treatment standard compliance Submit report required in paragraph entitled "Preservative-Treated Lumber and Plywood".

1.04 DELIVERY AND STORAGE

A. Deliver materials to the site in an undamaged condition. Carefully store materials off the ground to provide proper ventilation, drainage, and protection against dampness. Remove defective and damaged materials and provide new materials.

1.05 GRADING AND MARKING

- A. Lumber: Mark each piece of framing and board lumber or each bundle of small pieces of lumber with the grade mark of a recognized association or independent inspection agency. Such association or agency shall be certified by the Board of Review, American Lumber Standards Committee, to grade the species used.
- B. Structural Glued Laminated Timber: Mark each member with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of structural glued laminated timber products. The marking shall indicate compliance with AITC A190.1 and shall include all identification information required by AITC A190.1.
- C. Plywood: Mark each sheet with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood. The mark shall identify the plywood by species group or span rating, exposure durability classification, grade, and compliance with PS-1.

- D. Structural-Use Panels: Mark each panel with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the panel. The mark shall indicate end use, span rating, and exposure durability classification.
- E. Preservative-Treated Lumber and Plywood: The Contractor shall be responsible for the quality of treated wood products. Each treated piece shall be inspected in accordance with AWPA M2 and permanently marked or branded, by the producer, in accordance with AWPA M6. The Contractor shall provide the Engineer with the inspection report of an independent inspection agency that offered products comply with applicable AWPA Standards. The AWPB LP22 Quality Mark "LP-22"on each piece will be accepted, in lieu of inspection reports, as evidence of compliance with applicable AWPA treatment standards.
- F. Hardboard, Gypsum Board, and Fiberboard: Mark each sheet or bundle to identify the standard under which the material is produced and the producer.

1.06 SIZES AND SURFACING:

A. PS-20 for dressed sizes of yard and structural lumber. Lumber shall be surfaced four sides. Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced.

1.07 MOISTURE CONTENT

- A. Air-dry or kiln-dry lumber. Kiln-dry treated lumber after treatment. Maximum moisture content of wood products shall be as follows at the time of delivery to the job site:
 - 1. Framing lumber and boards 19 percent maximum
 - 2. Timbers 5 inches and thicker 25 percent maximum
 - 3. Materials other than lumber Moisture content shall be in accordance with standard under which the product is produced

1.08 PRESERVATIVE TREATMENT

A. Lumber and timber shall be treated in accordance with AWPA C1 and AWPA C2, and plywood in accordance with AWPA C1 and AWPA C9. Structural glued laminated timber shall be treated in accordance with AWPA C1 and AWPA C28. All wood shall be air or kiln dried after treatment. Specific treatments shall be verified by the report of an approved independent inspection agency, or the AWPB Quality Mark on each piece. Do not incise surfaces of lumber that will be exposed. Brush coat areas that are cut or drilled after treatment with either the same preservative used in the treatment or with a 2 percent copper naphthenate solution in accordance with CCA-4, retention assay of 0.40 pounds per cubic foot.

The following items shall be preservative treated:

- 1. Wood-framing, woodwork, and plywood up to and including the subflooring at the first-floor level of structures having crawl spaces when the bottoms of such items are 24 inches or less from the earth underneath.
- 2. Exterior wood steps, platforms, and railings; and all wood framing of open, roofed structures.
- 3. Wood sills, soles, plates, furring, and sleepers that are less than 24 inches from the ground, furring and nailers that are set into or in contact with concrete or masonry.
- 4. Nailers, edge strips, crickets, curbs, and cants for roof decks.

PART 2 - PRODUCTS

2.01 LUMBER

- A. Structural Lumber: Any of the species and grades listed in NFP NDS that have allowable unit stresses in pounds per square inch (psi) not less than 1,200 Fb, with 1,200,000 E allowable unit stresses indicated. Use for joists, rafters, headers, trusses, beams (except collar beams), columns, posts, stair stringers, girders, and all other members indicated to be stress rated.
- B. Framing Lumber: Framing lumber such as studs, plates, caps, collar beams, cant strips, bucks, sleepers, nailing strips, and nailers and board lumber such as subflooring and wall and roof sheathing shall be one of the species listed in the table below. Minimum grade of species shall be as listed.

Table of Grades for Framing and Board Lumber			
Grading Rules	Species	Framing	Board Lumber
NELMA SGRNL Standard Grading Rules	Balsam Fir, Eastern Hemlock - Tamarack, Eastern Spruce, Eastern White Pine, Northern Pine, Northern Pine Cedar	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade For 2 x 4 Size, 10 Feet and Shorter)	All Species: No. 3 Common Except Standard for Eastern White and Northern Pine

- C. Structural Glued Laminated Timber: AITC A190.1, allowable working stress values for loads of normal duration in pounds per square inch (psi) not less than the following:
 - 1. Bending Members, 2600psi Fb, 285psi Fv, 1900psi E.
 - 2. Compression Members, 2510psi Fc, 1900psi E.
 - 3. Tension Members, 1555psi Ft, 1900psi E.

Fabricated with wet-use adhesives. Members shall be Architectural Appearance Grade, sealed with a penetrating sealer, and bundle wrapped as standard with the manufacturer and approved. Members shall be complete with hardware for joining laminated members and for their connection to other construction.

2.02 PLYWOOD AND STRUCTURAL-USE PANELS

- A. PS-1 and APA E445-J, respectively.
 - 1. Structural-Use Panel: Combination subfloor-underlayment grade with durability equivalent to Exterior plywood, Span Rating of 24 or greater.
- B. Roof Sheathing:
 - 1. Plywood: C-D Grade, Exposure 1, with an Identification Index of not less than 24/0.
 - 2. Structural-Use Panel: Sheathing grade with durability equivalent to Exposure 1, Span Rating of 24/0 or greater.

2.03 OTHER MATERIALS

- A. Hardboard Underlayment: PS-58, service class, sanded on one side, 1/4-inch thick, 4-feet wide.
- B. Fiberboard Wall Sheathing: ASTM C208, 4-feet wide by 1/2-inch thick for supports 16 inches o.c., except only 4-feet wide by 1/2-inch thick sheathing over supports at 16 inches o.c. may be applied without corner bracing of framing. Sheathing shall be asphalt impregnated or asphalt coated to render the sheathing water resistant but vapor permeable. Fiberboard nail base sheathing conforming to ASTM D2277 may be provided as an option to 1/2-inch thick sheathing conforming to ASTM C208.
- C. Air Infiltration Barrier: Cross laminated polyethylene, UV resistant.
- D. Trussed Rafters: Metal plate connected trusses designed in accordance with TPI 78 and TPI WT and fabricated in accordance with TPI QST.
- E. Trussed Joints: Metal plate connected parallel chord wood trusses designed in accordance with TPI 78 and fabricated in accordance with TPI QST.

2.04 ROUGH HARDWARE

A. Unless otherwise indicated or specified, rough hardware shall be of the type and size necessary for the project requirements. Sizes, types, and spacing of fastenings of manufactured building materials shall be as recommended by the

- product manufacturer unless otherwise indicated or specified. Rough hardware exposed to the weather or embedded in or in contact with preservative treated wood, exterior masonry, or concrete walls or slabs shall be zinc-coated.
- B. Bolts, Nuts, Studs, and Rivets: ANSI B18.2.1, ANSI B18.5, ANSI B18.2.2, and ASTM A687. Provide a flat washer under each bolt head and a flat and lock washers under each nut.
- C. Lag Screws and Lag Bolts: ANSI B18.2.1.
- D. Wood Screws: ANSI B18.6.1.
- E. Tie Straps: For joists supported by the lower flange of steel beams, provide 1/8-inch by 1-1/2-inch steel strap, 2-feet long, except as indicated otherwise.
- F. Joist Anchors: For joists supported by masonry walls, provide anchors 3/16-inch by 1-1/2-inch steel tee or strap, bent and of length to provide 4 inches embedment into wall and 12 inches along joist except as indicated otherwise. For joists parallel to masonry or concrete walls, provide anchors 1/4-inch by 1-1/4-inch minimum cross-sectional area, steel strap, length as necessary to extend over top of first three joists and into wall 4 inches, and with wall end of bend or pin type, except as indicated otherwise.
- G. Toothed Rings and Shear Plates: NFP NDS.
- H. Beam Anchors: Steel U-shaped strap anchors 1/4-inch thick by 1-1/2 inches wide
- I. Metal Framing Anchors: Construct anchors to the configuration shown using hot dip zinc-coated steel conforming to ASTM A525, coating designation G90. Steel shall be not lighter than 18 gauge. Special nails supplied by the manufacturer shall be used for all nailing.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Conform to NFP WCD1 unless otherwise indicated or specified. Fit framing lumber and other rough carpentry, set accurately to the required lines and levels, and secure in place in a rigid manner. Do not splice framing members between bearing points. Set joists, rafters, and purlins with their crown edge up. Faces of framing members which will receive gypsum wallboard shall not vary more than 1/8 inch from the plane of the faces of adjacent framing, bridging, or furring members. Frame members for the passage of pipes, conduits, and ducts. Do not

cut or bore structural members for the passage of ducts or pipes without approval. Reinforce all members damaged by such cutting or boring by means of specially formed and approved sheet metal or bar steel shapes, or remove and provide new, as approved. Provide as necessary for the proper completion of the work all framing members not indicated or specified. Spikes, nails, and bolts shall be drawn up tight. Use slate or steel shims when leveling joists, beams, and girders on masonry or concrete. Do not use shimming on wood or metal bearings.

- B. Sills: Set sills level and square and wedge with steel or slate shims; point or grout with non-shrinking cement mortar to provide continuous and solid bearing. Anchor sills to the foundations as indicated. Where sizes and spacing of anchor bolts are not indicated, provide not less than 5/8-inch diameter bolts at all corners and splices and space at a maximum of 6 feet o.c. between corner bolts. Provide at least two bolts for each sill member. Lap and splice sills at corners and bolt through the laps or butt the ends and through-bolt not more than 6 inches from the ends. Provide bolts with plate washers and nuts. Bolts in exterior walls shall be zinc-coated.
 - 1. Anchors in Masonry: Except where indicated otherwise, Embed anchor bolts not less than 15 inches in masonry unit walls and provide each with a nut and a 2-inch diameter washer at bottom end. Fully grout bolts with mortar.
 - 2. Anchors in Concrete: Except where indicated otherwise, Embed anchor bolts not less than 8 inches in poured concrete walls and provide each with a nut and a 2-inch diameter washer at bottom end. A bent end may be substituted for the nut and washer; bend shall be not less than 90 degrees. Powder-actuated fasteners spaced 3 feet o.c. may be provided in lieu of bolts for single thickness plates on concrete.
- C. Beams and Girders: Set beams and girders level and in alignment and anchor to bearing walls, piers, or supports with U-shaped steel strap anchors. Embed anchors in concrete or masonry at each bearing and through-bolt to the beams or girders with not less than two bolts. Provide bolts not less than 1/2 inch in diameter and with plate washers under heads and nuts. Install beams and girders not indicated otherwise with 8-inch minimum end bearing on walls or supports. Install beams and girders into walls with 1/2-inch clearance at the top, end, and sides. Provide joints and splices over bearings only and bolt or spike together.
- D. Columns and Posts: Set columns and posts, plumb, in alignment, and with full and uniform bearing. Do not embed the bottom and bearing surfaces of columns in concrete or set in direct contact with concrete slabs on grade. Provide post and beam construction with steel post caps in such a manner that the post above will tier directly over the one below; fabricate the assembly in a rigid and substantial manner using bolts or lag screws.

E. Wall Framing:

- 1. Studs: Select studs for straightness and set plumb, true, and in alignment. In walls and partitions more than eight feet tall, provide horizontal bridging at not more than eight feet o.c. using nominal 2-inch material of the same width as the studs; install the bridging flat. Sizes and spacing of studs shall be as indicated. Double studs at jambs and heads of openings and triple at corners to form corner posts. Frame corner posts to receive sheathing lath, and interior finish. Truss over openings exceeding 4 feet in width or use a header of sufficient depth. Toenail studs to sills or soleplates with four 8-penny nails or fasten with metal nailing clips or connectors. Anchor studs abutting concrete or masonry walls thereto near the top and bottom and at mid-height of each story using expansion bolts or powder-actuated drive studs.
- 2. Plates: Use plates for walls and partitions of the same width as the studs to form continuous horizontal ties. Splice single plates; stagger the ends of double plates. Double top plates in walls and bearing partitions, built up of two nominal 2-inch thick members. Top plates for nonbearing partitions shall be single or double plates of the same size as the studs. Nail lower members of double top plates and single top plates to each stud and corner post with two 16-penny nails. Nail the upper members of double plates to the lower members with 10-penny nails, two near each end, and stagger 16 inches o.c. intermediately between. Nail soleplates on wood construction through the subfloor to each joist and header; stagger nails. Anchor sole- plates on concrete with expansion bolts, one near each end and at not more than 6 feet o.c., or with powder-actuated fasteners, one near each end and at not more than 3 feet o.c. Provide plates cut for the passage of pipes or ducts with a steel angle as a tie for the plate and bearing for joist.
- 3. Fire Stops: Provide fire stops for wood-framed walls and partitions and for furred spaces of concrete or masonry walls at each floor level and at the ceiling line in the top story. Where fire stops are not automatically provided by the framing system used, they shall be formed of closely fitted wood blocks of nominal 2-inch thick material of the same width as the studs.
- 4. Gypsum Sheathing Board: Apply gypsum sheathing board either horizontally or vertically. Butt joints and locate over the center lines of supports. Horizontally applied sheathing shall be T&G, applied with tongued edge up. Stagger vertical joints and abut sheet closely to frames of openings. Nail sheathing with 11 gauge, 3/8-inch head, zinc-coated nails 1-1/2 inches long for 1/2-inch sheathing and 1-3/4 inches long for 5/8-inch sheathing, spaced 3/8 inch minimum from edges. Provide 2-by 4-inch blocking for horizontal edges of 4-foot wide panels not otherwise supported.
 - a. Gypsum Sheathing Board Used with Diagonal-Braced Framing: Sheathing shall be either 2-feet or 4-feet wide. Apply sheathing

- 2-feet wide horizontally. Nail 4 inches maximum o.c. at edges and over intermediate bearings. Apply sheathing 4-feet wide either horizontally or vertically. Nail 4 inches maximum o.c. at edges and 8 inches maximum o.c. at intermediate bearings.
- b. Gypsum Sheathing Board Used with Unbraced Frames: Sheathing shall be 4-feet wide and applied vertically. Extend sheathing over and nail to both sill and top plates. Nail 4 inches maximum o.c. at edges and 8 inches maximum o.c. at intermediate bearings.
- F. Metal Framing Anchors: Provide framing anchors at every other trussed rafter to fasten trussed rafter to plates and studs against uplift and movement of any kind. Anchors shall be punched and formed for nailing so that nails will be stressed in shear only. Nails shall be zinc-coated; drive a nail in each nail hole provided in the anchor.
- G. Trusses: Metal plate connected wood trusses shall be handled and erected in accordance with TPI HET and braced in accordance with TPI BWT.
- H. Structural Glued Laminated Timber Members: Brace members before erection. Align members and complete all connections before removal of bracing. Unwrap individually wrapped members only after adequate protection by a roof or other cover has been provided. Treat scratches and abrasions of factory applied sealer with two brush coats of the same sealer used at the factory.
- I. Plywood and Structural-Use Panel Roof Sheathing: Install with the grain of the outer plies or long dimension at right angles to supports. Stagger end joints and locate over the center lines of supports. Allow 1/8-inch spacing at panel ends and 1/4 inch at panel edges. Nail panels with 8-penny common nails or 6-penny annular rings or screw-type nails spaced 6 inches o.c. at supported edges and 12 inches o.c. at intermediate bearings.

3.02 MISCELLANEOUS

- A. Rough Wood Bucks: 2-inch nominal thickness. Set wood bucks true and plumb. Anchor bucks to concrete or masonry with steel straps extending into the wall 8 inches minimum. Place anchors near the top and bottom of the buck and space uniformly at 2-foot maximum intervals.
- B. Wood Blocking: Provide proper sizes and shapes at proper locations for the installation and attachment of wood and other finish materials, fixtures, equipment, and items indicated or specified.
- C. Wood Grounds: Provide for fastening wood trim, finish materials, and other items to plastered walls and ceilings. Install grounds in proper alignment and true with an 8-foot straightedge.

- D. Wood Furring: Provide where shown and as necessary for facing materials specified. Except as shown otherwise, furring strips shall be one inch by 3 inches, continuous, and spaced 16 inches o.c. Erect furring vertically or horizontally as necessary. Nail furring strips to masonry. Do not use wood plugs. Provide furring strips around openings, behind bases, and at angles and corners. Furring shall be plumb, rigid, and level and shall be shimmed as necessary to provide a true, even plane with surfaces suitable to receive the finish required. Form furring for offsets and breaks in walls or ceilings on 1-inch by 4-inch wood strips spaced 16 inches o.c.
- E. Wood Bumpers: Dress to the sizes indicated, and bevel edges. Bore, countersink, and bolt bumpers in place.
- F. Temporary Closures: Provide with hinged doors and padlocks and install during construction at exterior doorways and other ground level openings that are not otherwise closed. Cover windows and other unprotected openings with polyethylene or other approved material, stretched on wood frames. Provide dustproof barrier partitions to isolate areas as directed.
- G. Wood Sleepers: Run wood sleepers in lengths as long as practicable and stagger end joints in adjacent rows.

END OF SECTION

SECTION 06 64 00

PLASTIC PANELING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Plastic Paneling, as shown on the Plans, as specified, and/or directed.

1.02 SUBMITTALS:

- A. Submit the following:
 - 1. Manufacturer's Catalog Data:
 - a. FRP sanitary board
 - b. Fasteners
 - c. Accessories and moldings
 - d. Adhesives
 - 2. Color Selection Samples:
 - a. FRP sanitary boards

1.03 DELIVERY, HANDLING, AND STORAGE

- A. Delivery: Deliver materials in the original packages, containers, or bundles with each bearing the brand name, applicable standard designation, and name of manufacturer, or supplier.
- B. Storage: Keep materials dry by storing inside a sheltered building. Where necessary to store plywood outside, store off the ground, properly supported on a level platform, and protected from direct exposure to rain, snow, sunlight, and other extreme weather conditions. Provide adequate ventilation to prevent condensation.

1.04 ENVIRONMENTAL CONDITIONS

- A. Temperature: Maintain a uniform temperature of not less than 50 degrees F in the structure for at least 48 hours prior to, during, and following the application of gypsum board and joint treatment materials, or the bonding of adhesives.
- B. Exposure to Weather: Protect FRP board products from direct exposure to rain, snow, sunlight, and other extreme weather conditions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. FRP Sanitary Boards: Textured .050-inch Class A fiberglass panel, factory laminated to 5/8-inch thick gypsum wallboard. Color shall be as selected by the Owner from manufacturer's standard color chart.
- B. Fasteners: Plastic panel manufacturer's or plastic board fabricator's standard or recommended rivets sized to securely attach material to substrate color to match plastic panels or plastic boards.
- C. Adhesives: Adhesive containing benzene, carbon tetrachloride, or trichloroethylene shall not be used.
- D. Accessories and Moldings: Fabricate from aluminum or plastic designed for its intended use. Flanges shall be free of dirt, grease, and other materials that may adversely affect the bond of joint treatment. Materials shall be prefinished to match FRP boards.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that framing and furring are securely attached and of sizes and spacing to provide a suitable substrate to receive FRP board. Verify that all blocking, headers and supports are in place to support plumbing fixtures. Do not proceed with work until framing and furring are acceptable for application of FRP board.

3.02 APPLICATION OF FRP BOARD

A. Apply FRP board vertically to framing and furring members in accordance with the requirements specified herein. Apply wallboard with separate boards in moderate contact; do not force in place. Neatly fit abutting end and edge joints over centerlines of supports. Use FRP board of maximum practical length. Cut out FRP board as required to make neat close joints around openings. Panels shall be of length required to reach full height of vertical surfaces in one continuous piece. Surfaces of FRP board and substrate members may be bonded together with an adhesive, except where prohibited by fire rating(s). Leave a space approximately 1/4 inch at bottom of FRP board for caulking.

B. Install moldings and trim plumb and level, within 1/8 inch in any 8 feet of length, in longest lengths practicable. Install division bars between panels in the same plan, inside corners at interior junctures, outside corners at external corners, and cap at top of panels and where panels abut dissimilar materials. Attach moldings and trim to substrate with concealed fasteners spaced not more than 2 inches from ends and 12 inches on centers.

3.03 CAULKING

A. Caulk openings around pipes, fixtures, and other items projecting through plywood as specified in Section 07 92 00, Joint Sealant. Apply caulking material with exposed surface flush with gypsum board.

3.04 CLEANING

A. Remove dirt and other foreign substances from exposed surfaces in accordance with manufacturer's printed cleaning instructions.

END OF SECTION

SECTION 07 13 26

SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.02 SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
- C. Samples: For the following products:
 - 1. 12-by-12-inch (300-by-300-mm) square of waterproofing and flashing sheet.
 - 2. 4-by-4-inch (100-by-100-mm) square of drainage panel.
- D. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.
- E. Qualification Data: For Installer.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for waterproofing.
- G. Warranties: Special warranties specified in this Section.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that is acceptable to waterproofing manufacturer for installation of waterproofing required for this project.
- B. Source Limitations: Obtain waterproofing materials through one source from a single manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver liquid materials to project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.
- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- D. Store rolls according to manufacturer's written instructions.
- E. Protect stored materials from direct sunlight.

1.05 PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
 - 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.06 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to replace waterproofing material that does not comply with requirements or that fails to remain watertight within specified warranty period.
 - 1. Warranty does not include, failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in substrate exceeding 1/16 inch (1.6 mm) in width.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MODIFIED BITUMINOUS SHEET WATERPROOFING

A. Modified Bituminous Sheet: 60-mil- (1.5-mm-) thick, self-adhering sheet consisting of 56 mils (1.4 mm) of rubberized asphalt laminated to a 4-mil- (0.10-mm-) thick, polyethylene film with release liner on adhesive side and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.

SELF-ADHERING SHEET WATERPROOFING 07 13 26 – 1

- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRI 860/861.
 - b. Grace, W. R. & Co.; Bituthene 4000.
 - c. Henry Company; Blueskin WP 200.
 - d. Polyguard Products; Polyguard 650.
 - e. Tamko Building Products, Inc.; TW-60.
 - f. An Approved Equal.
- 2. Physical Properties:
 - a. Tensile Strength: 250 psi (1.7 MPa) minimum; ASTM D412, Die C, modified.
 - b. Ultimate Elongation: 300 percent minimum; ASTM D412, Die C, modified.
 - c. Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C); ASTM D 1970.
 - d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch (3-mm) movement; ASTM C 836.
 - e. Puncture Resistance: 40 lbf (180 N) minimum; ASTM E154.
 - f. Hydrostatic-Head Resistance: 150 feet (45 m) minimum; ASTM D5385.
 - g. Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at 70 deg F (21 deg C); ASTM D 570.
 - h. Vapor Permeance: 0.05 perms (2.9 ng/Pa x s x sq. m); ASTM E96. Water Method.

2.02 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 - 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid primer recommended for substrate by manufacturer of sheet waterproofing material.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.
- D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.
- E. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.
- F. Sheet Strips: Self-adhering, rubberized-asphalt sheet strips of same material and thickness as sheet waterproofing.

G. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick, predrilled at 9-inch (229-mm) centers.

2.03 MOLDED-SHEET DRAINAGE PANELS

A. Non-woven-Geotextile-Faced, Molded-Sheet Drainage Panel:
Manufactured composite subsurface drainage panels consisting of a non-woven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 (0.21-mm) sieve laminated to one side with or without a polymeric film bonded to the other side of a studded, non-biodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of 9 to 15 gpm per ft. (112 to 188 L/min. per m).

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 - 1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
 - 2. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SURFACE PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
- E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D4258.
 - 1. Install sheet strips and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch (1.6 mm).

- F. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D6135.
 - 1. Install membrane strips centered over vertical inside corners. Install 3/4-inch (19-mm) fillets of liquid membrane on horizontal inside corners and as follows:
 - a. At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centered over corner.
- G. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D6135.

3.03 MODIFIED BITUMINOUS SHEET WATERPROOFING APPLICATION

- A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and according to recommendations in ASTM D6135.
- B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
 - 1. When ambient and substrate temperatures range between 25 and 40 deg F (minus 4 and plus 5 deg C), install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F (16 deg C).
- D. Horizontal Application: Apply sheets from low point to high point of decks to ensure that side laps shed water.
- E. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.
- F. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic.
- G. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.
- H. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches (150 mm) beyond repaired areas in all directions.

- I. Install protection course with butted joints over waterproofing membrane immediately.
 - 1. Molded-sheet drainage panels may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.
- J. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

3.04 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesives that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

3.05 FIELD QUALITY CONTROL

A. Engage a full-time site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions; surface preparation; membrane application, flashings, protection, and drainage components; and to furnish daily reports to Architect.

3.06 PROTECTION AND CLEANING

- A. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 07 41 13

PREFORMED METAL ROOFING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Preformed Metal Roofing, as shown on the Plans, and/or as specified.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. Federal Specification (Fed. Spec.):
 - a. TT-C-1796A Caulking Compounds, Metal Seam and Wood Seam
 - 2. Military Specification (Mil. Spec.):
 - a. MIL-S-4174B Steel Sheet and Strip, Flat, Aluminum Coated, Low Carbon
 - 3. American Society for Testing and Materials (ASTM) Publications:
 - a. A446 Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
 - b. A526 Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality
 - c. A792 General Requirements for Steel Sheet, Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
 - d. C578 Preformed, Cellular Polystyrene Thermal Insulation
 - e. C591 Unfaced Preformed Rigid Cellular Polyurethane Thermal Insulation

1.03 DEFINITIONS

- A. As used in section.
- B. Sheet: Flat metal sheet which is relatively thin, rectangular in cross-section and form, protected from corrosion by a metallic-coating bonded to the base metal, is produced in commercial sizes, and usually furnished in coiled lengths for further processing.

- C. Finish Coating System: Factory-applied, organic coating system which is applied over sheet.
- D. Corrugated Sheet: Sheet with finish coating system which is bent into standard corrugated shapes by roll forming.
- E. Panel: One of a series of standard-sized units produced by factory cutting a longer length of corrugated sheet, ready for installation as preformed metal roofing or siding.

1.04 SUBMITTALS

- A. Manufacturer's Data:
 - 1. Manufacturer's Data: Catalog cuts, technical data sheets and descriptive literatures for the following:
 - a. Sheets
 - b. Panels
 - c. Accessories
 - d. Fasteners
- B. Shop Drawings (Insulated Coated Steel):
 - 1. Panel and fastener layouts
 - 2. Joint
 - 3. Corners
 - 4. Supports
 - 5. Anchorages
 - 6. Trim
 - 7. Flashing
 - 8. Closures and special details
- C. Color Sample: One sample of each color indicated. When colors are not indicated, submit not less than six different samples of manufacturer's standard colors for selection.

1.05 DELIVERY AND STORAGE

A. Deliver, store, and handle panels and other manufactured products to prevent damage. Stack materials stored on the site on platforms or pallets and cover with tarpaulins or other suitable weathertight covering. Store panels so that water which might have accumulated during transit or storage will drain off; do not store the panels in contact with materials that might cause staining. Inspect the panels upon arrival to the job site; if wet, remove the moisture and restack and protect the panels until used.

PART 2 - PRODUCTS

2.01 ROOFING PANELS

A. When subjected to full design loads, wall panels shall not deflect more than 1/120 of their clear span, and roof panels shall not deflect more than 1/180 of their clear span, but in no case shall the thickness of the sheets for the panels be less than specified. Where gauges are specified, they are subject to normal manufacturing tolerances.

B. Coated Steel:

- 1. Panels shall be type having a cross sectional profile and depth as indicated. Form sheets from steel conforming to ASTM A446, Structural Grade A with a galvanized coating conforming to ASTM A526, Coating Class G-90. Sheets shall be not lighter than 26 U.S. Standard Gauge.
- 2. Finish Coating System: Factory-applied, silicone polyester minimum total dry film thickness of 1.0 mil, available in a minimum of six manufacturer's standard colors. Provide finish coating system on exposed face. Color of exterior face shall be as selected from manufacturer's standard colors. Color of interior face shall be manufacturer's standard.

C. Insulated Coated Steel:

- 1. Panels shall be interlocking concealed type having a cross sectional profile and depth as indicated with a plastic foam core. Exterior and interior sheets shall be no lighter than 26 U.S. Standard Gauge.
- 2. Plastic Foam Core:
 - a. Rigid Polyurethane Foam: ASTM C591, Type 1 or 2, foamed-inplace or in board form, with an oxygen index of not less than 22 percent when tested in accordance with ASTM D2863; or
 - b. Rigid Polystyrene Foam Board: ASTM C578, Type I or II.
- 3. Finish Coating System: Factory-applied, minimum total dry film thickness of 1.0 mil, available in a minimum of six manufacturer's standard colors. Provide a polyvinylidene fluoride (PVF2) finish coating system on the exterior face. The interior face shall receive a silicone polyester coating system. Concealed surfaces receive an acrylic wash coat applied to a minimum total dry film thickness of 0.20 mil. Colors shall be as selected from manufacturer's standard colors.
- 4. Liner Panels: Formed of same type material and profile as used for interior face of wall panels.
- D. Accessories: Sheet metal flashings, trim, moldings, closure strips, caps, and other similar sheet metal accessories used in conjunction with preformed metal panels shall be made of the same material and finish as used for the panels, except that such accessories which will be concealed after installation, may be provided without the finish if they are aluminum- or zinc-coated steel. Thickness of the

- metal shall be not less than that used for the panels. Molded closure strips shall be closed-cell or solid-cell synthetic rubber, neoprene, or polyvinyl chloride premolded to match the configurations of the preformed metal panels.
- E. Fasteners: Fasteners for attaching panels to structural supports and to adjoining panels shall be as approved and in accordance with the manufacturer's recommendations. Unless specified otherwise, the fasteners shall be self-tapping screws. Design the fastening system to withstand the design loads indicated. Fasteners shall be Series 305 stainless steel or aluminum. Fasteners, with the exception of those having integral hexagonal washer heads and those having aluminum drive caps, shall have composite metal and neoprene washers. Fasteners having integral hexagonal washer heads and fasteners having aluminum drive caps shall have polychloroprene washers. Heads of screws or bolts exposed on exterior face of factory-finished wall shall be nylon headed to match color of wall.
 - 1. Screws: Not less than No. 14 diameter self-tapping type or self-drilling and self-tapping type.
 - 2. Powder-Actuated Fasteners: Provide fasteners of the type to be used with powder-actuated tools, and with a shank diameter of adequate size to support loads imposed. Shank length of fasteners shall be not less than 1/2 inch for fastening panels to steel and not less than one inch for fastening panels to concrete. Fasteners for securing wall panels shall have threaded studs suitable for attaching approved color-coated nuts or caps.
- F. Joint Sealing Material: Fed. Spec. TT-C-1796, Type II, Class B ribbon form sealant, except that it shall not contain bituminous materials.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. In accordance with the manufacturer's approved installation instructions, except as specified otherwise. Panels shall be in full and firm contact with supports and with each other at side and end laps. Where panels are cut in the field, or where any of the factory-applied coatings are damaged in handling or installation, they shall, after the necessary repairs have been made with material of the same type and color as the finish coating, be approved before installation. Seal completely all cut ends and edges, including those at openings through the panels. Correct defects in the materials. Remove defective materials which cannot be corrected and provide non-defective materials. Provide molded closure strips where indicated and whenever panels terminate with open ends after installation.
- B. Roof Panels: Apply roofing panels with the configurations parallel to the slope of the roof. Provide roofing panels in full lengths from ridge or ridge panel to eaves, with no transverse joints except at the junction of ventilators, curbs,

skylights, chimneys, and similar openings. Lay side laps away from the prevailing wind and seal side and end laps with joint sealing material. Flash seal the roof at the ridge, at eaves and rakes, at projections through the roof, and elsewhere as necessary. Place closure strips, flashing, and sealing material to achieve complete weathertightness. Minimum side lap shall be interlocking rib. End laps shall be not less than 8 inches and shall occur only over purlins and structural members.

- C. Flashings: Flashings and related closures and accessories in connection with the preformed metal panels shall be provided where indicated and as necessary to provide a watertight installation. Details of installation which are not indicated shall be in accordance with the panel manufacturer's printed instructions and details or approved shop drawings. Installation shall allow for expansion and contraction of flashing.
- D. Fasteners: Fastener spacings shall be in accordance with the manufacturer's recommendations and as necessary to withstand the design loads indicated. Install fasteners in valleys or crowns as recommended by the manufacturer of the panel being used. Install fasteners in straight lines within a tolerance of 1/2 inch in the length of a bay. Drive exposed, penetrating-type fasteners normal to the surface and to a uniform depth to seat washers with gaskets and drive so as not to damage factory-applied coating. Exercise extreme care in drilling pilot holes for fastenings to keep drills perpendicular and centered in valleys or crowns, as applicable. After drilling, remove metal filings and burrs from holes prior to installing fasteners and washers. Torque used in applying fasteners shall not exceed that recommended by the manufacturer. Remove panels damaged by over torqued fastenings, and provide new panels. Remove metal shavings and filings from roofs on completion to prevent rusting and discoloration of the panels.

END OF SECTION

SECTION 07 60 00

FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Flashing and Sheet Metal, as shown on the Plans, as specified, and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. American Society for Testing and Materials (ASTM) Publications:
 - a. B209 Aluminum and Aluminum-Alloy Sheet and Plate
 - b. B221 Aluminum and Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube
 - c. D41 Asphalt Primer Used in Roofing, Dampproofing and Waterproofing
 - d. D1784 Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
 - e. D2822 Asphalt Roof Cement
 - f. D4022 Coal Tar Roof Cement
 - 2. American Welding Society, Inc. (AWS) Publication:
 - a. D1.2 Structural Welding Code, Aluminum
 - 3. Federal Specifications (FS):
 - a. QQ-L-201 Lead Sheet
 - b. UU-B-790 Building Paper, Vegetable Fiber: (Kraft, Waterproofed, Water Repellent and Fire Resistant)
 - 4. Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA) Publication:
 - a. ASMM Architectural Sheet Metal Manual

1.03 SUBMITTALS

- A. Submit the following.
 - 1. Drawings:
 - a. Gutters and downspouts
 - b. Building expansion joints
 - c. Gravel stops and fascias
 - d. Flashing for roof drains
 - e. Base and cap flashing (counterflashing)
 - f. Flashing at roof penetrations
 - g. Reglets

h. Copings

1) Indicate thicknesses, dimensions, fastenings and anchoring methods, expansion joints, and other provisions necessary for thermal expansion and contraction. Scaled manufacturer's catalog data may be submitted for factory fabricated items.

1.04 DELIVERY, HANDLING, AND STORAGE

A. Package and protect materials during shipment. Uncrate and inspect materials for damage, dampness, and wet-storage stains upon delivery to the job site. Remove from the site and replace damaged materials that cannot be restored to like-new condition. Handle sheet metal items to avoid damage to surfaces, edges, and ends. Store materials in dry, weathertight, ventilated areas until immediately before installation.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Furnish sheet metal items in 8 to 10-foot lengths. Single pieces less than 8 feet long may be used to connect to factory-fabricated inside and outside corners, and at ends of runs. Provide accessories and other items essential to complete the sheet metal installation. These accessories shall be made of the same materials as the items to which they are applied. Fabricate sheet metal items of the materials specified below and to the gage, thickness, or weight shown in Table I at the end of this Section. Sheet metal items shall have mill finish unless specified otherwise. Where more than one material is listed for a particular item in Table I, each is acceptable and may be used except as follows:
- B. Exposed Sheet Metal Items: Shall be of the same material. The following items shall be considered as exposed sheet metal: gutters, including hangers; downspouts; gravel stops and fascias; cap, valley, steeped, base, and eave flashings and related accessories.
- C. Lead Sheet: FS QQ-L-201, Grade B, minimum weight 4 pounds per square foot.
- D. Aluminum Alloy Sheet and Plate: ASTM B209, form alloy, and temper appropriate for use, alloy 3003-H14 except allow used for color anodized aluminum shall be as required to produce specified color. Alloy required to produce specified color shall have the same structural properties as alloy 3003-H14.
 - 1. Alclad: When fabricated of aluminum, the following items shall be fabricated of Alclad 3003, Alclad 3004, Alclad 3005, clad on one side, unless otherwise indicated.
 - a. Gutters, downspouts, and hangers
 - b. Gravel stops and fascias

- c. Flashing.
- 2. Finish: Exposed exterior sheet metal items of aluminum shall have a baked-on, factory-applied color coating of polyvinylidene fluoride (PVF2) or other equivalent fluorocarbon coating applied after metal substrates have been cleaned and pretreated. Finish coating dry-film thickness shall be 0.8 to 1.3 mils, and color shall be as selected by Architect/Engineer from full range of color options.
- E. Aluminum Alloy, Extruded Bars, Rods, Shapes, and Tubes: ASTM B221.
- F. Polyvinyl Chloride Reglet: ASTM D1784, Type II, 0.075 inch (1.9 mm) minimum thickness.
- G. Bituminous Plastic Cement: ASTM D2822, Type I; ASTM D4022.
- H. Building Paper: FS UU-B-790, Style 4, Grade B.
- I. Asphalt Primer: ASTM D41.
- J. Through-Wall Flashing: Through-wall flashing for masonry is specified in Section 04 20 00, "Unit Masonry".
- K. Fasteners: Use the same metal or a metal compatible with the item fastened. Use stainless steel fasteners to fasten dissimilar materials.
- L. Scuppers: Fabricate scuppers with minimum of 100 mm (4 inch) wide flange. Provide flange at top on through wall scupper to extend to top of base flashing. Fabricate exterior wall side to project not less than 13 mm (1/2 inch) beyond face of wall with drip at bottom outlet edge. Fabricate not less than 100 mm (4 inch) wide flange to lap behind gravel stop fascia. Fabricate exterior wall flange for through wall scupper not less than 25 mm (one inch) wide on top and sides with edges hemmed. Fabricate gravel stop bar of 25 mm x 25 mm (one by one inch) angle strip soldered to bottom of scupper. Fabricate scupper not less than 200 mm (8 inch) wide and not less than 125 mm (5 inch) high for through wall scupper. Solder joints watertight.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Requirements: Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry, and free of defects and projections which might affect the application. For installation of items not shown in detail or not covered by specifications, conform to the applicable requirements of SMACNA ASMM, Architectural Sheet Metal Manual. Provide sheet metal flashing in the angles

- formed where roof decks abut walls, curbs, ventilators, pipes, or other vertical surfaces and wherever indicated and necessary to make the work watertight. Join sheet metal items together as shown in Table II.
- B. Workmanship: Make lines, arrises, and angles sharp and true. Free exposed surfaces from visible wave, warp, and buckle, and tool marks. Fold back exposed edges neatly to form a 1/2-inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.
- C. Nailing: Confine nailing of sheet metal generally to sheet metal having a maximum width of 18 inches. Confine nailing or flashing to one edge only. Space nails evenly not over 3 inches on centers and approximately 1/2 inch from edge unless otherwise specified or indicated. Face nailing will not be permitted. Where sheet metal is applied to other than wood surfaces, include in shop drawings, the locations for sleepers and nailing strips required to secure the work. Sleepers and nailing strips are specified in Section 06 10 01, "Rough Carpentry".
- D. Cleats: Provide cleats for sheet metal 18 inches and over in width. Space cleats evenly not over 12 inches on centers unless otherwise specified or indicated. Unless otherwise specified, cleats shall be not less than 2 inches wide by 3 inches long and of the same material and thickness as the sheet metal being installed. Secure one end of the cleat with two nails and the cleat folded back over the nailheads. Lock the other end into the seam. Pre-tin cleats for soldered seams.
- E. Loose-Lock Expansion Seams: Not less than 3 inches wide; provide minimum one-inch movement within the joint. Completely fill the joints with the specified sealant, applied at not less than 1/8-inch thick bed. Sealants are specified in Section 07 92 00, "Joint Sealants".
- F. Welding and Mechanical Fastening: Use welding for aluminum of thickness greater than 0.040 inch. Aluminum 0.040 inch or less in thickness shall be butted and the space backed with formed flashing plate; or lock joined, mechanically fastened, and filled with sealant as recommended by the aluminum manufacturer.
 - 1. Welding of Aluminum: Use welding of the inert gas, shield-arc type. For procedures, appearance and quality of welds, and the methods used in correcting welding work, conform to AWS D1.2.
 - 2. Mechanical Fastening of Aluminum: Use No. 12, aluminum alloy, sheet metal screws or other suitable aluminum alloy or stainless steel fasteners. Drive fasteners in holes made with a No. 26 drill in securing side laps, end laps, and flashings. Space fasteners 12 inches maximum on centers. Where end lap fasteners are required to improve closure, locate the end lap fasteners not more than 2 inches from the end of the overlapping sheet.

- G. Protection from Contact with Dissimilar Materials:
 - 1. Aluminum: Aluminum surfaces shall not directly contact other metals except stainless steel, zinc, or zinc coating. Where aluminum contacts another metal, paint the dissimilar metal with a primer followed by two coats of aluminum paint. Where drainage from a dissimilar metal passes over aluminum, paint the dissimilar metal with a non-lead pigmented paint.
 - 2. Wood or Other Absorptive Materials: Paint surfaces that may become repeatedly wet and in contact with metal with two coats of aluminum paint or a coat of heavy-bodied bituminous paint.
- H. Expansion and Contraction: Provide expansion and contraction joints at not more 32-foot intervals for aluminum and at not more than 40-foot intervals for other metals. Where the distance between the last expansion joint and the end of the continuous run is more than half the required interval, an additional joint shall be provided. Space joints evenly. Join extruded aluminum gravel stops and fascias by expansion and contraction joints spaced not more than 12 feet apart.
- I. Base Flashing: Lay the base flashings with each course of the roof covering, shingle fashion, where practicable, where sloped roofs abut chimneys, curbs, walls, or other vertical surfaces. Extend up vertical surfaces of the flashing not less than 8 inches and not less than 4 inches under the roof covering. Where finish wall coverings form a counterflashing, extend the vertical leg of the flashing up behind the applied wall covering not less than 6 inches. Overlap the flashing strips with the previously laid flashing not less than 3 inches. Fasten the strips at their upper edge to the deck, with compatible, large-head roofing nails. Solder end laps and provide for expansion and contraction. Extend the metal flashing over crickets at the up-slope side of vertical surfaces extending through sloping roofs, the metal flashings. Extend the metal flashings onto the roof covering not less than 4.5 inches at the lower side of vertical surfaces extending through the roof decks. Install and fit the flashings so as to be completely weathertight. Base flashing for interior and exterior corners shall be factory-fabricated.
- J. Counterflashing: Except where indicated or specified otherwise, insert counterflashing in reglets located from 9 to 10 inches above roof decks, extend down vertical surfaces over upturned vertical leg of base flashings not less than 3 inches. Fold the exposed edges of counterflashings 1/2 inch. Where stepped counterflashings are required, they may be installed in short lengths or may be of the preformed one-piece type. Provide end laps in counterflashings not less than 3 inches and make it weathertight with plastic cement. Do not make lengths of metal counterflashings exceed 10 feet. Form the flashings to the required shapes before installation. Factory-form the corners not less than 12 inches from the angle. Secure the flashings in the reglets with lead wedges and space not more than 18 inches apart; on short runs, place wedges closer together. Fill calked-type

reglets or raked joints which receive counterflashing with calking compound. Calking is covered in Section 07 92 90, "Joint Sealants". Turn up the concealed edge of counterflashings built into masonry or concrete walls not less than 1/4 inch and extend not less than 2 inches into the walls. Install counterflashing to provide a spring action against base flashing.

- K. Metal Reglets: Calked type or friction type reglets shall be factory fabricated with a minimum opening of 1/4 inch and a depth of 1-1/4 inches, as approved.
 - 1. Calked Reglets: Provide with rounded edges and metal strap brackets or other anchors for securing to the concrete forms. Provide reglets with a core to protect them from injury during the installation. Provide built-up mitered corner pieces for internal and external angles. Wedge the flashing in the reglets with lead wedges every 18 inches, calked full and solid with an approved compound.
 - 2. Friction Reglets: Provide with flashing receiving slots not less than 5/8 inch deep, one-inch jointing tongues, and upper and lower anchoring flanges. Insert the flashing the full depth of the slot and lock by indentations made with a dull-pointed tool.
- L. Polyvinyl Chloride Reglets: Rigid polyvinyl chloride reglets may be provided in lieu of metal reglets.
- M. Gravel Stops and Roof Edge Fascias: Prefabricate in the shapes and sizes indicated and in lengths not less than 8 feet. Extend flange at least 4 inches onto roofing. Provide prefabricated, mitered corners internal and external corners. Install gravel stops and fascias after all plies of the roofing membrane have been applied. Nail flange securely to wood nailer with large-head, barbed-shank roofing nails 1.5 inches long spaced not more than 3 inches on centers.
 - 1. Edge Strip: Hook the lower edge of fascias at least 3/4 inch over a continuous strip of the same material bent outward at an angle not more than 45 degrees to form a drip. Nail hook strip to a wood nailer at 6 inches maximum on centers. Where fastening is made to concrete or masonry, use screws spaced 12 inches on centers driven in expansion shields set in the concrete or masonry. Where horizontal wood nailers are slotted to provide for insulation venting, install strips to prevent obstruction of vent slots. Where necessary, install strips over 1/16-inch thick compatible spacer or washers.
 - 2. Joints: Leave open the section ends of gravel stops and fascias 1/4 inch and backed with a formed flashing plate, mechanically fastened in place and lapping each section end a minimum of 4 inches set laps in plastic cement. Face nailing will not be permitted. Install prefabricated aluminum gravel stops and fascias in accordance with the manufacturer's printed instructions and details.

- N. Metal Drip Edge: Provide a metal drip, designed to allow water run-off to drip free of underlying construction, at eaves and rakes prior to the application of roofing shingles. Apply directly on the wood deck at the eaves and over the underlay along the rakes. Extend back from the edge of the deck not more than 3 inches and secure with compatible nails spaced not more than 10 inches on center along upper edge.
- O. Gutters: Field fabricate seamless gutters in manufacturer's standard shape, size as required. Provide gutters complete with mitered corners, end caps, outlets, brackets, and other accessories necessary for installation. Aluminum gutters shall be joined with riveted sealed joints. Install gutters below slope line of the roof so that snow and ice can slide clear. Support gutters on adjustable hangers spaced not more than 30 inches on center or as recommended by the manufacturer. Adjust gutters to slope uniformly to outlets, with high points occurring midway between outlets. Fabricate hangers and fastenings from metals compatible with the gutters.
- P. Downspouts: Types, shapes and sizes are indicated. Provide complete including elbows and offsets. Provide downspouts in approximately 10-foot lengths. Provide end joints to telescope not less than 1/2 inch and lock longitudinal joints. Provide gutter outlets with wire ball strainers for each outlet. Provide strainers to fit tightly into outlets and be of the same material used for gutters. Keep downspouts not less than one inch away from walls. Fasten to the walls at top, bottom, and at an intermediate point not to exceed 5 feet on centers with leader straps or concealed rack-and-pin type fasteners. Form straps and fasteners of metal compatible with the downspouts.
 - 1. Terminations: Neatly fit into the drainage connection the downspouts terminating in drainage lines, and fill the joints with a Portland cement mortar cap sloped away from the downspout. Provide downspouts terminating in splash blocks with elbow-type fittings. Concrete splash block is specified in Section 03 30 00, "Cast-In-Place Concrete". Provide splash pans as specified.
- Q. Eave Flashing: One piece in width, applied in 8 to 10-foot lengths with expansion joints spaced as specified in paragraph entitled "Expansion and Contraction". Provide a 3/4-inch continuous fold in the upper edge of the sheet to engage cleats spaced not more than 10 inches on centers. Locate the upper edge of flashing not less than 18 inches from the outside face of the building, measured along the roof slope. Fold lower edge of the flashing over and loose-lock into a continuous edge strip on the fascia. Where eave flashing intersects metal valley flashing, secure with one-inch flat locked joints with cleats that are 10 inches on centers. Place eave flashing over underlayment and in plastic bituminous cement.

- R. Expansion Joints: Provide expansion joints for roofs, walls, and floors where indicated and conform to the requirements of Table I.
 - 1. Roof Expansion Joints: Consist of curb with wood nailing members on each side of joint. Provide counterflashing as specified in paragraph "Counterflashing", except as follows: Provide counterflashing with vertical leg of suitable depth to enable forming into a horizontal continuous cleat. Secure the inner edge to the nailing member. Make the outer edge projection not less than one inch for flashing on one side of the expansion joint and be less than the width of the expansion joint plus one inch for flashing on the other side of the joint. Hook the expansion joint cover over the projecting outer edges of counterflashing. Provide roof joint with a joint cover of the width indicated. Hook and lock one edge of the joint cover over the shorter projecting flange of the continuous cleat, and the other edge hooked over and loose locked with the longer projecting flange. Joints are specified in Table II.
 - 2. Floor and Wall Expansion Joints: Provide U-shape with extended flanges for expansion joints in concrete and masonry walls and in floor slabs.
- S. Flashing at Roof Penetrations and Equipment Supports: Provide metal flashing for all pipes, ducts, and conduits projecting through the roof surface and for equipment supports, guy wire anchors, and similar items supported by or attached to the roof deck.
 - 1. Single Pipe Vents: "See Table I, footnote (d). Set flange of sleeve in bituminous plastic cement and nail 3 inches on centers. Bend the top of sleeve over and extend down into the vent pipe a minimum of 2 inches. For long runs or long rises above the deck, where it is impractical to cover the vent pipe with lead, use a two-piece formed metal housing. Set metal housing with a metal sleeve having a 4-inch roof flange in bituminous plastic cement and nailed 3 inches on centers. Extend sleeve a minimum of 8 inches above the roof deck and lapped a minimum of 3 inches by a metal hood secured to the vent pipe by a draw band. Seal the area of hood in contact with vent pipe with an approved sealant. Sealants are covered under Section 07 92 00, "Joint Sealants".

3.02 PAINTING

A. Field-paint sheet metal for separation of dissimilar materials.

3.03 CLEANING

A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, handling marks, contamination from steel wool, fittings and drilling debris, and scrub-clean. Free the exposed metal surfaces of dents, creases, waves, scratch marks, and solder or weld marks.

3.04 REPAIRS TO FINISH

A. Scratches, abrasions, and minor surface defects of finish may be repaired in accordance with the manufacturer's printed instructions and as approved. Repair damaged surfaces caused by scratches, blemishes, and variations of color and surface texture. Replace items which cannot be repaired.

TABLE I. SHEET METAL WEIGHTS AND THICKNESSES

	Lead, Pounds Per Square	Aluminum,
Sheet Metal Items	Foot	Inch
Building Expansion Joints		
Cover Waterstop-bellows or	16	.032
flanged, U-type.	16	-
Downspouts and leaders	16	.032
Downspout clips and anchors	-	.040 clip
	-	.125 anchor
Downspout straps, 2-inch	48(a)	.060
Flashings:		
Base	20	.040
Cap (Counter-flashing)	16	.032
Stepped	16	.032
Valley	16	.032
Roof drain	4	
Pipe vent sleeve (a)	2.5	
Coping Gravel stops and fascias:	-	.040
Extrusions	.075	

Sheets, corrugated		.032
Sheets, smooth	.050	
Edge strip		.050
Gutters:		
Gutter section	.032	
Continuous cleat		.032
Hangers, dimensions		1 inch x
		.080 inch
Joint Cover plates		.032

(a) 2.5-pound minimum lead sleeve with 4-inch flange. Where lead sleeve is impractical, refer to paragraph titled "Single Pipe Vents" for optional material.

END OF SECTION

SECTION 07 72 53

SNOW GUARDS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Snow Guards for metal roofs and non-penetrating attachment system as shown on the Plans, as specified and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
- B. Aluminum Association (AA):
- C. American Society for Testing and Materials (ASTM) Publications:
 - 1. A484/A484M-16 Standard Specifications for General Requirements for Stainless Steel Bars, Billets, and Forgings
 - 2. A554-16 Standard Specification for Welded Stainless Steel Mechanical Tubing
 - 3. A555/A555M-16 Standard Specification for General Requirements for Stainless Steel Wire and Wire Rods
 - 4. B85-03 Standard Specification for Aluminum-Alloy Die Castings
 - 5. B221-04a Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 - 6. F836M-02 (2015) Standard Specification for Style 1 Stainless Steel Metric Nuts (Metric)
 - 7. F880-12 Standard Specification for Stainless Steel Socket, Square Head, and Slotted Headless-Set Screws

1.03 SUBMITTALS: SUBMIT THE FOLLOWING

- A. Manufacturer's Data:
 - 1. Product Data: Product description, construction details, material descriptions, individual component dimensions, finishes, installation instructions.
 - 2. Shop Drawings: Include roof plans showing locations of snow guards on roof and attachment details and spacing.

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1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver components to jobsite properly packaged to provide protection during transport, delivery and handling. Store products in manufacturer's original labeled and unopened packaging in a clean and dry location, protected from potential damage, until ready for application.

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. Attachment system to provide attachment to standing seam metal roofs:
 - 1. With only minor dimpling of panel seams.
 - 2. Without penetrations through roof seams or panels.
 - 3. Without use of sealers or adhesives.
 - 4. Without voiding roof warranty.
- B. Performance Requirements: Provide snow guards to withstand exposure to the weather and environmental elements, and resist design forces without failure due to defective manufacture.
 - 1. Loading: Design snow guard system to resist minimum in-service vector load pounds per linear foot of eave.
 - 2. Factor of safety: Utilize an acceptable factor of safety to determine allowable loads from ultimate tested clamp tensile load values.
 - 3. Source Limitation: Provide snow guard system as designed and tested by the manufacturer as a complete system. Install components by the same manufacturer.

2.02 MANUFACTURER

- A. Acceptable Manufacturer: S-5! Metal Roof Innovations, Ltd., 8655 Table Butte Road, Colorado Springs, CO. 80908; Tel: 888-825-3432; Fax: 719-495-0045; Email: support@s-5.com; Web: www.s-5.com (www.S-5.com)
- B. Substitutions: Permitted if approved equal.

2.03 PIPE-TYPE SNOW RETENTION SYSTEMS FOR STANDING SEAM METAL ROOFS

- A. Basis of Design: DualGard, manufactured by S-5! Metal Roof Innovations, Ltd.
- B. Components:
 - 1. Clamps: Manufactured from 6061-T6 aluminum extrusions conforming to ASTM B221 or aluminum castings conforming to ASTM B85 and to AA Aluminum Standards and Data.

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- 2. Set screws: 300 Series stainless steel, 18-8 alloy, 3/8 inch (9.525 mm) diameter, with round nose point.
- 3. Attachment bolts: 300 Series stainless steel, 18-8 alloy, 8 mm diameter, hex flange bolt.

C. Pipe Brackets:

- 1. Manufactured from 5000 Series alloy and temper aluminum conforming to ASTM B221 and AA Aluminum Standards and Data.
- 2. Pipe Couplings (Splices): Manufactured from 6005a-T61 Series alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data.
- 3. Pipes (Cross Members): Manufactured 6005a-T61 Series alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data.
 - a. Model: Dual Pipe
- 4. Pipe Collar: Manufactured from 6005a-T61 Series alloy and temper aluminum extrusions conforming to ASTM b221 and AA Aluminum Standards and data, with ½-20 x 3/8 inch (9.525 mm) stainless steel set screw.
 - a. Model: Dual Collar
- 5. End Caps: Rubber or metal, black or color-matched.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install system in accordance with manufacturer's instructions and approved Shop Drawings.
- B. DualGard Snow Retention System: Pre-assemble one S-5! Mini clamp to each pipe bracket assuring the set screws are facing the correct side of the standing seam they will be applied to. Attach S-5! Mini clamps to pipe brackets on what will become the <u>upslope</u> side of the assembly. Hand tighten M8 bolt fastening S-5! Mini clamp to pipe bracket. Pre-load set screws into clamps.
 - 1. Insert pipes into pre-assembled upslope pipe bracket and S-5! Mini clamp assemblies. Insert a pipe collar inside last bracket of either end of the run as pipe is inserted into brackets.
 - 2. Place <u>downslope</u> clamps on standing seams at maximum 48 inches (1219 mm) on center or as required by in-service loads.
 - 3. Place downslope clamps in straight, aligned rows using a string line.
 - 4. Some clamps are directional. Reference installation instructions for the specific clamp used to assure they are oriented correctly.
 - 5. Tighten downslope clamp set screws to manufacturers recommended torque. Test set screw torque using calibrated torque wrench.

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- 6. Attach pre-assembled upslope row of S-5! Mini clamps with attached pipe brackets and pipes aligning with downslope clamps. Tighten M8 bolt to fasten pre-assembly on downslope clamps to recommended torque of 156 inch pounds (13 foot pounds) (17.63 Newton meters)
- 7. Tighten upslope clamp set screws to standing seams to manufacturers recommended torque. Test set screw torque using calibrated torque wrench. Then, tighten M8 bolt on upslope clamps to recommended torque of 156 inch pounds. (13 foot pounds) (17.63 Newton meters)
- 8. Install pipe coupling at adjoining pipe end joints. Insert coupling halfway into pipe that will be joined to next pipe in the run.
- 9. Cut extended end of pipe at end of run. Do not cantilever pipes more than 4 inches (101.6 mm) beyond last clamp and bracket at ends.
- 10. Apply end cap to each pipe.

END OF SECTION

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SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Joint Sealants, as shown on the Plans, and/or as specified.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. American Society for Testing and Materials (ASTM) Publication:
 - a. C920 Elastomeric Joint Sealants

1.03 SUBMITTALS

- A. Submit the following.
 - 1. Manufacturer's Catalog Data:
 - a. Sealants
 - b. Primers
 - c. Backstop materials
 - 1) Data for the sealants shall include shelf life, recommended cleaning solvents.

1.04 ENVIRONMENTAL CONDITIONS

A. The ambient temperature shall be within the limits of 40 and 100 degrees F when sealant is applied.

1.05 DELIVERY AND STORAGE

A. Deliver materials to the job site in unopened manufacturers' external shipping containers, with brand names, date of manufacture, color, and material designation clearly marked thereon. Elastomeric sealant containers shall be labeled to identify type, class, grade, and use. Carefully handle and store materials to prevent inclusion of foreign materials or subjection to sustained temperatures exceeding 100 degrees F or less than 40 degrees F.

1.06 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 in accordance with ASTM C1021 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 the Section.

PART 2 - PRODUCTS

2.01 SEALANTS

- A. Provide sealant that has been tested and found suitable for the substrates to which it will be applied.
- B. Interior Sealant: ASTM C920, Type S or M, Grade NS, Class 12.5, Use NT. Location(s) of sealant shall be as follows:
 - 1. LOCATION
 - a. Small voids between walls or partitions and adjacent lockers, casework, shelving, door frames, built-in or surface-mounted equipment and fixtures, and similar items.
 - b. Perimeter of frames at doors, windows, and access panels which adjoin exposed interior concrete and masonry surfaces.
 - c. Joints of interior masonry walls and partitions which adjoin columns, pilasters, concrete walls, and exterior walls unless otherwise detailed.
 - d. Joints between edge members for acoustical tile and adjoining vertical surfaces.
 - e. Interior locations, not otherwise indicated or specified, where small voids exist between materials specified to be painted.
- C. Exterior Sealant: For joints in vertical surfaces, provide ASTM C920, Type S or M, Grade NS, Class 25, Use NT. For joints in horizontal surfaces, provide ASTM C920, Type S or M, Grade P, Class 25, Use T. Location(s) of sealant shall be as follows:
 - 1. LOCATION
 - a. Joints and recesses formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Use sealant at both exterior and interior surfaces of exterior wall penetrations.

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- b. Joints between new and existing exterior masonry walls.
- c. Masonry joints where shelf angles occur.
- d. Joints in wash surfaces of stonework.
- e. Expansion and control joints.
- f. Interior face of expansion joints in exterior concrete or masonry walls where metal expansion joint covers are not required.
- g. Voids where items pass through exterior walls.
- h. Metal reglets, where flashing is inserted into masonry joints, and where flashing is penetrated by coping dowels.
- i. Metal-to-metal joints where sealant is indicated or specified.
- j. Joints between ends of gravel stops, fascias, copings, and adjacent walls.
- D. Floor Joint Sealant: ASTM C920, Type S or M, Grade P, Class 25, Use T. Location(s) of sealant shall be as follows:
 - 1. LOCATION
 - a. Seats of metal thresholds for exterior doors.
 - b. Control and expansion joints in floors, slabs, ceramic tile, and walkways.

2.02 PRIMER FOR SEALANT

A. Provide a nonstaining, quick-drying type and consistency recommended by the sealant manufacturer for the particular application.

2.03 BOND BREAKERS

A. Provide the type and consistency recommended by the sealant manufacturer for the particular application.

2.04 BACKSTOPS

A. Provide glass fiber roving or neoprene, butyl, polyurethane, or polyethylene foams free from oil or other staining elements as recommended by sealant manufacturer. Backstop material shall be compatible with sealant. Do not use oakum and other types of absorptive materials as backstops.

2.05 CLEANING SOLVENTS

A. Provide type(s) recommended by the sealant manufacturer except for aluminum and bronze surfaces that will be in contact with sealant.

2.06 COLOR

A. Sealants exposed to view shall match the color of adjacent finished surfaces.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

- A. Surfaces shall be clean, dry to the touch, and free from dirt, frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would tend to destroy or impair adhesion. When resealing an existing joint, remove existing calk or sealant prior to applying new sealant.
- B. Steel Surfaces: Remove loose mill scale by sandblasting or, if sandblasting is impractical or would damage finish work, scraping and wire brushing. Remove protective coatings by sandblasting or using a residue-free solvent.
- C. Aluminum or Bronze Surfaces: Remove temporary protective coatings from surfaces that will be in contact with sealant. When masking tape is used as a protective coating, remove tape and any residual adhesive just prior to sealant application. For removing protective coatings and final cleaning, use nonstaining solvents recommended by the manufacturer of the item(s) containing aluminum or bronze surfaces.

3.02 SEALANT PREPARATION

A. Do add liquids, solvents, or powders to the sealant. Mix multi-component elastomeric sealants in accordance with manufacturer's instructions.

3.03 APPLICATION:

- A. Joint Width-To-Depth Ratios:
 - 1. Acceptable Ratios:

<u>JOINT WIDTH</u>	<u>JOINT DEPTH</u>		
	<u>Minimum</u>	<u>Maximum</u>	
For metal, glass, or other nonporous surfaces: 1/4 inch (minimum) over 1/4 inch	1/4 inch 1/2 of width	1/4 inch Equal to width	
For wood, concrete, masonry, or stone:			
1/4 inch (minimum)	1/4 inch	1/4 inch	
Over 1/4 inch to 1/2 inch	1/4 inch width	Equal to width	
Over 1/2 inch to 2 inches	1/2 inch	5/8 inch	
Over 2 inches	(As recommended by sealant manufacturer)		

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- 2. Unacceptable Ratios: Where joints of acceptable width-to-depth ratios have not been provided, clean out joints to acceptable depths and grind or cut to acceptable widths without damage to the adjoining work. Grinding shall not be required on metal surfaces.
- B. Backstops: Install backstops dry and free of tears or holes. Tightly pack the back or bottom of joint cavities with backstop material to provide a joint of the depth specified. Install backstops in the following locations:
 - 1. Where indicated.
 - 2. Where backstop is not indicated but joint cavities exceed the acceptable maximum depths specified in paragraph entitled, "Joint Width-to-Depth Ratios".
- C. Primer: Immediately prior to application of the sealant, clean out loose particles from joints. Where recommended by sealant manufacturer, apply primer to joints in concrete masonry units, wood, and other porous surfaces in accordance with sealant manufacturer's instructions. Do not apply primer to exposed finish surfaces.
- D. Bond Breaker: Provide bond breakers to the back or bottom of joint cavities, as recommended by the sealant manufacturer for each type of joint and sealant used, to prevent sealant from adhering to these surfaces. Carefully apply the bond breaker to avoid contamination of adjoining surfaces or breaking bond with surfaces other than those covered by the bond breaker.
- E. Sealants: Provide a sealant compatible with the material(s) to which it is applied. Do not use a sealant that has exceeded shelf life or has jelled and cannot be discharged in a continuous flow from the gun. Apply the sealant in accordance with the manufacturer's instructions with a gun having a nozzle that fits the joint width. Force sealant into joints to fill the joints solidly without air pockets. Tool sealant after application to ensure adhesion. Sealant shall be uniformly smooth and free of wrinkles. Upon completion of sealant application, roughen partially filled or unfilled joints, apply sealant, and tool smooth as specified.

3.04 PROTECTION AND CLEANING

- A. Protection: Protect areas adjacent to joints from sealant smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.
- B. Final Cleaning: Upon completion of sealant application, remove remaining smears and stains, and leave the work in a clean and neat condition.
 - 1. Masonry and Other Porous Surfaces: Immediately scrape off fresh sealant that has been smeared on masonry, and rub clean with a solvent as recommended by the sealant manufacturer. Allow excess sealant to cure for 24 hours then remove by wire brushing or sanding.

2. Metal and Other Nonporous Surfaces: Remove excess sealant with a solvent-moistened cloth.

END OF SECTION

SECTION 08 11 13

METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Metal Doors and Frames, as shown on the Plans, as specified, and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. American Society for Testing and Materials (ASTM) Publications:
 - a. A526 Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality
 - b. A591 Steel Sheet, Cold-Rolled, Electrolytic Zinc-Coated
 - c. C578 Preformed, Cellular Polystyrene Thermal Insulation
 - d. C591 Unfaced Preformed Rigid Cellular Polyurethane Thermal Insulation
 - e. D2863 Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)
 - 2. Door and Hardware Institute (DHI) Publications:
 - a. A115.1 Preparation for Mortise Locks for 1-3/8 Inch and 1-3/4-Inch Doors
 - b. A115.2 Preparation for Bored Locks for 1-3/4 Inch and 1-3/8-Inch Doors
 - c. A115.4 Preparation for Lever Extension Flush Bolts
 - d. A115.5 Preparation for 181 Series and 190 Series Deadlock Strikes
 - e. A115.7 Preparation for Floor Closers -- Light Duty, Center Hung, Single or Double Acting; Center Hung, Single or Double Acting; Offset Hung, Single Acting
 - f. A115.12 Preparation for Offset Intermediate Pivots
 - g. A115.13 Preparation for Tubular Deadlocks
 - h. A115.14 Preparation for Open Back Strikes
 - 3. Hollow Metal Manufacturers Association (HMMA) Publications:
 - a. 861 Guide Specifications for Commercial Hollow Metal Doors and Frames
 - b. 862 Guide Specifications for Commercial Security Hollow Metal Doors and Frames

- c. 863 Guide Specifications for Detention Security Hollow Metal Doors and Frames
- d. 865 Guide Specifications for Swinging Sound Control Hollow Metal Doors and Frames
- 4. Military Specification (MIL):
 - a. DOD-P-21035 Paint, High Zinc Dust Content, Galvanizing Repair (Metric)
- 5. National Fire Protection Association (NFPA) Publications:
 - a. 80 Fire Doors and Windows
 - b. 252 Fire Tests of Door Assemblies
- 6. Underwriters Laboratories, Inc. (UL) Publication:
 - a. 10B Fire Tests of Door Assemblies

1.03 SUBMITTALS

- A. Submit the following.
 - 1. Manufacturer's Catalog Data:
 - a. Doors
 - b. Frames
 - c. Accessories
 - 1) Submit manufacturer's descriptive literature for doors, frames, and accessories. Include data and details on door construction, panel (internal) reinforcement, insulation, and door edge construction.
 - 2. Drawings:
 - a. Steel doors
 - 1) Show elevations, construction details, metal gauges, hardware provisions, method of glazing, and installation details.
 - 3. Schedules:
 - a. Doors and frames
 - 1) Submit door and frame locations.

1.04 DELIVERY AND STORAGE

A. Deliver doors, frames, and accessories undamaged and with protective wrappings or packaging. Strap welded frames in pairs, with one frame inverted, or provide temporary steel spreaders securely fastened to the bottom of each frame. Store doors and frames on platforms under cover in clean, dry, ventilated, and accessible locations, with 1/4-inch airspace between doors. Remove damp or wet packaging immediately, and wipe affected surfaces dry. Replace damaged materials with new.

PART 2 - PRODUCTS

2.01 STANDARD STEEL DOORS

A. SDI 100, except as specified otherwise. Doors shall be either hollow steel construction or composite construction. Prepare doors to receive hardware specified in Section 08 71 00, "Door Hardware". Undercut doors where indicated. Exterior doors shall have top edge closed flush. Doors shall be 1-3/4 inches thick, unless otherwise indicated.

B. Door Grades:

 Heavy Duty Doors: HMMA 862, of size(s) and design(s) indicated. Provide where shown. Fill hollow steel exterior doors with mineral fiber insulation.

2.02 SHELVES, LOUVERS, ASTRAGALS, AND MOLDINGS:

A. Moldings: Provide moldings around glass and louvers. Provide nonremovable moldings on the outside of exterior doors and on the corridor side of interior doors. Other moldings may be stationary or removable. Secure inside moldings to the stationary moldings, or provide snap-on moldings. Muntins shall interlock at intersections and shall be fitted and welded to stationary moldings.

2.03 PLASTIC FOAM CORES

- A. Rigid Polyurethane Foam: ASTM C591, Type 1 or 2, foamed-in-place or in board form, with an oxygen index of not less than 22 percent when tested in accordance with ASTM D2863; or
- B. Rigid Polystyrene Foam Board: ASTM C578, Type I or II.

2.04 STANDARD STEEL FRAMES

- A. HMMA Guide Specification shall match door as specified. Form frames to sizes and shapes indicated, with welded corners or knock-down field-assembled corners. Provide steel frames for doors, transoms, sidelights, mullions, cased openings, and interior glazed panels, unless otherwise indicated.
- B. Knock-Down Frames: Design corners for simple field assembly by concealed tenons, splice plates, or interlocking joints that produce square, rigid corners and a tight fit and maintain the alignment of adjoining members. Provide locknuts for bolted connections.

- C. Mullions and Transom Bars: Mullions and transom bars shall be closed or tubular construction and shall member with heads and jambs butt welded thereto or knock-down for field assembly. Bottom of door mullions shall have adjustable floor anchors and spreader connections.
- D. Stops and Beads: Form stops and beads from 20-gauge steel. Provide for glazed and other openings in standard steel frames. Secure beads to frames with oval-head, countersunk Phillips-head self-tapping sheet metal screws or concealed clips and fasteners. Space fasteners approximately 12 to 16 inches on centers. Miter molded shapes at corners. Butt or miter square or rectangular beads at corners.
- E. Terminated Stops: Where indicated, terminate interior door frame stops 6 inches above floor.
- F. Cased Openings: Fabricate frames for cased openings of same material, gauge, and assembly as specified for metal door frames, except omit door stops and preparation for hardware.
- G. Anchors: Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated or painted with rust-inhibitive paint, not lighter than 18 gauge.
 - 1. Wall Anchors: Provide a minimum of three anchors for each jamb. Locate anchors opposite top and bottom hinges and midway between.
 - a. Masonry: Provide anchors of corrugated or perforated steel straps or 3/16-inch diameter steel wire, adjustable or T-shaped;
 - b. Completed Openings: Secure frames to previously placed concrete or masonry with expansion bolts in accordance with SDI 111F;
 - 2. Floor Anchors: Provide floor anchors drilled for 3/8-inch anchor bolts at bottom of each jamb member. Where floor fill occurs, terminate bottom of frames at the indicated finished floor levels and support by adjustable extension clips resting on and anchored to the structural slabs.

2.05 WEATHERSTRIPPING

- A. As specified in Section 08 71 00, "Door Hardware".
- B. Integral Gasket: Black synthetic rubber gasket with tabs for factory fitting into factory slotted frames, or extruded neoprene foam gasket made to fit into a continuous groove formed in the frame, may be provided in lieu of head and jamb seals specified in Section 08 71 00, "Door Hardware". Insert gasket in groove after frame is finish painted.

2.06 HARDWARE PREPARATION

A. Reinforce, drill, and tap doors and frames to receive finish hardware. Prepare doors and frames for hardware in accordance with the applicable requirements of SDI 107 and DHI A115.1, DHI A115.2, DHI A115.4. Drill and tap for surface-applied hardware at the project site. Build additional reinforcing for surface-applied hardware into the door at the factory. Locate hardware in accordance with the requirements of SDI 100, as applicable. Punch door frames with the exception of frames that will have weatherstripping or soundproof gasketing to receive a minimum of two rubber or vinyl door silencers on lock side of single doors and one silencer for each leaf at heads of double doors. Set lock strikes out to provide clearance for silencers.

2.07 FINISHES

- A. Factory-Primed Finish: Unless specified otherwise, phosphate treat and factory prime metal doors and frames as specified in SDI 100.
- B. Hot-Dip Zinc-Coated and Factory-Primed Finish: Fabricate all doors and frames (Exterior and Interior) from galvanized steel, ASTM A526, Coating Designation G60 or A60 (galvannealed). Repair damaged zinc-coated surfaces by the application of zinc dust paint conforming to DOD-P-21035. Phosphate treat and factory prime zinc-coated surfaces as specified in SDI 100. Provide for all exterior doors.

2.08 FABRICATION AND WORKMANSHIP

- A. Finished doors and frames shall be strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Molded members shall be clean cut, straight, and true, with joints coped or mitered, well formed, and in true alignment. Dress exposed welded and soldered joints smooth. Design door frame sections for use with the wall construction indicated. Corner joints shall be well formed and in true alignment. Conceal fastenings where practicable.
- B. Grouted Frames: For frames to be installed in exterior walls and to be filled with mortar or grout, fill the stops with strips of rigid insulation to keep the grout out of the stops and to facilitate installation of stop-applied head and jamb seals.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Frames: Set frames in accordance with HMMA Guide Specifications. Plumb, align, and brace securely until permanent anchors are set. Anchor bottoms of frames with expansion bolts or powder-actuated fasteners. Build in or secure wall anchors to adjoining construction. Where frames require ceiling struts or overhead bracing, anchor frames to the struts or bracing. For frames in exterior walls, assure that stops are filled with rigid insulation before grout is placed.
- B. Doors: Hang doors in accordance with clearances specified in HMMA Guide Specifications. After erection and glazing, clean and adjust hardware.

3.02 PROTECTION

A. Protect doors and frames from damage. Repair damaged doors and frames prior to completion and acceptance of the project or replace with new, as directed. Wire brush rusted frames until all rust is removed, clean thoroughly, and apply an all-over coat of rust-inhibitive paint of the same type used for shop coat.

3.03 CLEANING

A. Upon completion, clean exposed surfaces of doors and frames thoroughly. Remove mastic smears and other unsightly marks.

END OF SECTION

SECTION 08 11 16

ALUMINUM DOORS AND FRAMES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Aluminum Doors and Frames, as shown on the Plans, as specified, and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. Aluminum Association, Inc. (AA) Publication:
 - a. DAF45Designation System for Aluminum Finishes
 - 2. American Architectural Manufacturers Association (AAMA) Publications:
 - a. 603.8 Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum
 - b. 605.2 High Performance Organic Coatings on Architectural Extrusions and Panels
 - 3. American Society for Testing and Materials (ASTM) Publications:
 - a. A36/36M Structural Steel
 - b. B209 Aluminum and Aluminum-Alloy Sheet and Plate
 - c. B221 Aluminum and Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube
 - d. E283 Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors
 - e. E331 Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

1.03 PERFORMANCE REQUIREMENTS

- A. Structural: Shapes and thicknesses of framing members shall be sufficient to withstand a design wind load of not less than 30 pounds per square foot of supported area or the design wind load indicated with a deflection of not more than 1/175 times the length of the member and a safety factor of not less than 1.65. Provide glazing beads, moldings, and trim of not less than 0.050 inch nominal thickness.
- B. Air Infiltration: When tested in accordance with ASTM E283, air infiltration shall not exceed 0.06 cubic feet per minute per square foot of fixed area at a test pressure of 6.24 pounds per square foot (50 mile per hour wind).

C. Water Penetration: When tested in accordance with ASTM E331, there shall be no water penetration at a pressure of 8 pounds per square foot of fixed area.

1.04 SUBMITTALS

- A. Shop Drawings: Submit the following.
 - 1. Elevations of each door type
 - 2. Size of doors and frames
 - 3. Metal gauges
 - 4. Details of door and frame construction
 - 5. Methods of anchorage
 - 6. Glazing details
 - 7. Weatherstripping
 - 8. Provisions for and location of hardware
 - 9. Details of installation
 - 10. Schedule showing location of each door, frame, and swing of door
- B. Manufacturer's Data: Submit detail specifications and instructions for installation, adjustments, cleaning, and maintenance.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Inspect materials delivered to the site for damage. Unload and store with minimum handling. Provide storage space in dry location with adequate ventilation, free from dust or water, and easily accessible for inspection and handling. Stack materials on nonabsorptive strips or wood platforms. Do not cover doors and frames with tarps, polyethylene film, or similar coverings. Protect finished surfaces during shipping and handling using manufacturer's standard method, except that no coatings or lacquers shall be applied to surfaces to which calking and glazing compounds must adhere.

PART 2 - PRODUCTS

2.01 DOORS AND FRAMES

A. Swing-type aluminum doors and frames of size, design, and location indicated. Provide doors complete with frames, framing members, subframes, transoms, adjoining sidelights, adjoining window wall, trim, and accessories.

2.02 MATERIALS

- A. Anchors: Stainless steel or steel with hot-dipped galvanized finish.
- B. Weatherstripping: Continuous wool pile, silicone treated, or type recommended by door manufacturer.

- C. Aluminum Alloy for Doors and Frames: ASTM B221, Alloy 6063-T5 for extrusions. ASTM B209, alloy and temper best suited for aluminum sheets and strips.
- D. Fasteners: Hard aluminum or stainless steel.
- E. Structural Steel: ASTM A36.
- F. Aluminum Paint: Type as recommended by aluminum door manufacturer.

2.03 FABRICATION

- A. Aluminum Frames: Extruded aluminum shapes with contours approximately as indicated. Provide removable glass stops and glazing beads for frames accommodating fixed glass. Use countersunk stainless steel Phillips screws for exposed fastenings, and space not more than 12 inches o.c. Mill joints in frame members to a hairline fit, reinforce, and secure mechanically.
- B. Aluminum Doors: Of type, size, and design indicated and not less than 1-3/4 inches thick. Minimum wall thickness, 0.125 inch, except beads and trim, 0.050 inch. Door sizes shown are nominal and shall include standard clearances as follows: 0.093 inch at hinge and lock stiles, 0.125 inch between meeting stiles, 0.125 inch at top rails, 0.187 inch between bottom and threshold, and 0.687 inch between bottom and floor. Bevel single-acting doors 0.063 or 0.125 inch at lock, hinge, and meeting stile edges. Double-acting doors shall have rounded edges at hinge stile, lock stile, and meeting stile edges.
 - 1. Full Glazed Stile and Rail Doors: Doors shall have narrow, medium or wide stiles and rails as indicated. Fabricate from extruded aluminum hollow seamless tubes or from a combination of open-shaped members interlocked or welded together. Fasten top and bottom rail together by means of welding or by 3/8- or 1/2-inch diameter cadmium-plated tensioned steel tie rods. Provide an adjustable mechanism of jack screws or other methods in the top rail to allow for minor clearance adjustments after installation.
 - 2. Flush Doors: Use facing sheets with a plain smooth surface. Use one of the following constructions:
 - a. A phenolic resin-impregnated kraft paper honeycomb core, surrounded at edges and around glass and louvered areas with extruded aluminum shapes. The impregnation of core shall have a minimum of 18 percent resin content. Provide sheet aluminum door facings, not less than 0.032-inch thick laminated to a 0.10-inch thick tempered hardboard backing, and bond the backing to the honeycomb core. Bond facing sheets to core under heat and pressure with a thermosetting adhesive, and mechanically lock to the extruded edge members.

- b. A phenolic resin-impregnated kraft paper honeycomb core. Use aluminum facing sheets not less than 0.050-inch thick and form into two pans which will eliminate seams on the faces. Bond honeycomb core to the face sheets using an epoxy resin or contact cement-type adhesive.
- c. A solid fibrous core, surrounded at edges and around glass and louvered areas and cross-braced at intermediate points with extruded aluminum shapes. Use aluminum facing sheets of not less than 0.050-inch thickness. Bond facing sheets to core under heat and pressure with a thermosetting adhesive, and mechanically lock to the extruded edge members.
- d. Form from extruded tubular stiles and rails mitered at corners, reinforce, and continuously weld at miters. Facing sheets shall consist of 0.032-inch thick sheet aluminum internally reinforced with aluminum channels or Z-bars placed horizontally not more than 16 inches apart and extending full width of panel. Fit spaces between reinforcing with sound-deadening insulation. Facing sheets shall finish flush with faces of stiles and rails and be welded to reinforcing bars or channels and to stiles and rails.
- e. Form from an internal grid system composed of extruded aluminum tubular sections. Provide extruded aluminum tubular sections at both sides, and at perimeters of louver and glass cutouts. Provide three extruded aluminum tubular sections at top and bottom of door. Wall thickness of tubular sections shall be not less than 0.09 inch except that lock rail shall be not less than 0.125 inch thick, hinge lock rail shall be not less than 0.125 inch thick, and hinge rail edge shall be not less than 0.19 inch thick. Fill spaces in door with mineral insulation. Facing sheets shall be of aluminum not less than 0.09 inch thick.
- f. Form from extruded aluminum members at top and bottom, both sides, and at perimeters of louver and glass cutouts. Wall sections of extruded aluminum members shall be not less than 0.09 inch thick and be properly reinforced for application of hardware. Framing members shall be covered on both sides with aluminum facing sheets not less than 0.064 inch thick. Fill door with foamed-in urethane with a 3-pound density.
- C. Welding and Fastening: Where possible, locate welds on unexposed surfaces. Dress welds on exposed surfaces smoothly. Select welding rods, filler wire, and flux to produce a uniform texture and color in finished work. Remove flux and spatter from surfaces immediately after welding. Exposed screws or bolts will be permitted only in inconspicuous locations, and shall have countersunk heads. Weld concealed reinforcements for hardware in place.

- D. Weatherstripping: Provide on stiles and rails of exterior doors. Fit into slots which are integral with doors or frames. Weatherstripping shall be replaceable without special tools, and adjustable at meeting rails of pairs of doors. Installation shall allow doors to swing freely and close positively.
- E. Anchors: On the backs of subframes, provide anchors of the sizes and shapes indicated for securing subframes to adjacent construction. Anchor transom bars at ends and mullions at head and sill. Where indicated, reinforce vertical mullions with structural steel members of sufficient length to extend up to the overhead structural slab or framing and secure thereto. Reinforce and anchor freestanding door frames to floor construction as indicated on approved shop drawings and in accordance with manufacturer's recommendation. Place anchors as indicated near top and bottom of each jamb and at intermediate points not more than 25 inches apart.
- F. Provisions for Hardware: Hardware is specified in Section 08 71 00, "Door Hardware". Deliver hardware templates and hardware (except field-applied hardware) to the door manufacturer for use in fabrication of aluminum doors and frames. Cut, reinforce, drill, and tap doors and frames at the factory to receive template hardware. Provide doors to receive surface-applied hardware, except push plates, kick plates, and mop plates, with reinforcing only; drill and tap in the field. Provide hardware reinforcements of stainless steel or steel with hot-dipped galvanized finish, and secure with stainless steel screws. Provide reinforcement in core of flush doors as required to receive locks, door closers, and other hardware.
- G. Provisions for Glazing: Provide extruded aluminum snap-in glazing beads on interior side of doors. Provide extruded aluminum, theft-proof, snap-in glazing beads or fixed glazing beads on exterior or security side of doors. Glazing beads shall have vinyl insert glazing gaskets. Design glazing beads to receive glass of thickness indicated or specified.
- H. Finishes: Provide exposed aluminum surfaces with factory finish of anodic coating or organic coating.
 - 1. Anodic Coating: Clean exposed aluminum surfaces and provide an anodized finish conforming to AA DAF45. Finish shall be clear (natural), designation AA-M10-C22-A31, Architectural Class II (0.4 mil to 0.7 mil) clear (natural), designation AA-M10-C22-A41, Architectural Class I (0.7 mil or thicker) integral color-anodized, designation AA-M10-C22-A32, Architectural Class II (0.4 mil to 0.7 mil) integral color-anodized, designation AA-M10-C22-A42, Architectural Class I (0.7 mil or thicker). Electrolytically deposited color-anodized, designation AA-M10-C22-A34, Architectural Class II (0.4 mil to 0.7 mil) electrolytically deposited color-anodized, designation AA-M10-C22-A44, Architectural Class I (0.7 mil or thicker). Color shall be as indicated and/or selected by Owner.

2. Organic Coating: Clean and prime exposed aluminum surfaces. Provide a baked enamel finish in accordance with AAMA 603.8 with total dry film thickness not less than 0.8 mil a high-performance finish in accordance with AAMA 605.2 with total dry film thickness of not less than 1.2 mils. The finish color shall be as indicated and/or selected by Owner.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Plumb, square, level, and align frames and framing members to receive doors, transoms, adjoining sidelights, and, adjoining window walls. Anchor frames to adjacent construction as indicated and in accordance with manufacturer's printed instructions. Anchor bottom of each frame to rough floor construction with 3/32-inch thick stainless steel angle clips secured to back of each jamb and to floor construction; use stainless steel bolts and expansion rivets for fastening clip anchors. Seal metal-to-metal joints between framing members as specified in Section 07 92 00, "Joint Sealants". Hang doors to produce clearances specified in paragraph entitled, "Aluminum Doors", of this Section. After erection and glazing, adjust doors and hardware to operate properly.

3.02 PROTECTION FROM DISSIMILAR MATERIALS

- A. Dissimilar Metals: Where aluminum surfaces come in contact with metals other than stainless steel, zinc, or small areas of white bronze, protect from direct contact by one or a combination of the following methods:
 - 1. Paint the dissimilar metal with one coat of heavy-bodied bituminous paint.
 - 2. Apply a good quality elastomeric sealant between the aluminum and the dissimilar metal.
 - 3. Paint the dissimilar metal with one coat of primer and one coat of aluminum paint.
 - 4. Use a nonabsorptive tape or gasket in permanently dry locations.
- B. Drainage from Dissimilar Metals: In locations where drainage from dissimilar metals has direct contact with aluminum, provide protective paint, to prevent aluminum discoloration.
- C. Masonry and Concrete: Provide aluminum surfaces in contact with mortar, concrete, or other masonry materials with one coat of heavy-bodied bituminous paint.

D. Wood or Other Absorptive Materials: Provide aluminum surfaces in contact with absorptive materials subject to frequent moisture, and aluminum surfaces in contact with treated wood, with two coats of aluminum paint or one coat of heavy-bodied bituminous paint. In lieu of painting the aluminum, the Contractor shall have the option of painting the wood or other absorptive surface with two coats of aluminum paint and sealing the joints with elastomeric sealant.

3.03 CLEANING

A. Upon completion of installation, clean door and frame surfaces in accordance with door manufacturer's recommended procedure. Do not use abrasive, caustic, or acid cleaning agents.

3.04 PROTECTION

A. Protect doors and frames from damage and from contamination by other materials such as cement mortar. Prior to completion and acceptance of the work, restore damaged doors and frames to original condition, or replace with new ones.

END OF SECTION

SECTION 08 36 13

SECTIONAL OVERHEAD DOORS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Sectional Overhead Doors, as shown on the Plans, as specified, and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. American Society for Testing and Materials (ASTM) Publications:
 - a. A36/A36M Structural Steel
 - b. A227 Steel Wire, Cold-Drawn for Mechanical Springs
 - c. A229 Steel Wire, Oil-Tempered for Mechanical Springs
 - d. A386 Zinc Coating (Hot-Dip) on Assembled Steel Products
 - e. A525 General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
 - f. B209/B209M Aluminum and Aluminum-Alloy Sheet and Plate
 - g. B221/B221M Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
 - h. E330 Structural Performance of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference
 - 2. Military Specification (MIL):
 - a. DOD-P-21035 Paint, High Zinc Dust Content, Galvanizing Repair (Metric)
 - 3. National Association of Architectural Metal Manufacturers (NAAMM) Publication:
 - a. MFM Metal Finishes Manual (Finish Designation)
 - 4. National Association of Garage Door Manufacturers (NAGDM)
 Publication:
 - a. A216.1 Specifications for Sectional Overhead Type Doors
 - 5. National Electrical Manufacturers Association (NEMA) Publications:
 - a. ICS1 General Standards for Industrial Control and Systems
 - b. ICS2 Industrial Control Devices, Controllers and Assemblies
 - c. ICS6 Enclosures for Industrial Controls and Systems
 - d. MG1 Motors and Generators
 - e. ST20 Dry-Type Transformers for General Applications

- 6. National Fire Protection Association (NFPA) Publication:
 - a. 70 National Electrical Code

1.03 SUBMITTALS

- A. Submit the following.
 - 1. Manufacturer's Catalog Data:
 - a. Sectional overhead doors
 - b. Motor and controls
 - 1) For electrically motor-operated doors, submit manufacturer's wiring diagrams for motor and controls.
 - 2. Drawings:
 - a. Sectional overhead doors
 - 1) Show types, sizes, locations, metal gauges, hardware provisions, installation details, and other details of construction. For electrically-operated doors, include supporting brackets for motors, location, type, and ratings of motors, switches, and safety devices.

1.04 DELIVERY AND STORAGE

A. Protect doors and accessories from damage during delivery, storage, and handling. Clearly mark manufacturer's brand name. Store doors in dry locations with adequate ventilation, free from dust and water. Storage shall permit easy access for inspection and handling. Remove damaged items and provide new.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Hard-Drawn Springwire: ASTM A227.
- B. Oil-Tempered Springwire: ASTM A229.
- C. Steel Sheet: ASTM A525.
- D. Steel Shapes: ASTM A36/A36M.
- E. Aluminum Extrusions: ASTM B221/B221M, Alloy 6063-T5.
- F. Aluminum Sheets and Strips: ASTM B209/B209M, alloy and temper best suited for the purpose.

2.02 DOORS

A. NAGDM A216.1 Commercial door, except as specified otherwise. Metal doors shall be horizontal sections hinged together which operate in a system of tracks to completely close the door opening in the closed position and make the full width and height of the door opening available for use in the open position. Provide a permanent label on the door indicating the name and address of the manufacturer. Doors shall be of the standard lift type designed to slide up and back into a horizontal overhead position and requiring a maximum of 16 inches of headroom for 2-inch tracks and 21 inches of headroom for 3-inch tracks. Doors shall be operated by electric power with auxiliary hand chain operation.

2.03 DESIGN REQUIREMENTS

A. NAGDM A216.1 except that design wind load shall be 20 pounds per square foot. Doors shall remain operable and undamaged after conclusion of tests conducted in accordance with ASTM E330 using the design wind load.

2.04 FABRICATION

- A. Steel Overhead Doors: Door sections shall be formed of hot-dipped galvanized steel not lighter than 16 gauge with flush surface without ribs or grooves or 20 gauge with longitudinal integral reinforcing ribs or 24 gauge with longitudinal integral reinforcing ribs and flat bottom V-grooves. Sections shall be not less than 2 inches in thickness. Meeting rails shall have interlocking joints to ensure a weathertight closure and alignment for full width of the door. Sections shall be of the height indicated or the manufacturer's standard, except the height of an intermediate section shall not exceed 24 inches. Bottom sections may be varied to suit door height, but shall not exceed 30 inches in height.
 - 1. Insulated Sections: Door sections shall be insulated with fibrous glass or plastic foam to provide a "U" factor of 0.14 or less. Interior of door sections shall be covered with steel sheets of not lighter than 24 gauge to completely enclose the insulating material.
- B. Tracks: Provide galvanized steel tracks not lighter than 13 gauge for 2-inch tracks and not lighter than 11 gauge for 3-inch tracks. Provide vertical tracks with continuous steel angle not lighter than 13 gauge for installation to walls. Vertical track shall be inclined through use of adjustable brackets to obtain a weathertight closure at jambs. Horizontal track shall be reinforced with galvanized steel angle; support from track ceiling construction with galvanized steel angle with cross bracing, as required, to provide a rigid installation.
- C. Hardware: Provide hinges, brackets, rollers, locking devices, and other hardware required for complete installation. Roller brackets and hinges shall be 13 gauge galvanized steel. Rollers shall have ball bearings and case-hardened races. Provide reinforcing on doors where roller hinges are connected. Provide a positive locking device and cylinder lock with two keys on manually operated doors.

D. Counterbalancing: Doors shall be counterbalanced by means of an oil-tempered, helical-wound torsional spring mounted on a steel shaft. Spring tension shall be adjustable; connect spring to doors with cable with a safety factor of at least 7 to 1. The force required to operate manual pushup doors shall not exceed 25 pounds. The force required to operate manual chain hoist doors shall not exceed 35 pounds.

2.05 ELECTRIC OPERATORS

- A. Operator Features: Provide operators of the drawbar type or side mount (jack shaft) type as recommended by the manufacturer. Operators shall include electric motor, machine-cut reduction gears, steel chain and sprockets, magnetic brake, brackets, push button controls, limit switches, magnetic reversing contactor, a manual chain hoist operator as specified above for emergency use, and other accessories necessary for operation. The electric operator shall be designed so that the motor may be removed without disturbing the limit switch timing and without affecting the manual operator. Provide the operator with slipping clutch coupling to prevent stalling the motor. The emergency manual operator shall be clutch controlled so that it may be engaged and disengaged from the floor; operation shall not affect limit switch timing. The manual operator is not required if door can be manual-pushup operated with a force not to exceed 25 pounds. Provide an electrical or mechanical device that disconnects the motor from the operating mechanism when the manual operator is engaged.
- B. Motors: NEMA MG1, high-starting torque, reversible type with sufficient horsepower and torque output to move the door in either direction from any position. Motor shall produce a door travel speed of not less than two-thirds foot or more than one foot per second without exceeding the rated two-thirds foot or more than one foot per second without exceeding the rated capacity. Motors shall operate on current of the characteristics indicated at not more than 3600 rpm. Single phase motors shall not have commutation or more than one starting contact. Motor enclosures shall be drip-proof type or NEMA TENV type.
- C. Controls: Each door motor shall have an enclosed, across-the-line type, magnetic reversing contactor, thermal overload and under voltage protection, solenoid-operated brake, limit switches, and control switches. Locate control switches at least 5 feet above the floor so the operator will have complete visibility of the door at all times. Control equipment shall conform to NEMA ICS1 and NEMA ICS2. Control enclosures shall be NEMA ICS6, Type 12 or Type 4, except that contactor enclosures may be Type 1. Each control switch station shall be of the three-button type; buttons shall be marked "OPEN", "CLOSE", and "STOP". The "OPEN" and "STOP" buttons shall require only momentary pressure to operate. The "CLOSE" button shall require constant pressure to maintain the closing motion of the door. If the door is in motion and the "STOP" button is pressed or the "CLOSE" button released, the door shall stop instantly and remain in the stop position; from the stop position, the door may be

- operated in either direction by the "OPEN" or "CLOSE" buttons. Push buttons shall be full-guarded to prevent accidental operation. Provide limit switches to automatically stop doors at the fully open and closed positions. Limit switch positions shall be readily adjustable.
- D. Safety Device: Provide a safety device on the bottom edge of electrically-operated doors. The device shall immediately stop and reverse the door in the closing travel upon contact with an obstruction in the door opening or upon failure of the device of any component of the control system and cause the door to return to the full open position. The door-closing circuit shall be automatically locked out, and the door shall be operable manually until the failure or damage has been corrected. Do not use the safety device as a limit switch.
- E. Control Transformers: NEMA ST20. Provide transformers in power circuits as necessary to reduce the voltage on the control circuits to 120 volts or less.
- F. Electrical Components: NFPA 70. The door manufacturer shall furnish manual or automatic control and safety devices, including extra flexible Type SO cable and spring-loaded automatic take-up reel or equivalent device, as required for operation of the doors. Conduit, wiring, and mounting of controls is specified in Division 26 Electrical.

2.06 WEATHER SEALS AND SAFETY DEVICE

A. Provide exterior doors with weatherproof joints between sections by means of tongue-and-groove joints, rabbeted joints, shiplap joints, or wool pile, vinyl or rubber weatherstripping; a rubber, wool pile, or vinyl, adjustable weatherstrip at the top and jambs; and a compressible neoprene, rubber, wool pile, or vinyl weather seal attached to the bottom of the door. On exterior doors that are electrically operated, the bottom seal shall be combination compressible weather seal and safety device for stopping and reversing the travel of the door.

2.07 FINISHES

- A. Concealed ferrous metal surfaces and tracks shall be hot-dip galvanized. Other ferrous metal surfaces, except rollers, shall be hot-dip galvanized and shop primed.
- B. Galvanized and Shop-Primed: Surfaces specified shall have a zinc coating, a phosphate treatment, and a shop prime coat of rust-inhibitive paint. The galvanized coating shall conform to ASTM A525, coating designation G90, for steel sheets, and ASTM A386 for assembled steel products. The weight of coatings for assembled products shall be as designated in Table I of ASTM A386 for the class of material to be coated. The prime coat shall be a type especially developed for materials treated by phosphates and adapted to application by dipping or spraying. Repair damaged zinc-coated surfaces by the application of

galvanizing repair paint conforming to DOD-P-21035 and spot prime. At the Contractor's option, a two-part system including bonderizing, baked-on epoxy primer, and baked-on enamel topcoat may be applied in lieu of prime coat specified.

PART 3 - EXECUTION

3.01 INSTALLATION

A. NFPA 70. Install doors in accordance with approved shop drawings and manufacturer's instructions. Accurately locate anchors and inserts for guides, brackets, motors, switches, hardware, and other accessories. Upon completion, doors shall be weathertight and free from warp, twist, or distortion. Doors shall be lubricated and adjusted to operate freely.

3.02 ELECTRICAL WORK

A. NFPA 70. Conduit, wiring, and mounting of controls are specified in Division 26 Electrical.

3.03 TESTING

A. After installation is complete, operate doors to demonstrate installation and function of operators, safety features, and controls. Correct deficiencies.

END OF SECTION

SECTION 08 51 13

ALUMINUM WINDOWS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Extruded aluminum windows with fixed sash, operating sash, and infill panels.
- B. Factory glazing.
- C. Operating hardware.
- D. Insect screens.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 01 Metal Fabrications: Steel lintels.
- B. Section 07 92 00 Joint Sealants: Sealing joints between window frames and adjacent construction.

1.03 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 North American Fenestration Standard/Specification for windows, doors, and skylights; 2017.
- B. AAMA CW-10 Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- C. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).
- D. AAMA 1503 Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- E. AAMA 2605 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.
- F. ASTM E283/E283M Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

- G. ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).
- H. ASTM E1105 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.
- I. ASTM F588 Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact; 2017.

1.04 SUBMITTALS

- A. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.
- B. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, anchorage locations, and installation requirements.
- C. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
 - 1. Evidence of AAMA Certification.
 - 2. Evidence of WDMA Certification.
 - 3. Evidence of CSA Certification.
 - 4. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.
- D. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements in excess of those prescribed by specified grade.
- E. Manufacturer's Qualification Statement.
- F. Installer's Qualification Statement.
- G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 OUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of AAMA CW-10.
- B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.07 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C)

1.08 WARRANTY

- A. See General Conditions for Closeout Procedures, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

PART 2 - PRODUCTS

2.01 BASIS OF DESIGN - AW PERFORMANCE CLASS WINDOWS

- A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 having Performance Class of AW, and Performance Grade at least as high as specified design pressure.
- B. Projected, Face of Sash and Frame in Approximately Same Plane:
 - Basis of Design: Boyd Aluminum; Series 4400, Project Out Casement, 4 inch deep frame, Thermally Broken: www.boydaluminum.com/#sle.
- C. Substitutions: See General Conditions.
 - 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.02 ALUMINUM WINDOWS

A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.

- 1. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.
- 2. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
- 3. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
- 4. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

B. Slider Type:

- 1. Construction: Thermally broken.
- 2. Provide screens.
- 3. Glazing: Single; clear; transparent.
- 4. Exterior Finish: Class I natural anodized.
- 5. Interior Finish: Class I natural anodized.

2.03 PERFORMANCE REQUIREMENTS

- A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
 - 1. Performance Class (PC): R.
- B. Design Pressure (DP): In accordance with applicable codes.
- C. Overall Thermal Transmittance (U-value): 0.35, maximum, including glazing, measured on window sizes required for this project.
- D. Forced Entry Resistance: Tested to comply with ASTM F588 requirements for performance level of Grade 10 for specific window style required.

2.04 COMPONENTS

- A. Frames: 4 inch deep profile, of .062 inch thick section; thermally broken with interior portion of frame insulated from exterior portion; flush glass stops of snap-on type.
- B. Insect Screens: Extruded aluminum frame with mitered and reinforced corners; screen mesh taut and secure to frame; secured to window with adjustable hardware allowing screen removal without use of tools.
 - 1. Hardware: Spring loaded steel pins; four per screen unit.
 - 2. Screen Mesh: Vinyl-coated fiberglass, window manufacturer's standard mesh.
 - 3. Frame Finish: Same as frame and sash.
- C. Operable Sash Weatherstripping: Wool pile; permanently resilient, profiled to achieve effective weather seal.

- D. Fasteners: Stainless steel.
- E. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

2.06 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils (0.018 mm) thick.
- B. Finish Color: As selected by Owner from manufacturer's standard range.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that wall openings and adjoining air and vapor seal materials are ready to receive aluminum windows.

3.02 INSTALLATION

- A. Install windows in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- D. Install sill and sill end angles.
- E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- F. Install operating hardware not pre-installed by manufacturer.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Door Hardware, as shown on the Plans, as specified, and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. Builders Hardware Manufacturers Association, Inc. (BHMA) Publications:
 - a. 101 Butts and Hinges (ANSI/BHMA A156.1)
 - b. 111 Template Hinge Dimensions (ANSI/BHMA A156.7)
 - c. 301 Door Controls Closers (ANSI/BHMA A156.4)
 - d. 311 Door Controls Overhead Holders (ANSI/BHMA A156.8)
 - e. 321 Life Safety Closer/Holder/Release Devices (ANSI/BHMA A156.15)
 - f. 501 Auxiliary Locks and Associated Products (ANSI/BHMA A156.5)
 - g. 601 Bored and Preassembled Locks and Latches (ANSI/BHMA A156.2)
 - h. 621 Mortise Locks and Latches (ANSI/BHMA A156.13)
 - i. 701 Exit Devices (ANSI/BHMA A156.3)
 - j. 1001 Architectural Door Trim (ANSI/BHMA A156.6)
 - k. 1101 Self-Closing Hinges and Pivots (ANSI/BHMA A156.17)
 - 1. 1201 Auxiliary Hardware (ANSI/BHMA A156.16)
 - m. 1301 Materials and Finishes (ANSI/BHMA A156.18)
 - 2. National Fire Protection Association (NFPA) Publications:
 - a. 101 Life Safety Code
 - 3. Steel Door Institute (SDI) Publication:
 - a. 100 Standard Steel Doors and Frames
 - 4. Underwriters Laboratories, Inc. (UL) Publications:
 - a. BMD Building Materials Directory, January
 - b. 14C Swinging Hardware for Standard Tin-Clad Fire Doors Mounted Singly and in Pairs

1.03 SUBMITTALS

- A. Submit the following.
 - 1. Design Data:
 - a. Keying system
 - 1) Submit keying system for approval.
 - 2. Manufacturer's Catalog Data:
 - a. Door hardware
 - 1) Submit for each different item of hardware.
 - 3. Schedules:
 - a. Hardware list
 - b. Hardware schedule
 - 1) Hardware List: Submit in the following form:

		Mfr.		
		Name	UL Mark	
	Reference	and	(If fire	BHMA
Hardware	Publication	Catalog	rated and	Finish
Item	Type No.	No.	listed)	Designation

4. Hardware Schedule: Submit to the Engineer. Include for each item the quantity, manufacturer's catalog number, corresponding reference publication type number, size, finish, key control symbols, and UL mark if fire rated and listed. Indicate that each item listed under the paragraph entitled "Hardware Items" meets the standard listed for that item. A copy of the listing of proposed hardware items in the current applicable BHMA directories of certified products may be submitted in lieu of test reports.

1.04 DELIVERY AND MARKING

A. Deliver hardware in original individual containers, complete with necessary appurtenances including fasteners and instructions. Mark each individual container with manufacturer's name and catalog number as shown in hardware schedule.

PART 2 - PRODUCTS

2.01 HARDWARE MANUFACTURERS AND MODIFICATIONS

A. Provide, as far as practicable, locks, hinges, pivots, and closers of one lock, hinge, pivot, or closer manufacturer's make. Modify hardware as necessary to provide features indicated or specified.

2.02 HARDWARE DESIGNATIONS

A. Hardware items covered by BHMA standards are specified by BHMA designations. Items covered by Federal Specifications are specified by Federal Designations.

2.03 TEMPLATE HARDWARE

A. Hardware to be applied to metal or to prefinished doors shall be made to template. Promptly furnish template information or templates to door and frame manufacturers. Template hinges shall conform to BHMA 111. Coordinate hardware items to prevent interference with other hardware.

2.04 HARDWARE FOR EXIT DOORS

A. NFPA 101 for exit doors, as well as to other requirements specified. Such hardware shall bear the UL label and be listed in UL BMD for class of door required.

2.05 HARDWARE ITEMS

- A. Conform to the respective standards listed and to requirements specified herein. Hinges, pivots, locks, latches, exit devices, bolts, and closers shall be clearly and permanently marked with the manufacturer's name or trademark where it will be visible after the item is installed. For closers with covers, the name or trademark may be beneath the cover. Provide hardware items as specified below and as listed under "Hardware Sets".
- B. Hinges: BHMA 101, 4-1/2 by 4-1/2 inches unless otherwise specified. Construct loose pin hinges for exterior doors and reverse-bevel interior doors so that pins will be nonremovable when door is closed. Other antifriction bearing hinges may be provided in lieu of ball-bearing hinges.
- C. Pivots: BHMA 301.
- D. Spring Hinges: BHMA 1101.
- E. Locks and Latches: BHMA 621, Series 1000, Operational Grade 1, Security Grade 1. Provide mortise locks with escutcheons not less than 7 by 2-1/4 inches with a bushing at least 1/4 inch long. Cut escutcheons to suit cylinders and provide trim items with straight, beveled, or smoothly rounded sides, corners, and edges. Knobs and roses of mortise locks shall have screwless shanks and no exposed screws. BHMA 601, Series 4000, Grade 2. Locks for exterior doors shall have threaded roses or concealed machine screws.

- F. Auxiliary Locks: BHMA 501, Grade 1.
- G. Exit Devices: Exit Devices (Panic Hardware or Fire Exit Hardware) and Auxiliary Items: BHMA 701, Grade 1. Provide adjustable strikes for rim type and vertical rod devices. Provide open back strikes for pairs of doors with mortise and vertical rod devices. Touch bars shall be provided in lieu of conventional cross bars and arms. Provide escutcheons, not less than 7 by 2-1/4 inches. Cut escutcheons to suit cylinders and operating trim.
- H. Lock Cylinders: Provide cylinders for new locks, including locks provided under other sections of this Specification. Cylinders shall have six pin tumblers and shall be products of the same manufacturer. Cylinders shall have interchangeable cores which are removable by a special control key. Provide a great master keying system. Provide a construction master keying system.
- I. Lock Trim: Cast, forged, or heavy wrought construction and commercial plain design. In addition to meeting the test requirements of BHMA 601 and BHMA 621, knobs, roses, and escutcheons shall be 0.050 inch thick if unreinforced. If reinforced, the outer shell shall be 0.035 inch thick and the combined thickness shall be 0.070 inch, except that knob shanks shall be 0.060 inch thick.
- J. Keys: Furnish one file key, one duplicate key, and one working key for each key change and for each master and grand master keying system; furnish one additional working key for each lock of each keyed-alike group.
- K. Door Bolts: BHMA 1201. Provide dustproof strikes for bottom bolts, except for doors having metal thresholds. Automatic latching flush bolts: BHMA 701, Type 25.
 - 1. Closers: BHMA 301, Series C02000, Grade 1, with optional feature (o.f.) PT 4C, unless otherwise specified. Provide closers complete with brackets, arms, mounting devices, fasteners, pivots, cement cases, and other features necessary for the particular application. Size closers in accordance with manufacturer's recommendations and list sizes in the Hardware Schedule.
 - a. Identification Marking: In addition to the manufacturer's name or trademark, each closer shall bear the manufacturer's size designation where it will be visible after installation.
 - b. Special Tools: Provide special tools for adjustment of door closing devices, such as spanner and socket wrenches.
- L. Door Release Plates: Door Pulls, Push Plates and Kickplates: BHMA 1001.
 - 1. Sizes of Kickplates: Width for single doors shall be 2 inches less than door width; width for pairs of doors shall be 1 inch less than door width. Height of kickplates shall be 10 inches for flush doors.
- M. Edge Guards: BHMA 1001, stainless steel, of same height as armor plates.

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- N. Door Stops and Silencers: BHMA 1201. Silencers Type L03011. Provide one silencer for each hole punched in hollow metal frames.
- O. Thresholds: BHMA 701, Type 26, with vinyl or silicone rubber insert in face of stop, and BHMA 1001.
- P. Weatherstripping: A set shall include head and jamb seals, sweep strips, and, for pairs of doors, astragals. Weatherstripping shall consist of extruded aluminum retainers not less than 0.07 inch wall thickness with vinyl, neoprene, silicone rubber, or polyurethane inserts. Aluminum shall be clear (natural) anodized. Fasten weatherstripping in place with color-matched sheet metal screws not more than 9 inches o.c. after doors and frames have been finish painted.
- Q. Soundproofing: A set shall include adjustable doorstops at head and jambs and an automatic door bottom, both of extruded aluminum, clear (natural) anodized, surface applied, with vinyl fin seals between plunger and housing. Doorstops shall have solid neoprene tube, silicone rubber, or closed-cell sponge gasket. Door bottoms shall have adjustable operating rod and silicone rubber or closed-cell sponge neoprene gasket. Doorstops shall be mitered at corners. Zero "Sound Stop 1" (#770 and #361); Pemko #350ASN and #430AS; National Guard #1038N and #420, or approved equal.
- R. Rain Drips: Extruded aluminum, not less than 0.08 inch thick, clear anodized. Set drips in sealant conforming to Section 07 92 00, "Joint Sealants", and fasten with stainless steel screws.
 - 1. Door Rain Drips: Approximately 1-3/4 inches high by 5/8-inch projection. Align bottom with bottom edge of door.
 - 2. Overhead Rain Drips: Approximately 1-1/2 inches high by 2-1/2-inches projection. Align bottom with door frame rabbet.
- S. Special Tools: Provide special tools, such as spanner and socket wrenches and dogging keys, required to service and adjust hardware items.

2.06 FASTENERS

A. Furnish fasteners of proper type, quality, size, quantity, and finish with hardware. Fasteners exposed to weather shall be of nonferrous metal or stainless steel. Use fasteners of type necessary to accomplish a permanent installation. Use full-threaded wood screws.

2.07 FINISHES

A. BHMA 1301. Hardware shall have BHMA 630 finish (satin stainless steel), unless specified otherwise. Provide items not manufactured in stainless steel in BHMA 626 finish (satin chromium plated) over brass or bronze, except surface door closers which shall have aluminum paint finish, and except steel hinges which shall have BHMA 652 finish (satin chromium plated) BHMA 600 finish (primed for painting). Exit devices may be provided in BHMA 626 finish in lieu of BHMA 630 finish except where BHMA 630 is specified under "Hardware Sets". Exposed parts of concealed closers shall have finish to match lock and door trim. Hardware for aluminum doors shall be finished to match the doors.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install hardware in accordance with manufacturers' printed instructions. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws. Use machine screws set in expansion shields for fastening hardware to solid concrete and masonry surfaces. Use toggle bolts where required for fastening to hollow core construction. Use through bolts where necessary for satisfactory installation.

3.02 ACCEPTANCE OF WORK

A. After installation, protect hardware from paint, stains, blemishes, and other damage until acceptance of work. Submit notice of testing 15 days before scheduled, so that the testing can be witnessed. Adjust hinges, locks, latches, bolts, holders, closers, and other items to operate properly. Correct, repair, and finish, as directed, errors in cutting and fitting and damage to adjoining work.

3.03 FIRE DOORS AND EXIT DOORS

A. Install hardware in accordance with NFPA 101 for exit doors.

3.04 HARDWARE LOCATIONS

- A. SDI 100, unless indicated or specified otherwise.
 - 1. Kick and Armor Plates: Push side of single-acting doors.

3.05 HARDWARE SETS

A. Hardware for aluminum doors shall conform to this Section. Hardware shall be provided with the doors under Section 08 11 16, "Aluminum Doors and Frames", except that cylinders and wall bumpers shall be provided under this Section.

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3.06 HARDWARE SETS

A. Hardware sets should be provided as specified below, or approved equal. Finishes to be selected by Owner from manufacturer's full range of finish options.

HW-1 (Entrance) Double Exterior Door (Aluminum)

2 Hinge McKinney Full Mortise Continuous Hinges

FM-2000 (780-112HD) (MCK Brand)

1 Gasketing Pemko 315SSR3684

1 Threshold Pemko Commercial Door Saddle Threshold

(252x4SSFG) (Assa Abloy) thermally

broken ADA saddle

1 Surface Vertical Rod Exit Device PHI Precision 2000 Series

1 Heavy Duty Lever Trim PHI Precision V4908A Lever

2 Closers Sargent 351-P9

1 Cylindrical Lever Corbin/Russwin CL3357-NZD

HW-2 (Single Dummy Trim) Single Hollow Metal Door

3 Hinge Best Hvy Wt (.180), FBB168 4 ½" x 4 ½"

1 Dummy Trim (Pull Side)
1 Push Plate
1 Closer
2 Rockwood 70C-RKW
Rockwood HD8016
3 Silencer
Rockwood 608-RKW

1 Each Wall Stops DCI Concave Wall Mounted Door Stop

HW-3 (Office) Single Hollow Metal Door

3 Hinge Best Hvy Wt(.180), FBB168 4 ½" x 4 ½"

1 Lockset 9K Series Commercial Grade Classroom (R)

F84 Lever #15D ADA Compliant (Best

Access Brand)

Rockwood K1050

1 Kickplate

3 Silencer Rockwood 608-RKW

1 Each Wall Stops DCI Concave Wall Mounted Door Stop

HW-4 (Privacy) Single Hollow Metal Door

3 Hinge Best Hvy Wt(.180), FBB168 4 ½" x 4 ½"

1 Lockset 9K Series Commercial Grade Door Lock

Mortise Lever #15D ADA Compliant (Best

Access Brand)

1 Dummy Trim (Pull Side) Best 9K3-0-1DT-15D

3 Silencer Rockwood 608-RKW

1 Each Wall Stops DCI Concave Wall Mounted Door Stop

HW-5 (Entrance) Single Hollow Metal Door

3 Hinge Best Hvy Wt(.180), FBB168 4 ½" x 4 ½"

1 Lockset 9K Series Commercial Grade Classroom

(AB) F109 Lever #15D ADA Compliant

(Best Access Brand)

1 Kick Down Door Stop Rockwood 460 – Kick Down Door Stop

(Assa Abloy)

1 Closer Rockwood HD8016

1 Set Weatherstripping Head, Jambs and Sill (Pemko Brand)

1 Kickplate Rockwood K1050

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HW-6 (Classroom) Single Hollow Metal Door

3 Hinge Best Hvy Wt (.180), FBB168 4 ½" x 4 ½"

1 Lockset 9K Series Commercial Grade Classroom

(AB) F109 Lever #15D ADA Compliant

(Best Access Brand)

1 Kick Down Door Stop Rockwood 460 – Kick Down Door Stop

(Assa Abloy)

1 Closer Rockwood HD8016

1 Set Weatherstripping Head, Jambs and Sill (Pemko Brand)

1 Kickplate Rockwood K1050

HW-7 (Passage) Single Hollow Metal Door

3 Hinge Best Hvy Wt (.180), FBB168 4 ½" x 4 ½"

1 Lockset 9K Series Commercial Grade Passage (N)

F75 Lever #15D ADA Compliant (Best

Access Brand)

3 Silencer Rockwood 608-RKW

END OF SECTION

SECTION 09 65 00

PVC LEISURE FLOORING SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The following base bid is for a molded in slip resistant leisure flooring with specifications based upon the "RecDeck" PVC leisure flooring with Dual Soil Masking Print as supplied by ARS, Inc. This specification is presented to establish a level of material and installation quality and experience levels and documentation of supplier responsibility required for the installation of the desired system on this project and is not designed to restrict in any way equal competitive bids. It is assumed that all products bid will be in literal compliance with the product and installation specifications in this section. It is the purchasing agencies' intention to consider any other alternate systems as a deductive alternate to the base bid. To submit a bid using materials different from these specifications, see the Deductive Alternate Bid Section that follows this specification section.
- B. The individual RecDeck components and installation criteria described below consists of a complete polyester backed 85 mil overall PVC membrane flooring to be installed in accordance with these specifications and referenced drawings.
- C. Material rolls of leisure flooring shall be custom trim fit and overlapped approximately V and heat welded together. Termination of the PVC system shall occur as shown on the project drawings. Upon completion, the flooring system shall provide a bonded down waterproof lining of the existing floor area complete with all necessary hardware, fittings, attachments, flanges, gaskets and include any and all necessary safety markings as required by applicable codes.

1.02 SUBMITTALS

- A. Shop Drawings: Show fabrication and connection details for all connections to existing floor structure.
- B. Provide standard catalogue sheets and installation instructions for each item specified.
- C. Provide samples of RecDeck Leisure Flooring, PVC coated Stainless Steel, required moldings and safety markings, (and 1/4" Foam if included in this spec.)
- D. Provide written documentation of project foreman and all welder's experience.

- E. Contract Closeout Submittals:
 - 1. Provide Care and Maintenance Guide.
 - 2. Provide copy of the suppliers 5year material warranty. Warranty should completely cover the material against leakage, delamination, bubbling, pitting, shearing, tearing, cracking or crazing or any material workmanship or defects. The warranty must include the above plus include a 5 year weld warranty on all PVC welding including targets, racing lanes and markings.

1.03 QUALITY ASSURANCE

- A. Flooring material supplier and manufacturer shall have both been engaged in the distribution of PVC flooring membranes for use in commercial applications for a minimum of Five Years under their current company name. Manufacturer shall employ only 100% virgin vinyl throughout the manufacturing process. All PVC membrane components shall be from the same manufacturer to assure compatibility of components and weldability over time. Products manufactured using recycled materials shall not be allowed.
- B. The installation foreman shall document a minimum of two (2) years' experience welding PVC membrane products with at least one (1) year's experience installing PVC product in flooring applications. All installation personnel handling a welding gun shall have a minimum of six months experience hot air welding PVC membranes.

1.04 DELIVERY, STORAGE AND HANDLING

A. All materials required for the completion of this project shall be delivered to the project site in a manner designed to prevent damage. No hooks or forks shall be used for unloading. Unloading shall be performed by the contractor. Materials shall be stored in a flat, dry area in a manner that will not damage them. All materials provided are to be new and in unopened packaging.

1.05 PROJECT SITE CONDITIONS

A. Adequate surface preparation is part of this contract. It shall be the responsibility of the contractor to inspect and include in his bid the cost of adequately preparing the existing substrate in accordance with the manufacturer's specifications. All burrs and rough edges shall be ground smooth or covered, pits, unlevel areas, and voids shall be filled with an epoxy or vinyl concrete patch compound. All working cracks, expansion joints or voids shall be filled with Poly urethane caulk. All oil and tar must be removed from the floor or covered with appropriate isolation materials.

1.06 WARRANTY

A. The flooring material shall be guaranteed for a period of five years against defects in materials or product workmanship. The installing contractor shall warrant his installation for a period of one year from acceptance of the work by the Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The system employed under this base bid shall be the RecDeck Leisure Flooring product system by ARS, Inc. or prior approved equal as a deductive alternate only. The product specifications contained herein describe a proven proprietary system as provided by ARS, Inc. The performance, warranty and material specifications provided herein are designed to establish a level of performance and quality deemed the minimum acceptable. Systems not meeting the standards, specifications and other specific requirements listed herein will not be accepted.

2.02 MATERIALS

A. All individual components utilized in the RecDeck Leisure Flooring system with Dual Print (Or the RecDeck over Engineered Foam Leisure Flooring with Print) shall be completely compatible with the pool environment and shall be supplied by one supplier as a system to assure compatibility and to assure a single source of responsibility. All PVC membrane components shall be from the same manufacturer to assure identical formulations, weld compatibility, and to ascertain identical product molecular weights. The dual print over the base color is required to provide masking of soiling and to reduce cleaning cycles.

2.03 SYSTEM COMPONENTS

- A. RecDeck Leisure Flooring shall be a flexible 85 mil PVC material UV stabilized, backed polyester webbing. The material shall be formulated using anti-fungal agents and manufactured specifically for use in the commercial swimming pool environment. The material shall be applied with the nonskid/textured side out as directed by the owner in the full floor area. All welds shall be accomplished as per section above. Material may be run up the walls for extra integrity and water impermeability. A 4" or 6" cove strip compatible with the material shall be installed where called for in the plans. Said cove strip shall be color matched and selected by the architect,
- B. All markings shall be as per the owner's instructions to conform to local codes.
- C. An antimicrobial product fully compatible with the PVC flooring membrane shall be sprayed or rolled on under the system to discourage microbial growth under the membrane.
- D. Solvent based adhesives that are documented from the manufacturer to be resistant to dissolving in water shall be provided as required to attach the RecDeck Leisure Flooring to the floor where required. A sample of the adhesive adhered to an 8 x 11 sheet of the PVC flooring membrane shall be provided along with product MSDS sheets.

- E. Geotextile fabric shall be of the highest quality, 100 percent virgin materials, and shall be free of all metal and scrap materials that might damage the PVC flooring membrane.
- F. Products manufactured using recycled materials will not be allowed.
- G. PVC coated Stainless RenoSys Steel as required to make for a satisfactory installation termination. All free edges shall be terminated in this manner. Galvanized PVC coated steel shall not be acceptable under this base bid. (See termination detail)
- H. Termination of the PVC flooring membrane shall be as per project specific installation details.
- I. Flanges at all penetrations shall be constructed of SS and custom fabricated, radiused, drilled as required for use at all floor drains and other midfloor penetrations. Flanges will be custom fabricated to fit as close to existing items as is practical and possible based on concrete conditions around penetrations. All metallic anchors used shall be 100% stainless steel anchors. No lead anchor systems or substitute metals other than stainless steel will be allowed.
- J. A 25 GA Stainless Steel strip shall span any expansion joints or working cracks greater than 1" wide. Gait'. Steel shall not be acceptable. Expansion joints or cracks less than 3/4" wide shall be cleaned and re caulked with a Polyurethane 1 part caulk (Sika, Sonneborne or equal)
- K. Caulking shall be installed where required by installation details, and shall be Polyurethane 1 part caulk (Sika, Sonneborne or equal). Caulking shall only be used at pool penetrations and terminations and shall not be employed for joining seams. Caulk shall never be used alone to secure an edge.
- L. Flooring supplier shall provide complete care instructions, PVC patch kit, warranty certificate and spare material as might be required. Owner's agent is also to be trained in the proper method of repairing the flooring as a part of this installation.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Installation crew shall inspect the installation surface at the beginning of the project and shall advise owner of any conditions which might affect the satisfactory installation of the PVC flooring product.

3.02 PREPARATION

A. The surface shall be prepared for the installation of the flooring membrane in accordance with the supplier's technical data and these specifications.

3.03 INSTALLATION AND APPLICATIONS

- A. Installation shall be performed by installers certified competent by the supplier whose experience is fully in compliance with the terms of these specifications.
- B. The installation procedures employed in the execution of this project are to be fully in accordance with the supplier's recommendations and current Technical Data. If any terms or conditions of this contract contradict recommended procedures of the manufacturer or supplier, work will be performed in accordance with manufacturers and suppliers requirements however written notice of any variances from these specifications must be provided to the project architect in advance of any actual work performed in the field.
- C. Work is to be performed as follows:
 - 1. Prepare surface as per specifications and suppliers recommendations.
 - 2. Span large cracks and voids with Stainless Steel sheet 25 GA metal and/or caulk as per above.
 - 3. Apply sanitizing agent.
 - 4. Apply adhesive to floors as required.
 - 5. Install flooring material as required.
 - 6. Install PVC Coated Stainless Steel where required.
 - 7. Apply membrane to floor as detailed in the plans and specifications. All hand welding is to be performed with a Leister hot air welder. No voids at wall/floor junctures shall be permitted in installation.
 - 8. Attach PVC markings, targets, racing lanes, logo etc. as required and directed by the Owner.
 - 9. Attach Compression flanges and gaskets as shown on the drawings or in accordance with supplier's recommendations. Bolt spacing shall not be greater than 3" O.C.
 - 10. Prime and caulk the perimeter termination and wherever else required to make for a suitable and proper watertight fitting,
 - 11. Inspect all welded seams with a roofing probe to ascertain that there are no false welds, pinholes or missed areas.
 - 12. Broom clean the pool and surrounding deck area. Remove any marks or dirty spots.
 - 13. Remove all trash and debris to the owners dumpster.
 - 14. Provide a service and care session of approximately one hour with the owner's designated agent. Provide patch kit, care instructions in a written format, plus 100 square feet of color matched patch material.

3.04 DEDUCTIVE ALTERNATE BIDS

A. Alternate material systems of equal thickness and durability should submit material data 10 days prior to bid date for consideration. Alternate proposals shall provide a full and complete written listing of any and all proposed variances from the base bid specifications as a part of this alternate bid. Contractors shall bid the specified material in their base bid and reflect the alternate material as a deductive alternate bid. Alternate proposals shall provide a full and complete written listing of any and all proposed variances from the base bid specifications as a part of this Alternate Bid.

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Painting as shown on the Plans, as specified and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. Code of Federal Regulations (CFR) Publications:
 - a. 29 1910.1000 Occupational Safety and Health Standards
 - b. 29 1910.1025 Occupational Safety and Health Standards (Lead)
 - 2. Federal Standard (FED-STD):
 - a. 313 Material Safety Data Sheets Preparation and Submission of
 - 3. Steel Structures Painting Council (SSPC) Publications:
 - a. Paint-1 Shop, Field, and Maintenance Painting
 - b. Paint-3 A Guide to Safety in Paint Application
 - c. Paint-20 Zinc-Rich Primers (Type I, Inorganic, and Type II Organic)
 - d. SP 1 Solvent Cleaning
 - e. SP 2 Hand Tool Cleaning
 - f. SP 3 Power Tool Cleaning
 - g. SP 6 Commercial Blast Cleaning
 - h. SP 7 Brush-Off Blast Cleaning
 - i. SP 10 Near-White Blast Cleaning
 - VIS1 Pictorial Surface Preparation Standards for Painting Steel Surfaces

1.03 SUBMITTALS

- A. Submit the following.
 - 1. Manufacturer's Instructions:
 - a. Paint application instructions
 - b. Manufacturer's material safety data sheets

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1) Submit Manufacturer's material safety data sheets for coatings, solvents, and other potentially hazardous materials, as defined in FED-STD-313.

1.04 REGULATORY REQUIREMENTS

- A. Lead Content: Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.
- B. Chromate Content: Do not use coatings containing zinc-chromate or strontium-chromate.
- C. Asbestos Content: Materials shall not contain asbestos.

1.05 DELIVERY AND STORAGE

A. Deliver materials in sealed, labeled containers bearing the manufacturer's name, brand designation, specification number, batch number, color, and date of manufacture. Restrict storage and mixing of materials to locations designated by the Engineer.

1.06 SAFETY METHODS

- A. Apply coating materials using safety methods and equipment in accordance with the following:
- B. Safety Methods Used During Coating Application: Comply with the requirements of SSPC Paint-3.
- C. Toxic Materials: To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:
 - 1. The chemical manufacturer when using mineral spirits, or other chemicals. Use impermeable gloves, chemical goggles or face shield, and other recommended protective clothing and equipment to avoid exposure of skin, eyes, and respiratory system. Conduct work in a manner to minimize exposure of building occupants and the general public.
 - 2. The appropriate OSHA standard in 29 CFR 1910.1025 for surface preparation on painted surfaces containing lead, zinc-chromate, strontium-chromate, asbestos, or other toxic ingredients.
 - 3. 29 CFR 1910.1000.
 - 4. Threshold Limit Values (R) of the American Conference of Governmental Industrial Hygienists.
 - 5. Manufacturer's Material Safety Data Sheets (MSDS).

1.07 ENVIRONMENTAL CONDITIONS

A. Exterior Coatings: Do not apply coating to surfaces during foggy or rainy weather, or under the following surface temperature conditions:

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- 1. Less than 5 degrees F above the dew point;
- 2. Below 40 degrees F (for oil-based paints), 50 degrees F (for latex paints), or over 95 degrees F, unless approved by the Engineer.
- B. Interior Coatings: Apply coatings when surfaces to be painted are dry and the following surface temperatures can be maintained:
 - 1. Between 65 and 95 degrees F during the application of enamels and varnishes;
 - 2. Between 50 and 95 degrees F during the application of other coatings.

1.08 COLOR SELECTION

A. Colors of finish coats shall be as indicated or specified. Where not indicated or specified, colors shall be selected by the Engineer.

1.09 LOCATION AND SURFACE TYPE TO BE PAINTED

- A. Painting Included: Where a space or surface is indicated to be painted, include the following unless indicated otherwise.
 - 1. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.
 - 2. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during performance of the work.
 - 3. Existing coated surfaces that are damaged during performance of the work.
- B. Painting Excluded: Do not paint the following unless indicated otherwise.
 - 1. Surfaces concealed and made inaccessible by panelboards, fixed ductwork, machinery, and equipment fixed in place.
 - 2. Surfaces in concealed spaces. Concealed spaces are defined as spaces above suspended ceilings, furred spaces, attic spaces, crawl spaces, and chases.
 - 3. Steel to be embedded in concrete.
 - 4. Copper, stainless steel, aluminum, brass, and lead except existing coated surfaces.
- C. Interior Painting: Includes new surfaces and appurtenances as indicated and existing coated surfaces made bare by cleaning operations. Where a space or surface is indicated to be painted, include the following items, unless indicated otherwise.

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- 1. Exposed columns, girders, beams, joists, and metal deck; and
- 2. Other contiguous surfaces.
- D. Mechanical and Electrical Painting: Includes field coating of interior and exterior new surfaces.
 - 1. Where a space or surface is indicated to be painted, include the following items unless indicated otherwise.
 - a. Exposed piping, conduit, and ductwork;
 - b. Supports, hangers, air grilles, and registers;
 - c. Miscellaneous metal work and insulation coverings.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS OF PAINT MATERIALS:

A. Products shall comply with MPI standards indicated and shall be listed in the "MPI Approved Product List."

2.02 MATERIALS

- A. Provide as far as practical, pretreatments, primers and top coats from one coating manufacturer. Coatings shall be applied as a complete system and must be compatible with the substrate and each coating component. Coating systems shall be the manufacturer's industrial or commercial systems and are specified by generic type only. Residential coating systems shall not be permitted.
- B. See painting schedule at the end of this Section.
- C. Provide brands and qualities of materials for use on work exactly as specified, or an approved equal.
- D. Coordination: Provide finish coats which are compatible with prime paints used. Provide barrier coats over incompatible primers where required. Submit written notification of anticipated problems using specified coatings with substrates primed by others.
- E. Paint Colors:
 - 1. Provide colors as indicated or selected by Owner.
 - 2. Paint area of each color for observation, review and revisions before batch mixing of colors, or shipping large quantities of that color to job. Allow revisions to approved colors and textures after review of initial area of each color.
 - a. Vary top coats in shade from preceding coat without affecting finish color.

F. Mixing and Tinting:

- 1. Job mix or job tint only if approved. Mix only in pails in suitably sized non-ferrous or oxide-resistant metal pans.
- 2. Strain to remove lumps and specks.
- 3. Use tinting colors recommended by manufacturer for the specific type of finish.
- 4. Add non-mercuric fungicidal agent to exterior finishes by manufacturer.

PART 3 - EXECUTION

3.01 PROTECTION OR AREAS AND SPACES

A. Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

3.02 SURFACE PREPARATION

A. Remove dirt, splinters, loose particles, grease, oil, disintegrated coatings, and other substances deleterious to coating performance as specified for each substrate.

3.03 PREPARATION OF METAL SURFACES

- A. New Ferrous Surfaces:
 - 1. Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: Solvent clean in accordance with SSPC SP 1 to remove oil and grease. Where shop coat is missing or damaged, clean according to SPC SP 2 or SSPC SP 3.
 - 2. Galvanized steel shall be prepared for painting in accordance with ASTM D6386.
 - 3. Immersed Surfaces to Receive a Coating: Clean in accordance with SSPC SP 10.
- B. Final Ferrous Surface Condition: Cleaned surface shall be similar to photographs in SSPC VIS1 as follows:

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DEGREE OF CLEANING	ADHERENT MILL SCALE	RUSTING MILL SCALE	RUSTED	PITTED AND RUSTED		
Hand Tool Cleaning SSPC SP 2	(1)	B St 2	C St 2	D St 2		
Power Tool Cleaning SSPC SP 3	(1)	B St 3	C St 3	D St 3		
Commercial Blast Cleaning SSPC SP 6	(1)	(1)	C Sa 2	D Sa 2		
Brush-Off Blast Cleaning SSPC SP 7	(1)	B Sa 1	C Sa 1	D Sa 1		
Near White Blast Cleaning SSPC SP 10	A Sa 2-1/2	B Sa 2-1/2	C Sa 2-1/2	D Sa 2-1/2		
Note: (1) No photograph is available or recommended for comparison.						

Note: (1) No photograph is available of recommended for comparison.

3.04 PREPARATION OF CONCRETE AND CEMENTITIOUS SURFACE

A. Concrete and Masonry:

- 1. Surface Cleaning: Remove the following deleterious substances.
 - a. Dirt, Chalking, Grease, and Oil: Wash new and existing uncoated surfaces with a solution composed of 3 ounces (2/3 cup) trisodium phosphate, 1 ounce (1/3 cup) household detergent, and 3 quarts of warm water. Then rinse thoroughly with fresh water. Wash existing coated surfaces with a suitable detergent and rinse thoroughly. For large areas, water blasting may be used.
 - b. Fungus and Mold: Wash surfaces with a solution composed of 3 ounces (2/3 cup) trisodium phosphate, 1 ounce (1/3 cup) household detergent, 1 quart 5 percent sodium hypochlorite solution and 3 quarts of warm water. Rinse thoroughly with fresh water.
 - c. Glaze and Loose Particles: Remove by wire brushing.
 - d. Efflorescence: Remove by scraping or wire brushing followed by washing with a 5- to 10-percent by weight aqueous solution of hydrochloric (muriatic) acid. Do not allow acid to remain on the surface for more than five minutes before rinsing with fresh water. Do not acid clean more than 4 square feet of surface, per workman, at one time.

3.05 APPLICATION

A. Coating Application: Apply coating materials in accordance with SSPC Paint-1. SSPC Paint-1 methods are applicable to all substrates, except as modified herein. Thoroughly work coating materials into joints, crevices, and open spaces. Touch up damaged coatings before applying subsequent coats. Interior areas shall be broom clean and dust free before and during the application of coating material.

- 1. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying. Provide each coat in specified condition to receive the next coat.
- 2. Primers, and Intermediate Coats: Do not allow primers or intermediate coats to dry more than 30 days, or longer than recommended by the manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Each coat shall cover the surface of the preceding coat or surface completely, and there shall be a visually perceptible difference in shades of successive coats.
- 3. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.
- B. Equipment: Apply coatings with approved brushes, approved rollers, or approved spray equipment, unless specified otherwise. Spray areas made inaccessible to brushing by items such as ducts and other equipment.
- C. Thinning of Paints: Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory for the type of paint being used. Obtain written permission from the Engineer to use thinners. The written permission shall include quantities and types of thinners to use.

D. Coating Systems:

1. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

<u>Table</u>

- I Exterior Metal Surfaces
- II Interior Metal Surfaces
- III Interior Masonry Surfaces
- 2. Minimum Dry Film Thickness (DFT): Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a minimum dry film thickness of 1.5 mil each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the minimum dry film thickness.
- 3. Coatings for Surfaces Not Specified Otherwise: Coat surfaces which have not been specified, the same as surfaces having similar conditions of exposure.
- 4. Existing Surfaces Damaged During Performance of the Work, Including New Patches In Existing Surfaces: Coat surfaces with the following:
 - a. One coat of primer.
 - b. One coat of undercoat or intermediate coat.
 - c. One top coat to match adjacent surfaces.
- 5. Existing Coated Surfaces To Be Painted: Apply coatings conforming to the respective specifications listed in the Tables herein, except that

pretreatments, sealers, fillers, and primers need not be provided on surfaces where existing coatings are soundly adhered and in good condition.

3.06 COATING SYSTEMS FOR METAL

- A. Primer: Apply specified ferrous metal primer on the same day that surface is cleaned. If flash rusting occurs, re-clean the surface prior to application of primer.
 - 1. Inaccessible Surfaces: Prior to erection, use two coats of the specified primer on metal surfaces that will be inaccessible after erection.
 - 2. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.
 - 3. Pipes and Tubing: The semitransparent film applied to pipes and tubing at the mill is not to be considered a shop coat. Apply specified ferrous metal primer prior to application of subsequent coats.
 - 4. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces: On surfaces to be coated with water thinned coatings, spot prime exposed nails and other ferrous metal with latex primer.
 - a. Apply coatings of Tables I and II. "DFT" means dry film thickness in mils.

3.07 INSPECTION AND ACCEPTANCE

A. In addition to meeting the previously specified requirements, demonstrate the mobility of moving components, including but not limited to swinging and sliding doors, cabinets, and windows with operable sash, for inspection by the Engineer. Perform this demonstration after appropriate curing and drying times of the coatings have elapsed and prior to invoicing for final payment.

TABLE I EXTERIOR METAL SURFACES							
CONDITION	PREPARATION	FIRST COAT	DFT	SECOND COAT	DFT	THIRD COAT	DFT
Severe	SSPC SP 6	Epoxy- Polyamide	4.0	Aliphatic Polyester Polyurethane	1.5	-	-
Mild	SSPC SP 6	Alkyd-Phenolic Primer	2.0	Alkyd	1.5	Alkyd	1.5

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TABLE II INTERIOR METAL SURFACES							
CONDITION	PREPARATION	FIRST COAT	DFT	SECOND COAT	DFT	THIRD COAT	DFT
Severe	SSPC SP 6	Epoxy- Polyamide Primer	3.0	Epoxy-Polyamide	4.0	-	-
Mild	SSPC SP 6	Alkyd-Phenolic Primer	2.0	Alkyd	1.5	Alkyd	1.5
Immersion	SSPC SP 10	Coal-Tar Epoxy	14.0	-	-	-	1

TABLE III INTERIOR MASONRY SURFACES							
CONDITION	PREPARATION	FIRST COAT	DFT	SECOND COAT	DFT	THIRD COAT	DFT
Severe	Clean and Dry	Epoxy- Polyamide Filler	75 sf/gal	Epoxy-Polyamide	4.0	Epoxy- Polyamide	4.0
Mild	Clean and Dry	Modified Epoxy Filler	60 sf/gal	Emulsified Acrylic	2.0	Emulsified Acrylic	2.0

END OF SECTION

SECTION 10 14 00

SIGNAGE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Signage, as shown on the Plans, as specified and/or directed including plaques, panel signs and illuminated panel signs.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. Federal Specifications (Fed. Spec.):
 - a. L-P-387a Plastic Sheet, Laminated, Thermostatting (for design plates)
 - b. FF-B-588C (1) Bolt, Toggle, and Expansion Sleeve, Screw
 - 2. Military Specification (Mil. Spec.):
 - a. MIL-M-43719B Marking Materials and Markers, Adhesive, Elastomeric, Pigmented; General Specification for
 - 3. The Aluminum Association (AA) Publications:
 - a. Standards for Anodized Architectural Aluminum
 - b. Designation System for Aluminum Finishes
 - 4. American National Standards Institute (ANSI) Publications:
 - a. B18.6.2 Slotted Head Cap Screws, Square Head Set Screws and Slotted Headless Set Screws
 - b. B18.6.3 Machine Screws and Machine Screw Nuts
 - 5. American Society for Testing and Materials (ASTM) Publications:
 - A123 Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars, and Strip
 - b. A153 Zinc-Coating (Hot-Dip) on Iron and Steel Hardware
 - c. A386 Zinc-Coating (Hot-Dip) on Assembled Steel Products
 - d. B26 Aluminum-Alloy Sand Castings
 - e. B108 Aluminum-Alloy Permanent Mold Castings
 - f. B209 Aluminum and Aluminum-Alloy Sheet and Plate
 - g. B221 Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

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1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
 - 1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
 - 3. Wiring Diagrams: Power, signal and control wiring.
- C. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
 - 1. Plaque Casting: 6 inches square including border.
 - 2. Aluminum: For each form, finish, and color, on 6-inch long sections of extrusions and squares of sheet at least 4 by 4 inches.
 - 3. Acrylic Sheet: 8 by 10 inches for each color required.
 - 4. Polycarbonate Sheet: 8 by 10 inches for each color required.
 - 5. Fiberglass Sheet: 8 by 10 inches for each color required.
 - 6. Panel Signs: Not less than 12 inches square including border.
 - 7. Trim: 6 inch long sections of each profile.
 - 8. Accessories: Manufacturer's full-size unit.
- D. Sign Schedule: Use same designations indicated on drawings.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: for fabricator.
- B. Warranty: Special warranty specified in this Section.

1.05 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in service performance.
- C. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- D. Regulatory Requirements: Comply with applicable provisions in ADA ABA Accessibility Guidelines and ICC/ANSI A117.1.

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1.07 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on shop drawings.

1.08 COORDINATION

A. Coordinate placement of anchorage devices with templates for installing signs.

1.09 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
- B. Failures include, but are not limited to, the following:
 - 1. Deterioration of metal and polymer finishes beyond normal weathering.
 - 2. Deterioration of embedded graphic image colors and sign lamination.
- C. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 LOCATIONS

- A. Provide signage as required in the flowing reference standards.
 - 1. International Building Code (applicable version): Chapter 11 Accessibility.
 - 2. International Fire Code (applicable version).
 - 3. ADA-ABA Accessibility Guidelines (applicable version).
- B. Coordinate exact locations and quantities with signage vendor as required.

2.02 MATERIALS

A. Aluminum Castings: ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.

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- B. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.
- C. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.
- D. Fiberglass Sheet: Molded, seamless, thermosetting, glass-fiber-reinforced polyester panels with a minimum tensile strength of 15,000 psi when tested according to ASTM D 638 and with a minimum flexural strength of 30,000 psi when tested according to ASTM D 790.
- E. Acrylic Sheet: ASTM D 4802, Category A□1 (cell-cast sheet), Type UVA (UV absorbing).
- F. Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:
 - 1. Impact Resistance: 16 ft-lbf/in. per ASTM D256, Method A.
 - 2. Tensile Strength: 9,000 lbf/sq. in. per ASTM D638.
 - 3. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. per ASTM D790.
 - 4. Heat Deflection: 265 deg F at 264 lbf/sq. in. per ASTM D648.
 - 5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.
- G. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils with pressure-sensitive adhesive backing, suitable for exterior applications.

2.03 PANEL SIGNS

- A. Manufacturers: Provide a manufacturer able to comply with the requirements of the specifications.
- B. Interior and Exterior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner, complying with the following requirements:
 - 1. High-Pressure Decorative Laminate: 0.048 inch thick.
 - 2. Laminated, Etched Photopolymer: Raised graphics with Braille 1/32 inch above surface with contrasting colors in finishes and color combinations indicated and laminated to acrylic back or aluminum alloy.
 - 3. Edge Condition: Square cut.
 - 4. Corner Condition: Square.
 - 5. Mounting: Manufacturer's standard anchors for substrates encountered.
 - 6. Paint Colors: As selected by Owner from manufacturer's range of color options.

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- 7. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch above surface with contrasting colors.
- C. Brackets: Fabricate brackets and fittings for bracket-mounted signs from extruded aluminum to suit panel sign construction and mounting conditions indicated. Factory paint brackets in color matching background color of panel sign.
- D. Changeable Message Inserts: Fabricate signs to allow insertion of changeable messages in the form of transparent covers with paper inserts printed by Owner.
 - 1. Furnish insert material and software for creating text and symbols for PC-Windows computers for Owner production of paper inserts.
 - 2. Furnish insert material cut-to-size for changeable message insert.
- E. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.
- F. Engraved Copy: Machine engrave letters, numbers, symbols, and other graphic devices into panel sign on face indicated to produce precisely formed copy, incised to uniform depth.
 - 1. Engraved Plastic Laminate: Engrave through exposed face ply of plastic-laminate sheet to expose contrasting core ply.
 - 2. Engraved Metal: Fill engraved copy with enamel.

2.04 ACCESSORIES

A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.05 FABRICATION

- A. General: Provide manufacturer's standard signs of configurations indicated.
 - 1. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
 - 2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
 - 3. Preassemble signs in the shop to greatest extent possible. Dissemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.

4.23 SIGNAGE 409.005.001 10 14 00-5 4. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.06 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. 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 the same piece are not acceptable. 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.

2.07 ALUMINUM FINISHES

- A. Clear Anodic Finish: Manufacturer's standard Class 1 clear anodic coating, 0.018 mm or thicker, over a satin (directionally textured) mechanical finish, complying with AAMA 611.
- B. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
 - 1. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of 1.5 mils, medium gloss.

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PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that items, including anchor inserts, are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.
- B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
 - 1. Two-Face Tape: Mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
 - 2. Mechanical Fasteners: Use non-removable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
 - 3. Signs Mounted on Glass: Provide matching opaque plate on opposite side of glass to conceal mounting materials.
 - 4. Bracket-Mounted Signs: Provide manufacturer's standard brackets, fittings, and hardware for mounting signs that project at right angles from walls and ceilings. Attach brackets and fittings securely to walls and ceilings with concealed fasteners and anchoring devices to comply with manufacturer's written instructions.

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3.03 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner

END OF SECTION

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PHENOLIC - CORE TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Phenolic-core toilet compartments configured as toilet enclosures and urinal screens.

B. Related Requirements:

- 1. Section 06 10 01 "Rough Carpentry" for blocking
- 2. Section 10 28 13 "Toilet Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories mounted on toilet compartments.

1.02 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 toilet compartments.

B. Sustainable Design Submittals:

- 1. "Sourcing of Raw Materials" Subparagraph below applies to LEED v4 (all), MRc "Building Project Disclosure and Optimization Sourcing of Raw Materials, Option 1 Raw Material Source and Extraction Reporting." Verify, with manufacturer, that corporate sustainability reports are available, have been prepared within the last year or are applicable to the year of production, and are by an organization approved by the USGBC.
- 2. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
- 3. Retain "Product Data" Subparagraph below to require minimum recycled content for LEED v4.1, MRc "Building Product Disclosure and Optimization Sourcing of Raw Materials, Option 2 Leadership Extraction Practices. Extended producer responsibility. Recycled content."
- 4. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
- 5. First "Product Certificates" Subparagraph below applies to IgCC, which requires that a minimum of 55 percent of building materials or products be extracted, harvested, manufactured, or recovered within 500 miles (800 km) of Project. See IgCC-2012, 505.2.5.

- 6. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.
- 7. "Product Certificates" Subparagraph below applies to ASHRAE 189.1, which requires that a minimum of 15 percent of building materials or products be extracted, harvested, manufactured, or recovered within 500 miles (800 km) of Project. See ASHRAE 189.1-2014, 9.4.1.2.
- 8. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each regional material.
- C. Shop Drawings: For toilet compartments.
 - 1. Include plans, elevations, sections, details, and attachment details.
 - 2. Retain first subparagraph below if required or revise to suit Project.
 - 3. Show locations of cutouts for compartment-mounted toilet accessories.
 - 4. Show locations of centerlines of toilet fixtures.
 - 5. Show locations of floor drains.
 - 6. Show ceiling grid, ceiling mounted items.
- D. Retain "Samples for Initial Selection" and "Samples for Verification" paragraphs below for two-stage Samples.
- E. Samples for Initial Selection: For each type of toilet compartment material indicated.
 - 1. Include Samples of hardware and accessories involving material and color selection.
- F. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:
 - 1. Each type of material, color, and finish required for toilet compartments, prepared on 3-inch- (76-mm-) square Samples of same thickness and material indicated for Work.
 - 2. Each type of hardware and accessory.
- G. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

1.03 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.04 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

2.02 PHENOLIC-CORE TOILET COMPARTMENTS

- A. Basis-of-Design Product: Provide ASI Global Partitions, an ASI Group company; Ultimate Privacy Phenolic Partitions with Easy-Stall Shoe:
 - 1. ASI Global Partitions (Basis of Design)
- B. Toilet-Enclosure Style: Floor anchored/overhead braced with integral zero-sightline privacy system.
- C. Urinal-Screen Style: Wall Hung
- D. Door Width: 24" Standard Unit, 36" Ambulatory, 36" ADA
- E. Door and Panel Height: 58 inches (1473 mm)
- F. Door Height Above Floor: 9 inches
- G. Pilaster Height: 82 inches
- H. Door Construction: Solid phenolic-core panel material with melamine facing on both sides fused to substrate during panel manufacture (not separately laminated), and with eased and polished edges and no-sightline system routed on door and adjacent pilaster. Provide minimum 3/4-inch- (19-mm-) thick doors. Provide door with factory predrilled hinge locations for barrel hinges.

- I. Screen and Pilaster Construction: Solid phenolic-core panel material with melamine facing on both sides fused to substrate during panel manufacture (not separately laminated), and with eased and polished edges. Provide nominal 3/4-inch- (19-mm-) pilasters, stiles: Provide nominal 1/2-inch- (13-mm-) thick panels.
- J. Pilaster Construction: Solid phenolic-core panel material with melamine facing on both sides fused to substrate during panel manufacture (not separately laminated), and with eased and polished edges. Provide with integral no-sightline privacy system with routing on pilaster and adjacent door. Provide nominal 3/4-inch- (19-mm-) thick pilasters. Provide pilaster with factory predrilled hinge locations for barrel hinges.
- K. Pilaster Shoes: Formed from stainless steel sheet, not less than 0.031-inch (0.79-mm) nominal thickness and 3 inches (76 mm) high, No. 4 satin finish. Shoe bottom enclosed and integral to compartment structure.
- L. Panel or Pilaster Pedestal Legs: Stainless steel and minimum 4 inches (102 mm) high. Pedestal legs adjustable in height to within 1 inch (25 mm). Secure to floor with 2-1/2-inch- (64-mm-) long, corrosion-resistant screws.
- M. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters; with stainless steel shoe.
- N. Brackets (Fittings):
- O. Stirrup Type: Ear or U-brackets, stainless steel.
 - 1. Continuous Type: Manufacturer's standard design; stainless steel
- P. Phenolic-Panel Finish:
 - 1. Facing Sheet Finish: One color and pattern in each room.
 - 2. Color and Pattern: As selected by Architect from manufacturer's full range with manufacturer's standard dark color core (Class "B" fire rated).
 - 3. Edge Color: Black Core (Class "B" fire rated).

2.03 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard operating hardware and accessories.
 - 1. Material: Stainless Steel.
 - 2. Hinges: Manufacturer's standard surface-mounted barrel hinges, allowing emergency access by lifting door.
 - 3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit on door for out-swinging doors and pilaster for in-swinging doors designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.

- 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
- 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at outswinging doors.
- 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.04 MATERIALS

- A. Aluminum Castings: ASTM B26/B26M.
- B. Aluminum Extrusions: ASTM B221 (ASTM B221M).
- C. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.
- D. Stainless Steel Castings: ASTM A743/A743M.
- E. Zamac: ASTM B86, commercial zinc-alloy die castings.

2.05 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

- D. Ceiling-Hung Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for connection to structural support above finished ceiling. Provide assemblies that support pilasters from structure without transmitting load to finished ceiling. Provide sleeves (caps) at tops of pilasters to conceal anchorage.
- E. Floor-and-Ceiling-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.
- F. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of posts. Provide shoes and sleeve (caps) at posts to conceal anchorage.
- G. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
 - 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch (13 mm).
 - b. Panels and Walls: 1 inch (25 mm).
 - 2. Retain applicable bracket types in "Stirrup Brackets" and "Full-Height (Continuous) Brackets" subparagraphs below.
 - 3. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than two brackets attached near top and bottom of panel.
 - a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.

- b. Align brackets at pilasters with brackets at walls.
- 4. Continuous Brackets: Secure panels to walls and to pilasters with full-height brackets.
 - a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
- D. Ceiling-Hung Units: Secure pilasters to supporting structure and level, plumb, and tighten. Hang doors and adjust so bottoms of doors are level with bottoms of pilasters when doors are in closed position.
- E. Floor-and-Ceiling-Anchored Units: Secure pilasters to supporting construction and level, plumb, and tighten. Hang doors and adjust so doors are level and aligned with panels when doors are in closed position.
- F. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.03 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware in accordance with hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION

SECTION 10 28 13

TOILET ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Toilet Accessories, as shown on the Plans, as specified and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. Commercial Item Description (CID) Publication:
 - a. A-A-2380 Dispenser, Paper Towel
 - 2. Federal Specifications (Fed. Spec.):
 - a. W-H-50B Hand Drier, Blower, Electric
 - b. DD-M-00411B Mirrors, Glass
 - c. RR-A-1255C Ash Receiver, Tobacco (Wall Mounted, Paraboloidal Shape, 2-Quart Capacity)
 - d. WW-D-1908A Dispenser, Toilet Paper, Cabinet
 - e. WW-H-1911A Holder, Toilet Paper (Single Roll)
 - f. WW-P-541/8B Plumbing Fixture (Accessories, Land Use) (Detail Specification)

1.03 SUBMITTALS

- A. Manufacturer's Catalog Data: Submit for each type of accessory specified. Include descriptions of materials, finishes, fastening and anchoring devices, and appurtenances.
- B. Shop Drawings: Indicate dimensions, description of materials and finishes, general construction, specific modifications, component connections, anchorage methods, hardware and installation procedures.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated on drawings.
 - 2. Identify products using designations indicated on drawings.

1.04 DELIVERY AND STORAGE

A. Deliver materials to the site in unopened containers, labeled with the manufacturer's names and brands, ready for installation. Store accessories in safe, dry locations until needed for installation.

1.05 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustments, operation, cleaning and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying Work.

PART 2 - PRODUCTS

2.01 MATERIALS AND FABRICATION

A. Fabricate accessories in accordance with commercial practice, with welds ground smooth. Bend, flange, draw, form, and perform similar operations in a manner to ensure no defects. Flanges of recessed accessories to return to walls to provide a continuous, tight-against-the-wall installation. Doors shall be warp free. Key manufacturer's standard locks alike, for groups of accessories; two keys furnished for each group.

2.02 FINISHES

A. Finishes on metals not specified otherwise shall be provided as follows:

MetalFinishCorrosion-resisting SteelGeneral-Purpose Polished (Stainless Steel)AluminumSatin Anodic, ClearCarbon SteelBright Chromium PlateCopper Alloy (Brass)Bright Chromium PlateZinc AlloyBright Chromium Plate

2.03 MANUFACTURED UNITS

- A. Toilet Tissue Dispensers
 - 1. Surface-mounted hinged hood dual rail toilet tissue dispenser model 5126 by "Bradex (or approved equal)

- B. Grab Bars: Fed. Spec. WW-P-541/8B, Type IV, Class 2, surface mounted, stainless steel, 1-1/4 inches in diameter, with a nominal wall thickness of not less than 0.50 inch (18 gauge), of the length and shape indicated, and with a non-slip finish. Grab bars and mounting devices shall be capable of withstanding a static load of 250 pounds at any point on the bar.
- C. Mirrors: Class 2, Style E, Grade 1, electrocopper plated, conforming to Fed. Spec. DD-M-00411, size as indicated

D. Electric Hand Drier:

- 1. Surface mounted ada compliant adjustable speed hand dryer, type: "model 2902-28 as mfgr.'d by Bradex (or approved equal)
- E. Diaper Changing Station Horizontal, wall mounted design, 35 inches by 20 inches by 4 inches deep in closed position, 20 inches wide when opened. Made of high-impact polyethylene.
 - 1. Ada compliant wall mounted type: "model 961 baby changer" as mfgr.'d by "Bradley (or approved equal)

F. Napkin Disposal

- 1. Ada compliant wall mounted type: "Model 961 baby changer" as mfgr.'d by Bradley (or approved equal)
- G. Soap Dispenser
 - 1. Ada compliant model 6562 as mfgr.'d by Bradley (or approved equal)

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Surfaces of fastening devices exposed after installation shall have the same finish as the attached accessory. Exposed screw heads shall be oval. Install accessories at the location and height indicated. Protect exposed surfaces of accessories with strippable plastic or by other means until the installation is accepted. After acceptance of accessories, remove and dispose of strippable plastic protection. Coordinate accessory manufacturer's mounting details with other trades as their work progresses. After installation, thoroughly clean exposed surfaces and restore damaged work to its original condition or replace with new work. Install grab bars to withstand downward load of at least 250 pound-force, when tested per method in ASTM F446. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Recessed Accessories: Fasten accessories with wood screws to studs, blocking or rough frame in wood construction. Set anchors in mortar in masonry

- construction. Fasten to metal studs or framing with sheet metal screws in metal construction.
- C. Surface-Mounted Accessories: Mount on concealed backplates, unless specified otherwise. Accessories without backplates shall have concealed fasteners. Unless indicated or specified otherwise, install accessories with sheet metal screws or wood screws in lead-lined braided jute, Teflon or neoprene sleeves, or lead expansion shields, or with toggle bolts or other approved fasteners as required by the construction. Install backplates in the same manner, or provide with lugs or anchors set in mortar, as required by the construction. Fasten accessories mounted on gypsum board and plaster walls without solid backing into the metal or wood studs or to solid wood blocking secured between wood studs, or to metal backplates secured to metal studs.

3.02 CLEANING

- A. Remove temporary labels and protective coatings.
- B. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION

SECTION 10 44 00

FIRE EXTINGUISHERS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Fire Extinguishers, as shown of the Plans, as specified and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
- B. The following is a list of standards which may be referenced in this Section:
 - 1. Factory Mutual (FM).
 - 2. Mine Safety and Health Administration (MSHA).
 - 3. National Fire Protection Association:
 - 4. 10, Standard for Portable Fire Extinguishers.
 - 5. National Institute for Safety and Health (NIOSH): Certification Program.
 - 6. Occupational Safety and Health Act (OSHA).
 - 7. Underwriters Laboratories, Inc. (UL): Fire Protection Equipment List.
 - 8. ASTM International: ASTM E814, Standard Test Method for Fire Tests of Penetration Firestop Systems.

1.03 SUMMARY

- A. Section includes:
 - 1. Fire extinguishers.
 - 2. Brackets for wall mounting.
 - 3. Projecting graphic identification signage.
- B. Related work specified elsewhere:
 - 1. Section 06 10 01, Rough Carpentry.
 - 2. Section 09 91 00, Painting.

1.04 SUBMITTALS

- A. Comply with Submittal Procedures and provide the following:
 - 1. Action Submittals:
 - a. Fire Extinguishers: Submit manufacturer's product data for each item, including sizes, UL listings, or other certifications and mounting information.

- b. Product Data: Submit extinguisher operational features, color and finish, and anchorage details.
- 2. Informational Submittals:
 - a. Manufacturer's Installation Instructions:
 - Special criteria and wall opening coordination requirements.
 - b. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
 - c. Operation and Maintenance Data: Submit test, refill or recharge schedules and recertification requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site and inspect for damage.
- B. Store and protect materials according to manufacturer's instructions.
- C. Do not install extinguishers when ambient temperature is capable of freezing extinguisher contents.

PART 2 - PRODUCTS

2.01 FIRE EXTINGUISHERS

- A. Manufacturers:
 - 1. JL Industries
 - 2. Larsen's Manufacturing Company
 - 3. Nystrom Products Company
 - 4. Potter Roemer
 - 5. Or Approved Equal

B. General:

- 1. Conform to NFPA 10 for fire extinguishers.
- 2. Furnish all fire extinguishers from one manufacturer.
- 3. UL-listed, charged and ready for service.
- 4. Provide ten (10) 10-lb fire extinguishers, with mounting bracket and graphic identification sign, as specified herein.
- C. Multi-Purpose Hand Extinguisher (EXT-1):
 - 1. Tri-class dry chemical extinguisher agent.
 - 2. Pressurized, red enamel steel shell cylinder.
 - 3. Activated by top squeeze handle.
 - 4. Agent propelled through hose or opening at top of unit.
 - 5. For use on A, B, and C class fires.
 - 6. Minimum UL Rating: 4A:80B:C, 10-lb capacity.

2.02 ACCESSORIES

- A. Extinguisher Brackets: For each extinguisher, furnish heavy-duty brackets with clip-together strap for wall-mounting formed steel, white enamel finish.
- B. Graphic Identification Sign:
 - 1. Provide projecting graphic identification sign for each fire extinguisher furnished.
 - 2. Each sign shall use photo-luminescent material to remain illuminated during a power outage and shall comply with ASTM E2072.
 - 3. Sign shall include OSHA-approved pictorial markings to indicate the extinguisher uses and non-uses on a single label.
 - 4. Manufacturer: GlowSmart, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install where indicated or directed and in accordance with the manufacturer's recommendations.
- B. Install brackets and graphic identification signs plumb and level on walls.
- C. Install wall brackets maximum 48 inches from finished floor to top of extinguisher handle.
- D. Secure cabinets rigidly in place.
- E. Place extinguishers on wall brackets.
- F. Position cabinet signage as required by AHJ.

END OF SECTION

SECTION 10 51 13

METAL LOCKERS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Metal Lockers, as shown on the Plans, as specified, and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. Federal Specifications (Fed. Spec.):
 - a. AA-L-00486H Interim Federal Specification, Lockers, Clothing, Steel
 - b. TT-C-490 Cleaning Methods and Pretreatment of Ferrous Surfaces for Organic Coatings
 - c. PPP-P-15 Packaging and Packing of Storage Cabinets and Clothing Lockers, Metal

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data, descriptive literature and installation instructions for metal locker units.
- B. Shop Drawings: Submit shop drawings indicating elevations, thicknesses and gages of metals, fastenings, proposed method of anchoring, the size and spacing of anchors, details of construction, hardware, fittings, mountings and other related items and installation details.
- C. Certificates of Compliance: Submit certificates from the manufacturer attesting that materials meet the requirements specified herein.

1.04 DELIVERY, STORAGE AND PROTECTION

A. Deliver materials to the site in original sealed containers or packages, bearing the manufacturer's name and brand designation conforming to requirements of Fed. Spec. PPP-P-15. Store and handle materials in a manner to protect them from damage during the entire construction period.

2.01 MATERIALS

- A. Three-tier lockers (semi-louvered door). Size: 12 inches wide, 18 inches deep, 72 inches high overall,
 - 1. Locker Body: Back and side walls shall be minimum 24 gage steel, with double-flanged connections extended full height. Form top and bottom panels of not less than 24 gage steel, with flanged edges.
 - 2. Locker Shelf: 24 gage steel.
 - 3. Locker Door (Three per locker): One piece, minimum 16 gage sheet steel, flanged at all edges, constructed to prevent springing when opening or closing. Fabricate to swing 180 degrees. Provide stamped, louvered vents in door face.
 - 4. Locker Hinges: Heavy duty, not less than 0.050-inch thick steel, full loop, 5 knuckle, tight pin, 2 inches high. Weld to inside of frame and secure to door with not less than 2 factory-installed fasteners which are completely concealed and tamperproof when door is closed.
 - 5. Locker Latching: Positive automatic, pre-locking, pry-resistant latch and pull with rubber silencers; chromium-plated, heavy duty, vandal-proof lift-up handle, containing strike and hole for padlock; and with mechanism three point latching conforming to requirements of Fed. Spec. FF-P-101.
- B. Locker Accessories: Provide the following accessories for each unit:
 - 1. Sloping Tops: Tops shall be not less than 20 gage sheet steel, approximately 25 degrees pitch, in lengths as long as practicable. Provide closures at all exposed ends. Finish to match lockers.
 - 2. Filler Panels: Provide filler panels where required to close space between lockers and wall surface. Panels shall be not less than 16 gage steel sheet, factory fabricated and finished to match locker units.
 - 3. Closed Base: Metal base shall be not less than 16 gage cold rolled steel, fabricated to enclose base of lockers without additional fastening devices. Flange bottoms inward 3/4 inch for stiffening. Factory finish metal base to match lockers.
- C. Fabrication: Fabricate lockers square, rigid, and without warp, with metal faces flat and free of dents or distortion. Make all exposed metal edges safe to touch. Weld frame members together to form rigid, one-piece structure in accordance with Mil. Spec. MIL-W-12332. Weld, bolt, or rivet other joints and connections as standard with manufacturer. Grind exposed welds flush. Do not expose bolts or rivet heads on front of locker doors or frames. Fabricate of 16 gage channels or 12 gage angles, minimum, with continuous stop/strike formed on vertical members. Chemically pretreat metal with degreasing and phosphatizing process in accordance with Fed. Spec. TT-C-490. Apply baked-on enamel finish to all surfaces, exposed and concealed, except plates and non-ferrous metal.

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PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install metal lockers at locations shown in accordance with manufacturer's instructions for plumb, level, rigid, and flush installation.
- B. Space fastenings 48 inches on center, unless otherwise recommended by manufacturer, and apply through back-up reinforcing plates where necessary to avoid metal distortion; conceal fasteners where possible.
- C. Install sloping top units, and metal filler panels where indicated, using concealed fasteners to provide flush, hairline joints against adjacent surfaces.

END OF SECTION

4.23 METAL LOCKERS 409.005.001 10.51.13-3

SECTION 13 11 00

PVC MEMBRANE SWIMMING POOL LINING SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for the PVC Membrane Swimming Pool Lining Systems specifically designed and formulated for use in swimming pools as shown on the Plans, as specified and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. American National Standards Institute (ANSI) Publications:
 - a. Z49.1 Safety in Welding, Cutting and Allied Processes
 - 2. American Society for Testing and Materials (ASTM) Publications:
 - a. D751 Standard Test methods for Coated Fabrics
 - b. G21 Standard Practice for Determining Resistance of Plastics and Polymeric Materials
 - c. D2136 Standard Test Method for Coated Fabrics Low-Temperature Bend Test
 - d. D413 Standard Test Methods for Rubber Property Adhesion to Flexible Substrate
 - e. D1204 Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature
 - f. D1203 Standard Test Methods for Volatile Loss from Plastics Using Activated Carbon Methods
 - g. D1239 Standard test Methods for Resistance of Plastic Films to Extraction by Chemicals
 - h. D4833 Standard Test Method Puncture Resistance of Geomembranes and Related Products
 - D4355 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
 - 3. New York State Department of Health Publication:
 - a. Subpart 6.1 New York State Sanitary Code
 - 4. York State Uniform Fire Prevention and Building Code (NYSUFPBC) Publication:
 - a. 2018 New York State Plumbing Code

1.03 GENERAL REQUIREMENTS:

- A. The specification is for a United States manufactured, 60 mil thick, 81" wide, reinforced textured PVC Pool renovation membrane. The specified product system consists of a 60 mil thick membrane with enhancements designed for maximal product durability and ease of maintenance over time as listed below; a sealed encapsulated machine edge, a wick proof polyester scrim reinforcement, including special additives designed to provide maximal UV and chlorine fade resistance.
- B. This specification is presented to establish a minimum level of material quality and to define the installation technique, material quality and experience levels required to perform the required work and is not designed to restrict in any way equal competitive bids. It is assumed that all products bid will be in compliance with the product and installation specifications provided herein. Manufactured material made without stain guard coatings, made without wick proof scrims, and manufactured employing standard dyes and materials without special UV and Chlorine fade resistance will not be considered.
- C. The individual components and installation criteria described below consists of a complete polyester scrim reinforced PVC membrane liner to be installed in accordance with these specifications and submitted drawings. Material rolls of reinforced PVC membrane shall be custom fit and fuse welded together using hot-air hand welders and machine welders (or preapproved equal). Termination of the PVC system shall occur as shown on the project drawings. Upon completion, the pool lining system shall provide a waterproof lining of the existing pool over the poly felt (poly felt-as required) complete with all necessary hardware, fittings, attachments, flanges, gaskets and all appropriate inside pool markings, as required to meet applicable state pool codes.
- D. Prior approval of a specific PVC material does allow the installing contractor to deviate in any manner from the specified installation method as outlined in these Specifications nor does it constitute acceptance of any deviation from this level of quality, or warranty requirements.
- E. Pool systems including materials, installation, and workmanship shall be in accordance with the New York State Plumbing Code and New York State Department of Health Sanitary Code. In the Codes referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" had been substituted for the word "should" wherever it appears.
- 1.04 SUBMITTALS: The following items are to be submitted prior to commencing work.
 - A. Manufacturer's Product Data:
 - 1. Provide standard catalogue sheets and installation instructions for each item specified. List each material finished and application and cross-reference to the shop drawing(s).

B. Shop Drawings:

1. Show fabrication and connection details for all connections to existing pool structure. Provide dimensional shop drawings showing all pertinent dimensions.

C. Samples:

1. Provide a 2 ft x 2 ft samples of PVC membrane for chemical and UV testing purposes, if required. Include 10.5 oz. felt-as required, PVC coated stainless steel, countersunk fastener to be employed at flanges, and marking samples and a 1 ft x 1 ft sample of the adhesive attaching PVC to the felt under layer. Also supply four 2 inch x 2 inch PVC to felt samples for water testing of adhesive bond. Adhesive must hold felt to PVC to felt after a 24 hour water immersion test.

D. Project Forman Certification:

1. Provide written documentation of Project Foreman certification.

E. Contract Closeout Submittals:

- 1. Provide Care & Maintenance Guide.
- 2. Provide copy of supplier's 10-year PVC material warranty. Warranty should completely cover the material against leakage, delaminating, bubbling, pitting, shearing, tearing, cracking or crazing or any material workmanship or defects. The warranty must include the above, plus include a 10-year weld warranty on all PVC welding including targets, racing lanes and markings. In the event of failure of the lining system the Bidder shall repair and/or replace the damaged section.

1.05 QUALITY ASSURANCE

A. Qualifications of the Contractor and Manufacturer:

- 1. Experience: Pool material supplier and the actual pool membrane manufacturer shall have been engaged in the manufacture of PVC membranes for use in swimming pools for a minimum of ten (10) years. Manufacturer shall employ only 100% virgin vinyl throughout the manufacturing process. All PVC membrane components shall be from the same manufacturer to assure compatibility of components and weld ability over time. Products manufactured using recycled materials will not be allowed.
- 2. Contractor must demonstrate a minimum of 10 pools of similar size installed by its staff-utilizing site built reinforced PVC membrane materials.
- 3. Licensing: The Contractor shall provide proof of maintaining the proper license(s), if any, as required to do work in this State. Contractor shall comply with all Federal, State and local rules, regulations and licensing requirements.

- 4. The Foreman provided by the installer shall be certified competent in installing PVC membrane materials by the membrane supplier and shall have a minimum of two years' experience welding PVC membranes for pool applications.
- 5. Pre-award Material Chlorine Testing: A 2' x 2' sample of the actual material to be employed on the subject project shall be provided for the purpose of testing prior to project award. Sample shall be subjected to a 24-hour chemical resistance test simulating extreme exposure to 100% powdered tri-chlor chlorine. A small 3" x 3" sample of all products submitted in accordance with these Bid instructions shall be placed in a shallow plastic container with water and a ½ teaspoon of 100% tri-chlor in powder form shall be applied to the surface of each material and left undisturbed for a period of 48 hours. Fading, the material condition and durability of the samples shall be evaluated by the Owner and shall be used in final evaluation for award. A sample of actual materials employed on the project may also be tested to confirm the material quality of products actually employed.
- 6. Bidders shall initial each item, and execute and return with the bid, the enclosed PVC liner bidder certification and representation sheet. Failure to include this sheet properly executed shall invalidate the Bid.
- 7. The drawings are generally diagrammatic and are intended to convey the scope of work and indicate general arrangement. The drawings are intended for Contractors having experience, skill, and discretion in the execution of the work implied by the drawings.

1.06 DELIVERY, STORAGE AND HANDLING

A. All materials required for the completion of this project shall be delivered to the project site in a manner designed to prevent damage. No hooks or forks shall be used for unloading. The Contractor shall perform or direct the uploading of all materials. Materials shall be stored in a flat, dry area in a manner that will not damage them. All materials provided are to be new and in unopened packaging.

1.07 PROJECT SITE CONDITIONS

A. The Contractor (in accordance with the supplier's requirements) shall prepare project site. All burrs and rough edges shall be ground smooth or covered accordingly. Severe pits and voids shall be filled with either Portland cement repair concrete for areas with depths 1-3/4" or greater and portland cement repair mortar for areas with depths 1-3/4" or less. All working cracks, expansion joints or voids shall be isolated from the 10.5 oz. poly felt (as required) over the installed rigid stainless steel or plastic expansion strips. All oil and tar compounds must be removed from the pool or covered with appropriate isolation materials. See repair details on drawings for additional information regarding repair of damaged pool shell floors and walls. Surface preparation is part of this Contract.

PVC MEMBRANE SWIMMING POOL LINING SYSTEMS 13 11 00-4

1.08 WARRANTY

A. The flexible PVC membrane system shall be warranted by the supplier for workmanship, materials, and shall be specifically warranted to not delaminate, pit, crack, require additional sealing, tear, or become structurally unsuitable for its intended purpose for a period of ten (10) years. Additionally, the Contractor shall warrant against delaminating at all heat welds at seams and racing lanes for a period of ten (10) years. In the event the material should become unusable during the period, the manufacturer and installer agree to repair and/or replace the defective sections. All other products such as fasteners, caulk, fittings, etc. shall carry a one (1) year warranty. Any equipment provided shall carry the manufacturer's warranty.

1.09 SAFETY STANDARDS

- A. The Contractor shall comply with applicable Federal, State and local requirements for protecting the safety of the Contractor's employees, building occupants and the environment. In particular, all applicable standards of the Occupational Safety and Health Administration (OSHA) shall be followed when working in accordance with this Specification.
- B. The Contractor shall assure that its employees have received safety equipment training, medical surveillance programs, individual health protection measures, manufacturer's product information and Material Safety Data Sheets (MSDS) as required for the work by the U.S. Occupational Safety and Health Administration, and as described by this Specification.
- C. The Contractor shall maintain a copy of all current MSDS documentation and safety certifications at the site at all times, as well as comply with all other site documentation requirements of applicable OSHA programs and this specification.
- D. Occupant Safety: No processes or materials shall be employed in such a manner that they will introduce additional hazards into occupied spaces.
- E. Rotating Equipment Safety: Fully guard couplings, motor shafts, gears, and other exposed rotating or rapidly moving parts in accordance with ASME B15.1. The guards shall be cast iron or expanded metal. Guard parts shall be rigid, secured and readily removable without disassembling the guarded unit.
- F. Welding and Cutting Safety: ANSI Z49.1.

1.10 DELIVERY, STORAGE AND HANDLING

A. The PVC Membrane Swimming Pool Lining System components shall be delivered to the job site adequately packaged to prevent damaged. Unloading and storage shall be executed by the Contractor. The materials shall not be stacked or stored in any manner which could cause damage or deformity. Site assembly or

fabrication of any part of the PVC Membrane Swimming Pool Lining System without the complete coordination and supervision of the manufacturer or his representative is strictly prohibited.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The material manufacturer shall be engaged in the formation and manufacture of reinforced PVC membranes for use in commercial pools for greater than ten (10) years.

2.02 MATERIALS

- A. All individual components utilized to renovate the project pool shall be completely compatible with the pool environment and shall be supplied by one supplier as a system to assure compatibility and to assure a single source of responsibility. All PVC membrane components shall be from the same manufacturer to assure identical formulations, weld compatibility, and to ascertain identical product molecular weights. Material shall possess an embossed standard slip-resistance throughout the pool to provide slip-resistance to pool bathers or as required by the Owner. An extra aggressive slip-resistant material on steps, gutters, ramps and zero depth entry areas up to water depth minimum of 24" deep.
- B. Material Specifications shall be provided meeting or exceeding the following Physical Properties of the specified system. Provide RenoSys Endura Series Pool Membrane Typical Material Properties, or approved equal.
 - 1. Description: Polyester reinforced PVC membrane Pool Renovation Membrane System. The PVC membrane shall be available at a minimum in two (2) easily cleanable textures.
 - 2. Compound: Maximal UV resistance, chlorine impervious PVC compounded for the pool environment. Product shall be compounded with permanent dyes, permanent plasticizers, UV inhibitors, and antifungal agents.
 - 3. Reinforcement: Non-wicking Polyester scrim fabric 1000 Denier yard 9 x9 per inch count.
 - 4. Reference Number: #Ripple/8125m60 pool membrane (Endura Series).

Property	Machine Direction Transverse Direction	Test Method	Result
Thickness		ASTM D-751	60 mil.
Break Strength @ Yield (lbs in)	MD	ASTM D-751	418
@ Yield (lbs in)	TD	ASTM-D751	328
@ Break (lbs in)	MD	ASTM D-751	375
@ Break (lbs in)	TD	ASTM-D751	345
@ Yield (lbs in)	MD	ASTM D-638	181
@ Yield (lbs in)	TD	ASTM D-638	161
@ Break (lbs in)	MD	ASTM D-638	117
@ Break (lbs in)	TD	ASTM D-638	85
Tear Resistance (lbs)	MD	ASTM D-751	85.0
Fungal & Bacterial Resistance	TD	ASTM G-21	No growth or staining
Cold Flex Resistance 1/8" Mandrel		ASTM D-2136	Pass -40 ° C
Ply Adhesion (lbs) Method Type A		ASTM D-413	10
% Dim. Stability (15 min. 212 Deg.)	MD	ASTM D-1204	2.0%
Volatility % weight loss, max.	TD	ASTM D-1203	<1%
Specific Gravity		ASTM D-752	1.235
Water Resistance % weight loss, max.		ASTM D-1239	+0.3%
Puncture Resistance (lbs min.)		ASTM D-4833	135
Delamination Resistance (lbs min.)	MD	7151111 1033	12.0
UV Resistance % retained (after exposure) Testing Agency: ASTM American Society for Testing Agency: Astm American		ASTM D-4355	100

Testing Agency: ASTM – American Society for Testing and Materials
Test method Definitions: MD – Machine Direction; TD – Transverse Direction

2.03 SYSTEM COMPONENTS

A. Pool lining membrane shall be rolls of flexible 81" wide, x 25 meters long x 60 mil thick 100% virgin PVC material fully UV and chlorine stabilized, reinforced with a wick proof scrim. To prevent material delamination due to freezing conditions, this scrim shall be offset approximately ½" from the edge and shall be fully machine edge encapsulated. The scrim shall be kept from contacting the pool water along the machine edge of the material to prevent moisture seeping between the layers. The material shall be applied with a slip-resistant/textured side "out" as required by the Owner. The floor area, the gutter perimeter, ramps, and step areas to provide with a slip-resistance. All welds shall be accomplished

- employing hot-air welding. No solvent welding of PVC materials shall be allowed on this project. No double stick Mylar or other tapes are permitted under the liner on this project unless pre-approved. Seams shall be tacked, a continuous air entrapment weld shall be applied continuous on all welds, and then a minimum 3/4" wide final weld shall be installed. No burning of the material shall be permitted.
- B. Racing lanes, targets and marking strips shall be provided by the supplier and colored black on the textured side and light blue on the reverse side to prevent black bleeding along the weld zone. All markings shall be as per local pool state code requirements.
- C. An anti-microbial product fully compatible with the PVC membrane shall be sprayed or rolled on under the felt (felt-as required) material to discourage microbial growth under the system.
- D. Adhesives that are not weakened when exposed to chlorinated water immersion and that are fully compatible and suitable for bonding to the PVC material and the felt layer shall be provided that are designed to chemically bond to the PVC material and to fully attach the geotextile fabric to the pool walls (and floor where required). Note: All walls and dive hopper and three foot of perimeter shall be adhered over poly felt. All poly felt is to be bonded to the pool. Additionally, all PVC material employed on all pool walls and in dive hoppers shall be fully adhered as a condition of these Specifications. Any adhesives that are water-soluble shall not be allowed under the scope of the bid documents to prevent the Geotextile fabric from shifting under the membrane. PVC adhesive shall be further designed to be resistant to plasticizer migration. Adhesive on project shall be water impermeable RenoBond or Nordot #34, or approved equal manufacturers adhesive only. No tacking of the PVC wall and floor sections to PVC metal strips is intended under this Specification.
- E. An under layer of 10.5 oz. felt shall be installed fully adhered with the appropriate adhesive throughout the entire pool.
- F. PVC coated stainless steel or aluminum metal shall be installed where detailed or as required to make for a satisfactory installation. Galvanized PVC coated steel shall not be acceptable for use on this project.
- G. Trim away poly felt and compress liner around perimeter as detailed in the accompanying installation details.
- H. Flanges at all penetrations shall be constructed of Type I exterior grade hard PVC sheet and CNC custom fabricated, radius, and drilled as required for use at all membrane penetrations. Flanges will be custom fabricated to fit as close to existing pool fittings as is practical and possible based on substrate conditions

- around penetrations. All bolts used to fasten any compression bar shall be countersunk to allow for a flush installation. All metal fasteners employed shall be of 18-8 stainless steel.
- I. 4" to 6" wide plastic or stainless steel 25-gauge plate shall be fastened on one side to the sub-straight over all active expansion joints and working cracks. Galvanized steel shall not be acceptable.
- J. Caulking shall be installed where required by installation details, and shall be Novagard underwater grade caulk or prior approved equal. Caulking shall only be used at pool penetrations and terminations and shall not be employed for joining seams.
- K. Membrane supplier shall provide complete care instructions, PVC underwater patch kit, warranty certificate and 100 square foot of liner material. Owner's agent is also to be trained in the proper method of repairing the membrane underwater as a part of this installation.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Installation crew shall inspect the pool surface at the beginning of the project and shall advise Owner as soon as practicable of any existing conditions which might affect the satisfactory installation of the pool membrane lining product.

3.02 PREPARATION

A. The pool shall be prepared for the installation of the membrane in accordance with the supplier's technical data and these Specifications. Deteriorated areas of the concrete pool structure shall be removed and repaired as shown and specified.

3.03 INSTALLATION AND APPLICATIONS

A. Installation shall be performed by installers certified competent by the supplier whose experience is fully in compliance with the terms of these Specifications. The PVC membrane installation shall be completely supported by the structural walls in all respects. The material shall be completely supported by structural walls at all corners and wall/floor junctures before the pool is filled. Due to the inordinate stress induced at seams and fittings by water pressure, in no case shall gaps, voids or spaces be allowed behind the membrane before water is added. Stretch fitting the PVC membrane material will not be allowed.

- B. The installation procedures employed in the execution of this project are to be fully in accordance with the supplier recommendations and current Technical Data. If any terms or conditions of this Contract contradict recommended procedures of the manufacturer or supplier, work will supersede those contradictions and will remain in accordance with the manufacturer and supplier requirements. However, should an alteration be required, then a written notice for any variances from these Specifications must be provided to the Project Engineer/Architect/Owner in advance of any such actual work being performed in the field.
- C. All work to be performed by skilled technicians having adequate experience with, and specific training in, the field welding and fabrication of flexible PVC Swimming Pool Membrane Liner Systems. Additionally, to ensure the overall integrity of the installation, the installing crew shall be supervised by a crew leader having had no less than two (2) tears experience in the application of PVC membrane system on at least five (5) pool projects similar in size and scope to this project. If requested, the Contractor shall submit the personnel and supervisor's experience in writing for approval prior to the award of the Contract.
- D. Work is to be performed as follows:
 - 1. Prepare pool surface per specifications, repair details on the drawings and suppliers recommendations.
 - 2. Span any cracks or voids with Stainless Steel sheet 25-gauge or 1/16th inch hard plastic plate and pinned into place with appropriate stainless steel fasteners. Repair any major damage to pool walls and floors per the repair details on the drawings.
 - 3. Apply sanitizing agent.
 - 4. Apply adhesive to pool walls and floors where required and attach 10.5 oz poly felt (if required) to all walls and floor. Trim away excess at compression fittings.
 - 5. Apply poly felt material (if required) throughout pool with water insoluble adhesives.
 - 6. Install non corrosive coated PVC stainless steel where required.
 - 7. Apply PVC membrane to pool as detailed in the plans and overlap weld (allowing a 2" overlap) with a minimum 3/4" wide final weld. All hand welding is to be performed with a hot-air welder. No solvent welding, glue welding or THF Swell agent welding is permitted on this project. No voids at wall/floor junctures shall be permitted in this installation. No double stick tapes are permitted, unless pre-approved.
 - 8. Provide PVC markings, targets, racing lanes, logo etc. as required and directed by the Plans and required by State codes. Targets and lane lines shall be fully welded to the walls and floor as indicated on the prints.
 - 9. Attach compression flanges and gaskets as shown on the drawings or in accordance with supplier's recommendations. Fastener spacing shall not be greater than 3" O.C. All fastener heads shall be countersunk, if warranted.

- 10. Prime and caulk the perimeter termination and wherever else is required to make for a suitable and proper watertight fitting.
- Inspect all seams in the pool with a roofing probe to ascertain that there are no false welds, pinholes or missed areas. Seal all seam edges with edge sealant as required in installation bulletins.
- 12. Broom clean pool and surrounding deck area. Remove any marks or "dirty" spots. Remove all trash and debris to the Owner's dumpster.
- 13. Provide a service and care session of approximately one hour with the Owner's designated agent. Inspect the completed installation, make final adjustments, place the system in operation and give operating instructions relative to its care and use. Provide patch kit, care instructions in a written format, plus approximately 100 square feet of color matched liner material. Prepare a complete "Project Completion Report and Warranty Application," documenting the proper completion of the project, training of Owner's personnel, and application for warranty. Provide at least three (3) full sets of bound operation and maintenance manuals which fully detail the proper system operation and maintenance techniques.

3.04 FIELD QUALITY CONTROL

- A. Limit access to the site to minimize possibility of damage to the membrane. Materials and equipment shall not be dragged across the surface of the liner or allowed to slide down the slopes. All parties working on the liner shall wear soft soled shoes. Immediately following installation, verify completion and testing of all seams. Retesting may be necessary to ensure complete sealing.
- B. Upon completion of installation and testing, the completed PVC Membrane Swimming Pool System shall be hydrostatically tested by filling the pool to the typical operating level and all systems for a period of 6 hours without evidence of leakage.

END OF SECTION

SECTION 13 11 43

SWIMMING POOL PERIMETER GUTTER SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

- A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Swimming Pool Perimeter Gutter System as shown on the Plans, as specified and/or directed.
- B. Related work specified elsewhere:
 - 1. Section 02 40 00 Demolition and Removal
 - 2. Section 03 21 00 Reinforcing Steel
 - 3. Section 03 00 00 Cast-In-Place Concrete
 - 4. Section 13 11 00 PVC Membrane Swimming Pool Lining Systems
 - 5. Section 13 11 46 Swimming Pool Filtration System

1.02 REFERENCE STANDARDS

- A. The following is a list of standards that may be referenced in this section:
 - 1. American National Standards Institute, Inc. (ANSI) Publication:
 - a. B31.1 Power Piping
 - b. B31.9 Building Services Piping
 - c. Z49.1 Safety in Welding and Cutting
 - d. AWWA C509 Resilient-Seated Gate Valves for Water Supply Service
 - e. AWWA C550 Protective Interior Coatings for Valves and Hydrants
 - 2. American Society for Testing and Materials (ASTM) Publication:
 - a. A126 Gray Iron Castings for Valves, Flanges, and Pipe Fittings
 - 3. American Welding Society, Inc. (AWS) Publication:
 - a. D1.6 Structural Stainless Steel Welding

1.03 SUBMITTALS

- A. Manufacturer's Data:
 - 1. Shop Drawings and Catalog Cuts. Submit shop drawings and catalog information showing plan, elevations, anchor details and layout, corner details, line anchor detail and layout, grating detail and grate support layout, surge weirs, water supply channel, dimensions, capacities, accessories, controls, and ratings.
- B. Welding Submittals: As required by ANSI B31.9.

- C. Operation and Maintenance Manuals:
 - 1. Swimming Pool Perimeter Gutter System

1.04 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum ten (10) years documented experience.

1.05 WELDING REQUIREMENTS

- A. Welding Procedure: Before any welding is performed, the Contractor shall submit to the Owner's Representative three copies of welding procedure specification for all metals included in the work, together with proof of its qualifications in accordance with ANSI B31.9.
- B. Performance Qualification Record: Before any welder or operator performs any welding, the Contractor shall also submit to the Owner's Representative three copies of the Welder's Performance Qualification Record in conformance with ANSI B31.9 showing that the welder was tested under the approved procedure specification submitted by the Contractor. In addition, the Contractor shall submit the assigned number, letter, or symbol used to identify the work of the welder, and affix it immediately upon completion of the weld. Give welders making defective welds, after passing a qualification test, a requalification test, and do not permit them to work under this Contract if they fail the requalification test.
- C. Previous Qualifications: Welding procedures, welders, and welding operators previously qualified by test may be accepted for this Contract without requalifying subject to the approval of the Owner's Representative and provided that all the conditions specified in ANSI B31.9 are met before a procedure is used.

1.06 SAFETY PRECAUTIONS

A. Welding and Cutting Safety: ANSI Z49.1.

1.07 WARRANTY

A. The manufacturer shall guarantee the gutter system for a period of five (5) years for materials and workmanship if the system is operated in accordance with written instructions. The grating included with the system shall carry the original manufacturer's warranty for a period of one (1) year.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The perimeter gutter system and materials shall not be stacked or stored in any manner which could cause damage or deform the materials.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Perimeter gutters shall be fabricated entirely of 12-gauge, Type 304L stainless steel with a finish similar or equal to a #3 polished (100 mesh abrasive) finish. Angle anchors and stiffener brackets shall be stainless steel. Manufacture shall be as by RenoSys Corporation, Model DTRO.8, or approved equal.
- B. Anchorage: Perimeter gutter system shall be anchored to the pool structure with threaded 5/8-inch diameter stainless steel U-bars installed as shown and fastened to the pool reinforcing steel. Anchors shall be placed at the corners and on a minimum of 4-foot centers around the pool.
- C. Turn-Down Flange: Gutters shall be provided with continuous stainless steel turn-down flange welded to the bottom of the gutter. The flange shall connect the PVC liner to the stainless steel gutter to form a water tight termination.
- D. Filtered Water Supply Channel: Filtered water return tube shall be of 12-gauge Type 304L stainless steel fitted with 3/8-inch diameter jet inlet nozzles placed in a continuous "V" notch formed into the perimeter. The channel shall be formed in such a way to create a continuous rounded 90-degree angle where the bottom face of the gutter system meets the interior pool wall. Inlets shall be spaced not more than 36-inches on center around the entire pool perimeter except where expressly deleted. These inlet jets shall be installed so as to provide a stream of filtered chlorinated water on a fixed 45° angle directed toward the bottom of the pool.
- E. Overflow Channel: The overflow system shall be of 12-gauge Type 304L stainless steel fitted with jet flow nozzles to provide a constant stream of filtered chlorinated water in the channel. All areas of the gutter shall be accessible for inspection and cleaning. The overflow channel shall be covered by a protective grating form of extruded polyvinyl chloride (PVC) sections held in place with stainless steel and stainless steel cap screws. Grating holddowns shall be fully recessed from the top surface of the grating. The top shall be of slip-resistant finish with UV inhibitors. The open area of the grating shall be of sufficient free area to accommodate 100% of the pool filtration rate. The grating shall be white.
- F. Surge Weirs: Surge control weirs shall be installed in the perimeter overflow system as shown on the Contract Drawings. They shall be located to provide a surface cleaning action when the water level is below the perimeter overflow system lip during periods of non-use. The weir gate shall close automatically as the water level in the pool rises for rim flow operation without raising the water level in the in the perimeter channel. The surge control weirs shall be responsive only to changes in water level within the pool. The flow through each weir shall be designed to be 50 GPM. The system provides "in-pool" surge capacity of one

- gallon per square foot of pool surface area and quiescent surface cleaning in a manner which permits water displaced by bathers and their dynamic surge to remain within the pool structure.
- G. Stainless Steel Collector and Converter Boxes: Stainless steel gutter convertor box and collector box shall be provided at locations indicated on Contract Drawings. Convertor and Collector boxes shall be provided with stainless steel flanged connection for the interconnecting piping and sized to accommodate 100% of the pool filtration rate.
- H. Accessories: The perimeter gutter system shall be fitted with stainless steel converters, jet wash fittings, surge weirs, and lane line anchors as specified and/or shown on Contract Drawings.

2.02 VALVES

Gate Valves 2-1/2" and Larger: ANSI/AWWA C509 and C550, Class 125 iron A. body, ASTM A126 Class B cast iron body and bonnet, resilient wedge, fully coated and lined with fusion bonded epoxy, stainless steel bolts and nuts, 200 psi nonshock working pressure, nonrising stem, and flanged ends. Manufacture shall be as by Stockham, Crane, Powell, or equal.

2.03 POOL FILTRATION EQUIPMENT, ACCESSORIES AND PIPING:

Provide as specified in Section 13 11 46, "Swimming Pool Filtration System". A.

PART 3 - EXECUTION

3.01 **INSTALLATION**

- A. Install gutter system as recommended and required by manufacturer's written instructions. All installation shall be by a welder with at least five (5) years' experience in the field of welding stainless steel recirculating systems. Installation procedures for welding, brushing, blending, testing and cleaning shall be in strict accordance with manufacturer's written procedures.
- В. All welding shall be performed in accordance with procedures established by the American Standards Association. All exposed welds shall be smooth and uniform with minimum irregularities. All spatter, burns, and discoloration must be removed. Welds shall be cleaned.

3.02 **TESTING AND COMMISSIONING**

Upon completion of gutter installation and before jet inlets have been drilled, the A. supply tube shall be pressure tested at no more than 5 psi, and maintained for a period of 4 hours without significant drop in pressure. All joints shall be soap tested during the 4-hour period.

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- B. After installation and pressure testing, the gutter system shall be grouted in place as shown on drawings and as required by manufacturer's installation instructions.
- C. The Contractor shall be responsible for providing a qualified representative of the perimeter gutter system manufacturer to complete start-up services, including inspection of the completed installation, final adjustments and placing system in operation.

3.03 INSTRUCTION OF OPERATING PERSONNEL

A. Upon completion of the work, and acceptance of the installation, and at a time designated by the Owner, the services of a competent technician regularly employed or authorized by the manufacturer of the gutter system shall be provided for instructing personnel in the proper operation, maintenance, safety and emergency procedures. The period of instruction shall be not less than four hours. The training shall be conducted at the job site during actual operation and coordinated with the Owner one week in advance.

END OF SECTION

SECTION 13 11 46

SWIMMING POOL FILTRATION SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for the Swimming Pool Filtration System as shown on the Plans, as specified and/or directed.

1.02 REFERENCE STANDARDS

- A. The following is a list of standards that may be referenced in this section:
 - 1. American National Standards Institute, Inc. (ANSI) Publication:
 - a. B1.1 Unified Inch Screw Threads
 - b. B15.1 Safety Standard for Mechanical Power Transmission Apparatus
 - c. B16.5 Pipe Flanges and Flanged Fittings
 - d. B16.10 Face to Face and End to End Dimensions of Valves
 - e. B31.9 Building Services Piping
 - f. B40.100 Pressure Gauges and Gauge Attachments
 - g. Z49.1 Safety in Welding, Cutting and Allied Processes
 - h. NSF/ANSI 50 Equipment and Chemicals for Swimming Pools
 - 2. American Society for Testing and Materials (ASTM) Publication:
 - a. D709 Laminated Thermosetting Materials
 - b. D1785 Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
 - c. D2000 Classification System for Rubber Products in Automotive Applications
 - d. D2467 Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
 - e. D2564 Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
 - f. D2665 Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe and Fittings
 - 3. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Publication:
 - a. SP-58 Pipe Hangers and Supports Materials, Design and Manufacture
 - b. SP-67 Butterfly Valves
 - c. SP-69 Pipe Hangers and Supports Selection and Application
 - d. SP-70 Cast Iron Gate Valves, Flanged and Threaded Ends
 - e. SP-80 Bronze Gate, Globe, Angle and Check Valves

- f. SP-85 Cast Iron Globe and Angle Valves, Flanged and Threaded Ends
- g. SP-110 Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends
- 4. National Sanitation Foundation (NSF) Publication:
 - a. NSF 50 Recreational Water Safety Standard for Equipment and Chemicals
- 5. New York State Codes, Rules and Regulations Publication:
 - a. Volume A (Title 10) SubPart 6-1 Swimming Pools
- 6. Uniform Fire Prevention and Building Code of New York State Publication:
 - a. 2020 Building Code

1.03 SUBMITTALS

- A. Manufacturer's Data:
 - 1. Filtration System
 - 2. Filter Media
 - 3. Media Loading System
 - 4. Pump, Strainer and Variable Frequency Drive
 - 5. Piping, Valves and Site Glass
 - 6. Flow Metering Equipment
 - 7. Filter System Controller
 - 8. Air Compressor and tubing
 - 9. Pool Water Level Controller
 - 10. Pool Water Treatment System

B. Shop Drawings:

- 1. Filtration System dimensioned plan and elevation views
 - a. System operation chart
- 2. Filter Media and Loading System
- 3. Pump, Strainer & Variable Frequency Drive
- 4. Piping, Valves and Site Glass
- 5. Flow Metering Equipment
- 6. Air Compressor and tubing
- 7. Filter System Controller and Controls Diagram
- 8. Wiring Diagram
- 9. Pool Water Level Controller
- 10. Pool Water Treatment System

C. Operation and Maintenance Manuals:

- 1. Filtration System and Controller
- 2. Filter Media and Media Loading System
- 3. Pump and Variable Frequency Drive
- 4. Air Compressor Equipment
- 5. Pool Water Level Controller
- 6. Pool Water Treatment System

1.04 QUALITY ASSURANCE

- A. Qualifications of the Contractor:
 - 1. The Contractor shall have a minimum of five years' experience in the installation of a minimum of three similar filtration, pool level and chemical treatment systems and shall show evidence of satisfactory operation for each installation. Contractor shall be regularly engaged in the maintenance of similar systems.
 - 2. The Contractor shall possess and furnish all necessary equipment, materials and labor to adequately perform the specified services.
 - 3. Licensing: The Contractor shall provide proof of maintaining the proper license(s), if any, as required to do work in this State. Contractor shall comply with all Federal, State and local rules, regulations and licensing requirements.

1.05 SAFETY

A. Welding and Cutting Safety: ANSI Z49.1.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Filtration System: Furnish a vertical, pressurized regenerative media filter system consisting of one (1) filter tank complete with integral tube elements to hold perlite media with collection system, operating valves check valve, two pneumatic valves and level drain valve), external "pulse" mechanism, air compressor, media loading system, flow sensor that reads both flow and temperature, five analog pressure transducers, three access ports, filter control console, interlock controller, six (6) charges of perlite media, and one (1) charge of filter cleaner. The filter system effective water filtration rate shall not exceed 1.5 GPM/ft² of filter area. The system and perlite shall have characteristics and performance as scheduled and NSF Standard 50 listed. Manufacture shall be as by Aquify, or approved equal.
 - 1. Nameplate: Each major item of equipment shall include a nameplate with the manufacturer's name, address, unit model, unit serial number and pertinent design information. The nameplate shall be permanently secured to the piece of equipment in an accessible location.
 - 2. System Shipping and Assembly: The system shall be fabricated and fully assembled by the original equipment manufacturer. The face piping and system accessories shall be removed from the system and shipped individually. The internals are to be factory installed and internally braced for transit. No field installation of internals shall be permitted.

- 3. Filter Tanks: The tanks shall be sized as scheduled and constructed of high quality fiberglass reinforced plastic (FRP) composite, and suitable for a working pressure of 50 PSIG. The tank shall be NSF listed. Tank shall be fitted with three access ports.
- 4. Connections: All tank connections (inlet, outlet and similar) shall have ANSI B16.5 Class 150 flanged connections in the vertical orientation.
- 5. Filter Piping and Valves (External): The filter system shall be provided with all necessary face piping and valves which shall be pre-assembled by the original equipment manufacturer. Piping shall be ASTM D1785 Schedule 80 PVC with ASTM D2467 Schedule 80 PVC fittings.
 - a. Butterfly Valves 12" and Smaller: Glass-filled polypropylene outer body, wetted inner body is PVC with EPDM seals, gear operator for 8-inch or larger valves and lever operator for 6-inches and smaller. Valve shall be double eccentric butterfly, 150 psi rated wafer type, and ANSI flat-face flanges. Manufacture shall be as by GF Piping Type 563 or Aquify Valve series.
 - b. Sight Glass: A pressure type sight glass, 125 PSIG rated, with Pyrex sight glass, shall be supplied on the side inspection port.
 - c. Double Door Wafer Style Check Valve: Ductile iron body with stainless steel disc, stem, bushing and O-ring. NSF listed.
 - d. Ball Valves: Valves shall be of PVC-U, PTFE ball seal provided with socket & FNPT connections, true union. Manufacture shall be as by GF Piping Type 375.
 - e. Air Release Valve: Valve for water with manual isolation valve included with the filtering piping assembly as manufactured by Asahi.
 - f. Pressure Gauges: Bottom connection, 4-1/2-inch dial, chrome ring, shutoff cock with range between midpoint and two-thirds of maximum range under design conditions as manufactured by Marsh or Trerice. Stainless steel sensing element, 4-20 mA analog output, ½-inch male NPT process connections, 8.5 to 36 VDC operating voltage, 4-pin M12 quick-connect installed on each side of the filter unit.
- 6. Internal Distribution and Collection System: Internal components shall be hydraulically balanced to prevent filter media migration during filtration.
 - a. Tank elements shall be 38-inch long internal filter flexible tube elements constructed of T316 stainless steel spring with polyester braided filament.
 - b. Filter Media Change: Filter tank shall have one drainpipe at the base of the tank and valves to allow for emptying the filter tank's volume including perlite and water.
- 7. Filter Media: Media shall consist of uniformly perlite and NSF 50 listed. Perlite shall have a Darcy permeability factor of 1.7, specific gravity of 2.3 and composed of amorphous aluminum silicate. Media shall be supplied by the filter system manufacturer, and the system filled according

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- to manufacturer's recommendations. System shall be supplied with a minimum of six (6) charges of perlite.
- 8. Air Compressor: Single stage, air cooled reciprocating, belt driven, vertical portable type, suitable for supplying compressed air at 125 psi. Manufacture shall be as by Ingersoll Rand Model P1.5IU-A9, and shall be provided with the filtration system package.
- 9. Flow Sensor: Magnetic flow sensor with 25-foot cable shall be incorporated into the filtration system to monitor system flow and temperature, and provides two separate analog output signals to the controller. Sensor small be constructed of 316L stainless steel with a measuring range of 0.15 to 9.85 ft/sec, resolution of 0.05 ft/sec, and temperature monitoring range of -4° to 212°F, resolution of 0.5°F. Unit shall have a 4-digit alphanumeric display with simple pushbutton setup. Flow sensor shall be factory supplied with the filtration system.
- 10. Filtration System Controller: Filter shall be controlled by a fully automated, touchscreen interface controller including live trending, alarms, password protections, flowmeter, temperature, pressure differentials and supplied air pressure.
 - a. A separate UL listed interlock controller designed to electrically interlock the circulation pump and variable frequency drive, filtration, air compressor, media loading system, and other auxiliary equipment including all chemical treatment systems, shall be provided and fully integrated with the System Controller as manufactured by the Filtration System manufacturer.
 - b. Controller shall be configurable to monitor and control the speed of the circulation pump, pressure differential of the strainer basket, and position and control of valves to automate the operation of the filter.
 - c. Pulse function of the controller shall be by differential pressure, manual push-button control override, and/or calendar scheduling.
 - d. Controller shall initiate the tube cleaning procedure and include onboard PID control, downloadable data logs via remote access and USB connection, diagnostics and troubleshooting. System shall also include an integrated air manifold system to control and distribute pneumatic signals in the control of the filter features including precoat valves and pulse assembly.
 - e. Filter controller shall be housed in a NEMA 4X enclosure. Air manifold system shall be attached to the enclosure without nullifying the NEMA 4X listing.
 - f. Controller system shall be capable of integrating with building automation systems through Ethernet, BACnet, and/or MODBUS, or through a wireless router with integrated VPN to enable secure communication and operation via the internet or remote web interface and mobile application.

B. Piping Systems:

- 1. Above and Below Grade Pool Water Filtration System Piping: Schedule 80 Polyvinyl Chloride (PVC) ASTM D2665.
- 2. Pressure Gauges: ANSI B40.100, single style pressure gauge for water with 4-inch dial, brass or aluminum case, bronze tube, 1/4 inch isolation ball valve, pressure snubber, and syphon. Provide scale range suitable for the intended service.
- 3. Dielectric Connections: Provide at connections between copper and ferrous metal piping materials. ASTM F441, Schedule 80, CPVC threaded pipe nipples, 4-inch minimum length, may be provided for dielectric connections in pipe sizes 2 inches and smaller.
- 4. Pipe Sleeves: Sleeves in Masonry and Concrete Walls, Floors, and Roofs shall be ASTM A53, Schedule 40 or Standard Weight, hot-dip galvanized steel pipe sleeves. Each type shall be equipped with a steel water stop ring.
- 5. Pipe Hangers and Supports: Provide MSS SP-58 and MSS SP-69, Type 1 or 6, of the adjustable type, except as modified herein or indicated otherwise. Attachments to steel W or S beams shall be with Type 21, 28, 29, or 30 clamps. Attachments to steel angles and channels (with web vertical) shall be with Type 20 clamp with a beam clamp channel adaptor. Attachments to steel channel (with web horizontal) shall be with drilled hole on center line and double nut and washer. Attachments to concrete shall be with Type 18 insert or a drilled hole with expansion anchor. Attachments to wood shall be as indicated. Hanger rods and attachments shall be full size of the hanger threaded diameter. Provide Type 40 insulation protection shields for insulated piping. Provide steel support rods. Provide nonmetallic, hair felt, or plastic piping isolators between copper tubing and the hangers.
- 6. Identification of Piping: All exposed piping associated with the pool and filtration equipment, and piping located in the Pool Equipment Building shall be color coded with them name of the liquid and arrows indicating direction of flow in accordance with the New York State Codes, Rules and Regulations, SubPart 6-1, as follows:
 - a. Potable water lines Dark blue
 - b. Filter water Aqua
 - c. Gutter return Olive green
 - d. Main drain Black
 - e. Chlorine Yellow
 - f. Acid Pink
 - g. Backwash waste Dark brown
 - h. Sewer Dark gray
 - i. Compressed air Dark green

C. Circulation Pump:

- Pool water circulation pump assembly shall be NSF certified, selfpriming, back pull-out design constructed with cast iron casing, selflubricating mechanical shaft seal, multi-vane replaceable diffuser, bronze impeller and be rated for 125 psi maximum working pressure. Provide flanged, fiberglass (FRP) bodied, basket style inlet strainer with stainless steel basket, ½-inch perforations for 61% open area, ½ NPT connections for pressure transducer to monitor differential pressure, and removable acrylic top with Viton O-ring seal for servicing. Pump shall be with fusion-bonded epoxy coating on all wetted cast iron surfaces. Pump motor shall be a NEMA series JM construction, inverter duty, with carbon steel shaft inside a removable shaft sleeve of series 300 stainless steel, open drip-proof design with permanently sealed ball bearing. Assembly shall be specifically designed and listed for use in commercial/institutional pool water filtration systems. Performance and arrangement shall be as scheduled and indicated on the Plans. Manufacture shall be Herborner F-N, or equal.
- 2. Variable Frequency Drive: Furnish pump drive motor with a variable frequency drive, matched to the pump motors for the variable speed operation of the pump. Drives shall be for use with 480 volt, 3 phase, 1,750 rpm inverter duty rated pump motors.
 - a. Drives shall have the following functions:
 - 1) variable and constant torque applications
 - 2) minimum power factor of .98; minimum 98% efficient at full load
 - 3) maximum allowable voltage fluctuation of $\pm 10\%$
 - 4) Sine wave PWM output
 - 5) field adjustable, maximum 15,000 hz carrier frequency
 - 6) insulated gate bipolar transistors (IGBT's)
 - 7) 100% rated torque at 1.5 hz and 150% rated torque at 3 hz
 - 8) local display and digital keypad (remote mount on MPS-CP face)
 - 9) hand-off-auto (H-O-A) selector switch with auxiliary contacts for each position for SCADA connection and position indication.
 - 10) 4-20 mA and 0-10 VDC speed control input
 - 11) fault indications for under voltage, over voltage, over temperature, instantaneous over current, ground fault, overload threshold exceeded, overload shutdown, processor fault
 - 12) drive to be capable of running without load connected
 - 13) start/stop by remote contact closure/opening
 - 14) any drive fault to actuate a common output contact for actuating a drive fault pilot light and auxiliary contact for SCADA connection and indication of "drive fault" condition.

- drive shall have input line reactor and shall have data submitted to prove unit shall not exceed harmonic distortion limitations of IEEE S19-1992 Table 10.2, without line reactor
- 16) drive shall be adjusted to limit minimum pump motor speed to no less than 30% of full speed
- 17) drive shall provide electronic overload protection for the pump motor
- 18) provide output line reactor matched to VFD and motor electrical characteristics
- 19) drive shall be able to operate a motor "on the fly"
- 20) capability for regenerative braking
- 21) have capability for auto restart after power outage

D. Compressed Air Piping:

- 1. Copper Tubing: ASTM B88, Type K or L, hard drawn, Class 1.
 - a. Fittings: ANSI B16.18 cast bronze, ANSI B16.22 wrought copper or bronze, with silver brazed joints.
 - b. Brazing Filler Metal: AWS A5.8.
 - c. Unions: Bronze, Class 150, ASTM B584, brazed joint type.
 - d. Flanges and Flanged Fittings: ANSI B16.24, bronze, 150 pound.
 - e. Flared fittings; ASTM B88, Type K or L, annealed, with ANSI B16.26 or SAE J513 F flared fittings.

E. Pool Water Level Controller:

- 1. The pool water level controller system shall be comprised of three (3) electrode rods, electrode fitting flanged for three electrodes, and water level relay in housing. The system shall be solid state type with Type 303 stainless steel electrode threaded rods. The electrode flanged fitting shall be capable of holding 3 probes, shall have 2-inch PVC flat faced flange connection, and die-cast aluminum, epoxy coated terminal housing. Water level relay in housing shall be UL 508 listed, solid state plug-in type for differential service, LED monitoring, 8 pin socket with screw-type connections, in a NEMA 4 enclosure. Controller shall be inverse reacting, and interlocked with make-up water motorized ball valve to open and close on high and low pool level as sensed by the electrode rods. Manufacture shall be as by Warrick Controls, Models 16ML1A4 (controller), 3F3E (electrode flange fitting), and 3R3CO (electrodes), or approved equal.
- 2. Motorized Ball Valve: NSF 61 listed, valve shall be true union ball valve, PVC body per ASTM D1784 with flanged ends, non-shock, 150 psi rated, EPDM seals, double O-ring stem seals, and actuator ready as manufactured by Hayward Model TBH or approved equal. Actuator shall be UL listed, NEMA 4 polypropylene enclosure, permanently lubricated gear train, actuator brake, and 120 VAC with thermal overload protection. Actuator shall be as manufactured by Hayward Series EAU29, or approved equal.

- F. Chemical Treatment Control System:
 - Controller: Chemical treatment control system shall include programmable digital pH/ORP Controller, flow cell, inline globe flow cell strainer, flow switch, sample valves, ORP and pH probes, tubing and fittings, one Pro Series 300 Peristaltic pump at 38 GPD and one peristaltic pump at 12 GPD. System shall be mounted on a polypropylene board for wall mounting and shall comprise a fully operational chemical feed, treatment, and monitoring system. Microprocessor based with separate LED digital readouts to continuously monitor and maintain pH balance and sanitizer (ORP) level. The pH and sanitizer level (ORP) levels shall be displayed on the front panel. The pH display range shall be 6.0 to 8.4 with a 0.1 unit resolution. The pH setpoint shall be adjustable from 7.0 to 8.0 in 0.1 pH steps with a default set point of 7.4 pH. The ORP display range is 0 to 995 mV with a 5 mV display resolution. The set point is adjustable from 400 to 900 mV with default set point of 650 mV. During a pH or ORP feed cycle, the pH feed lamp or ORP feed lamp will flash when pH or sanitizing chemicals are being fed and illuminate continuously during the feed delay portion of the cycle. The pH or ORP alert lamp will illuminate when the pH or ORP reading is higher or lower than the high or low pH or ORP Alert set points and prevent the feeding of pH or sanitizing chemicals. The controller will prevent the pumps/feeders from activating if the set level is not reached within the present consecutive feed alert limit, set at a default value of 40 cycles or 40 minutes of continuous feed mode. The system shall be capable of manual feed cycles, and shall have an internal non-volatile memory in which all factory default settings as well as field-modified settings are stored. The relay outputs are fused and transient protected. The system shall include an internal step-down transformer with class-two energy limiting rating. Input power shall be 120V AC, 3 wire grounded power cord with combined load not to exceed 10 amps. Output power shall be 120V AC, 5 amps (fused) for both ORP and pH, with two 3-wire grounded power receptacles. Manufacture shall be as by RoleChem Model 554501, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install filtration system, piping and all components to ensure proper and efficient operation of the equipment and controls. Install all items in accordance with manufacturer's printed instructions. Provide proper supports for the mounting of stands, valves, clamps and brackets. Arrange piping connections to equipment so that removal of equipment or components of equipment can be accomplished with the least amount of disassembly or removal of the piping system. Electric isolation shall be provided between dissimilar metals to reduce the rate of galvanic corrosion. All components shall be installed in accordance with local and

- State Department of Health and Building Code regulations. Secure all necessary permits and approvals prior to installation and required testing and inspections upon completion of applicable portion of construction.
- B. Piping Systems: Welding, heating and soldering shall conform to ANSI B31.9 and as specified herein. Horizontal runs of piping shall pitch toward drain points at not less than one inch in twenty feet. Provide sufficient pitch to assure adequate drainage and venting. Provide drain valves at low points of piping system and air vent valves at high points where air pockets would occur. All piping shall follow the general arrangement shown, cut accurately to measurements established for the work by the Contractor and worked into place without springing or forcing. All piping and equipment within buildings shall be entirely out of the way of adjacent utilities. Provide adequate clearance from walls and floors to permit the welding of joints; at least 6 inches for pipe sizes 4 inches and less, 10 inches for pipe sizes over 4 inches, and in corners provide sufficient clearance to permit the welder to work between the pipe and one wall. Do not bury, conceal, or insulate piping until inspected, tested, and approved.
- C. Protect materials and equipment from the weather. Except where shown otherwise, run vertical piping plumb and straight and parallel to walls. Thoroughly clean each section of pipe, fittings and valves to be free of all foreign matter before erection. Prior to erection, hold each piece of pipe in an inclined position and thoroughly tap to loosen sand, mill scale, and foreign matter. Before all final connections are made to apparatus, wash the interior of all piping thoroughly with water. Blow out piping with compressed air to remove rust scale, oil, and debris. Plug or cap open ends of mains during all shutdown periods. Do not leave lines open at any place where foreign matter might accidentally enter.
 - 1. Fittings: Make changes in size of piping with reducing fittings. Reducer bushings shall not be used. Do not miter pipe to form elbows, notch straight runs to form full-sized tees or utilize any similar construction.
 - 2. Flanged Joints: Faced true, square, tight and used as indicated and where necessary for normal maintenance. Mate with valves and the various equipment connections. Remove the raised faces when used with flanges having a flat face.
 - 3. Valves: Install at equipment to allow maintenance or isolation, and to establish proper and sequential operation of the complete system. Remove valve bonnets, where valve construction permits removal, when connecting valves by brazing to copper tubing. Install globe and angle valves with stems horizontal where necessary to avoid trapping of fluid. Provide unions on one side of all valves to facilitate servicing.
 - 4. Dielectric Unions or Flanges: Provide between ferrous and nonferrous piping, equipment and fittings; except that bronze valves and fittings may be used without dielectric couplings for ferrous-to-ferrous or nonferrous-to-nonferrous connections. Flanges and unions shall conform to the requirements of ANSI B16.10.

- 5. Pipe Hangers and Supports: Where not shown, design and fabrication of pipe hangers, supports and welding attachments shall conform to MSS SP-58. Hanger types and supports for bare and covered pipes shall conform to MSS SP-69 for the system temperature range. Unless otherwise indicated, horizontal and vertical piping attachments shall conform to MSS SP-58. Provide metal protection shields and inserts for insulated piping.
 - a. Maximum Spacing Between Supports:
 - 1) Vertical Piping: Support metal piping at each floor, but at not more than 10-foot intervals. Support plastic at each floor and at midpoint between floors, but at not more than 5-foot intervals.

Horizontal Piping: Support cast-iron piping at 5-foot intervals, except for pipe exceeding 5-foot length, provide supports at intervals equal to the pipe length but not exceeding 10 feet. Support copper tube, CPVC pipe, PVC pipe and steel pipe as follows and support plastic pipe at each change of direction.

Maximum Spacing (Feet)						
Nominal Pipe Size	One and					3 and
(Inches)	Under	1.25	1.5	2	2.5	Over
Steel Pipe	7	8	9	10	11	12
Copper Tube	6	6	8	8	9	10
PVC	4	4	4	4	4	4
CPVC	3	4	4	4	4	4

- 6. Pipe Sleeves: Provide pipe sleeves for pipes and tubing which penetrate the building structures as shown. Securely retain sleeves in position and location before and during construction. Space between pipe and sleeves shall be not less than ¼-inch or greater than 1 inch between outside of pipe and inside wall of sleeves. Fill the annular space with silicone sealer as shown. Seal terminal ends of pipe insulation with mastic where required.
- 7. Drain and Vent Fittings: Provide low-point drains and high-point vents consisting of 3/4-inch hose-end ball valves (with cap and tether) to allow for complete drainage of system where subject to freezing (including unheated indoor spaces).
- 8. As-Built Drawings: Provide completed as-built drawing information on a clean set of documents that accurately indicate piping type, location, size, invert elevation, fitting types, valve location and type, buried valve operating rotation and service.

- D. Filtration System: Adjust tank supports to achieve a level installation and even internal distribution of pool water to be filtered. Manually bleed air from piping system during initial start-up and testing. Finish paint tanks in accordance with Section 230500, "Mechanical General Requirements"; color to be selected by Owner. Protect all components of the system that are not to be painted as well as all mechanical, electrical, structural and architectural elements from overspray and other damage. Upon completing initial start-up, run system for a minimum of 24 hours to demonstrate compliance with Contract Documents and satisfactory performance. Secure written approval of the installation from the Owner and local Department of Health prior to turnover.
- E. Circulation Pump and Flow Sensor: Install pump and strainer in accessible location to aid maintenance and serviceability. Anchor pump to floor structure to eliminate stress imposed on piping system; utilize neoprene vibration isolation pads between pump base and floor. Clean strainer periodically during start-up and testing to eliminate dirt and debris accumulated during installation. Install flow sensor in accordance with manufacturer's requirements for spacing, support and location in system. Upon completing initial start-up, cleaning and balancing, run system for a minimum of 24 hours to demonstrate compliance with Contract Documents and satisfactory performance.
- F. Pool Water Level Controller: Install pool water level controller system with three (3) electrode rods, electrode fitting flanged for three electrodes, motorized ball valve, and water level relay in housing, in accordance with manufacturer's recommendations and requirements, and as indicated on Contract Documents. Controller shall be inverse reacting, and interlocked with make-up water motorized ball valve to open and close on high and low pool level as sensed by the electrode rods. Upon completing initial start-up, cleaning and balancing, run system for a minimum of 24 hours to demonstrate compliance with Contract Documents and satisfactory performance.
- G. Chemical Treatment Control System: Install digital controls system, pumps/feeders, flow cell, inline globe flow cell strainer, flow switch, sample valves, ORP and pH probes, tubing and fittings in strict accordance with manufacturer's requirements, and as indicated on Contract Documents. Provide required spacing, support and maintenance access to equipment and controls. Upon completing initial start-up, cleaning and balancing, run system for a minimum of 24 hours to demonstrate compliance with Contract Documents and satisfactory performance.
- H. Connections To Existing Services: Provide connections, splices and branches at the locations shown. When new fittings are installed into an existing pipeline for the purpose of a branch or splice, the new fittings shall be of the same diameter as the existing pipeline. New branch lines off existing pipelines may be of reduced diameter.

3.02 TESTING AND COMMISSIONING

- A. Field Tests: After completion of the system installation and prior to initial operation, conduct tests on the piping system. Furnish materials and equipment required for tests. Correct defects disclosed by the test. Perform test after installation and prior to acceptance in the presence of the Owner's Representative and subject to his approval.
 - 1. Piping: Hydrostatically test in accordance with the requirements of ANSI B31.9. Test piping system at one and one-half times system pressure but at least 100 psig with water not exceeding 100 degrees F. Before tests, remove or isolate gauges, traps and other apparatus in the new system which may be damaged. Repair leaks. Do not caulk joints. Install a calibrated test pressure gauge in the system to observe loss in pressure. Maintain the required test pressure for a sufficient amount of time to enable an inspection of joints and connections. Correct defects disclosed by the test.
- B. Cleaning of Systems: When installations of the various components of the systems are completed, clean before final closing. Clean all piping and components of scale and thoroughly flush out all foreign matter. Clean all strainers and valves thoroughly. Wipe equipment clean, removing all traces of oil, dust, dirt, or paint spots. Maintain the system in this clean condition until final approval.
 - 1. Safety Procedure: Ventilate work area, avoiding skin contact by using solvent resistant gloves. Observe precautions and warnings on the manufacturer's product labels.
- C. Startup and Operational Tests: Start up and initially operate the system. During this time, periodically clean the various strainers until no further accumulation of foreign material occurs. Adjust safety and automatic control instruments as necessary to place them in required operation and sequence.

3.03 INSTRUCTION OF OPERATING PERSONNEL

A. Provide minimum eight (8) hours on-site training for Facilities Staff charged with operating, maintaining and servicing all components of filtration system. Training shall be conducted by a qualified manufacturer's representative with a minimum ten (10) years' experience in the operation, maintenance and service of similar systems in commercial or institutional installations. Training shall be based on the Operation and Maintenance (O&M) manuals specifically assembled for the installed components including, but not necessarily limited to, Filtration System, Circulation Pump, Flow Regulator, Flow Meter, Vacuum Release Device, Chemical Injection Pumps, Diverting Valve, and Below Grade Drain Valves. Additionally, provide a functional demonstration of proper filling, start-

up, shutdown and draining of the system to simulate normal spring and fall maintenance. O&M Manuals shall be provided to the Owner and Engineer two (2) weeks prior to training. Schedule training session minimum two weeks in advance and coordinate two (2) possible dates and times for Owner to choose from.

END OF SECTION

SECTION 13 14 13

SPLASHPAD PARK SYSTEM EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Under this Section the Contractor shall furnish all materials, features, equipment, accessories and appurtenances for complete installation of the Splash Pad System Equipment, as manufactured and supplied by Vortex Aquatic Structures Intl., or approved equal, as specified and or, directed.
 - 1. The following items of work shall be included:
 - a. Furnish all equipment, hardware, appurtenances and specialized tools necessary for complete assembly and installation.
 - b. Furnish concrete spray pad surface as shown and specified.
- B. Related work specified elsewhere:
 - 1. Section 03 21 00 Reinforcing Steel
 - 2. Section 03 30 00 Cast-In-Place Concrete
 - 3. Section 31 05 16 Aggregates for Earthwork
 - 4. Section 31 23 43 Excavating, Backfilling and Compacting
 - 5. Section 33 11 16 Site Utility Piping
 - 6. Division 26 Electrical

1.02 REFERENCE STANDARDS

- A. The following is a list of standards that may be referenced in this section:
 - 1. American Society for Testing and Materials (ASTM) Publication:
 - a. F-1487 Consumer Safety Performance Specification for Playground Equipment for Public use
 - b. F-2461 Standard Practice for Manufacture, Construction, Operation and Maintenance of Aquatic Play Equipment
 - 2. National Electrical Manufacturers Association (NEMA) Publication:
 - a. ICS2 Industrial Control Devices, Controllers and Assemblies
 - b. ICS6 Enclosures for Industrial Controls and Systems
 - c. MG1 Motors and Generators
 - 3. Underwriters Laboratories, Inc. (UL) Publication:
 - a. 508 Industrial Control Equipment
 - 4. Uniform Fire Prevention and Building Code of New York State Publication:
 - a. 2020 New York State Plumbing Code

1.03 SUBMITTALS

A. Manufacturer's Data:

- 1. Detail Drawings: Shop Drawings, Color Charts, Product Installation Drawings, and Catalog Cuts: Submit shop drawings and catalog information showing plans, elevations, dimensions, capacities, and ratings for the splash pad park equipment system.
- 2. Operation and Maintenance Manuals for the splash pad park system.

1.04 QUALITY ASSURANCE

- A. Splash Pad Equipment Installation Contractor: Installation of the new splash pad system equipment and features, concrete foundations and slabs, footers, structural support, water supply, drainage, and other associated appurtenances shall be by a firm regularly engaged in installation of splash pad systems, and that can demonstrate to Owner's satisfaction that, within the previous five (5) years, the firm has successfully performed and completed at least three (3) projects similar in scope and type to work required on this project involving installation of a complete splash pad system. Installation Contractor shall also be manufacturer certified to install the equipment by the specified manufacturer or have installed at least one (1) splash pad park system of similar size and scope in the past three (3) years from the specified manufacturer.
 - 1. Supervisor/Foreman: All work associated with the installation of the splash pad park system equipment shall be directly supervised by a full-time foreman with experience equal to or greater than that required of the Splash Pad Equipment Contractor. Foreman shall be on site daily for the duration of the work of this Section. The same Foreman shall remain on the Project throughout the work unless Owner deems his performance unacceptable.
- B. Final inspection is to be performed by a qualified manufacturer's representative, complete with written confirmation of acceptance provided to the Owner, to assure the final work product (materials and assembly) is consistent with manufacturer's current standards, and meets or exceeds industry standards.

1.05 WARRANTY

- A. Manufacturer's Warranty on replacement parts only (not including removal and installation costs) beginning from the date of the Seller's invoice:
 - 1. Two-year warranty on color coating, all moving parts, stainless steel hardware, fiberglass products, See flow polymer products, the soft-touch elastomer Toe guard, actuated valves, ball valves, check valves, cartridge elements, pressure gauges, motor starters, electrical relays, terminal blocks, programmable logic controller (PLC controller), time switches, manual switches, transformers, breakers, electrical wiring and connections associated with the Splash Pad manufacturer's supplied equipment.

- 2. Five-year warranty on brass components including: spray nozzles, spray caps and spray heads, high-density polyethylene components, polyurethane components, ultra-high molecular weight polyethylene components, stainless steel automated water distribution manifold, drain boxes, strainers, and electrical enclosures.
- 3. Twenty-five-year warranty on stainless steel Play Events/Products structures, stainless steel anchoring systems and aluminum spheres.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All splash pad park product structures installed above and below grade shall be manufactured from 304/304L stainless steel. The anchoring system and associated fastening hardware shall be manufactured from 304/304L stainless steel. Rigid centricast fiber reinforced (FRP) and/or molded fiberglass, PVC, filament wound tubing, galvanized steel, or aluminum shall not be utilized for any above or below grade play product structures.
 - 1. All hardware and anchoring systems shall be 304/304L stainless steel. All Play Products and Ground Spray systems shall include an integrated anchoring and leveling system facilitating installation and a flush surface finish. Exposed and accessible hardware shall be tamper resistant, requiring a special tool for removal to deter vandalism and theft.
 - 2. Nozzles and rotational joints shall be manufactured from C360 lead free brass and shall use tamper resistant tools for installation and removal. PVC, nylon, acetyl copolymer, and Delrin TM, will not be accepted. All grade level play products are to be furnished with appropriate winterization caps.
 - 3. Product finish shall be a polyester smooth glossy heat-cured powder coat that is UV and chemical resistant and suitable for public spaces. Textured products will not be accepted. All polyethylene, polyurethane, elastomers, and Seeflow polymers used for paneling, signage or water deflection shall be resistant to chlorinated water and be ultraviolet stabilized to inhibit sunlight fading.
 - 4. All accessible edges shall be machined to a rounded finish. All welds shall be watertight, buffed smooth, or polished to a non-visible finish and factory pressure tested. Accessible nozzles and spray heads shall be recessed to ensure a completely safe play environment with no pinch points, head entrapments or protrusion hazards. All products shall be designed in accordance with ASTM F1487, ASTM F-2461 and CSA Z614-98 regulations for public playgrounds.
 - 5. The Seeflow Polymer shall be specially selected for aquatic play products and shall have the following characteristics: translucent, highly resistant to shock and impact, vandalism and must be non-flammable. The polymer

- shall present dimensional stability a high resistance towards chemical products, ultra-violets rays and be transparent presenting crystal clear surface throughout. Fiberglass, metal and other plastics will not be allowed.
- 6. When applicable, templates shall be supplied to facilitate the installation of embedded anchoring equipment. Product drawings and installation manuals shall be supplied by the manufacturer for ease of installation.
- B. SPLASHPAD SPRAY FEATURES: All splash pad park system features, controls, drain structures, anchoring systems, structural supports and associated appurtenances shall be supplied as one complete system by the same manufacturer. Manufacture of complete splash pad park system, including splash pad features, controls, drain structures, anchoring systems, and associated appurtenances, shall be as by Vortex Aquatic Structures Intl, or approved equal.
 - 1. Vortex Safeswap No 1. and Safeswap No. 2 anchoring systems shall be constructed of 304/304L stainless steel. The anchoring system shall provide the ability to add/remove/interchange select play products without having to incur any additional infrastructure costs. The anchoring system shall have an integrated leveling system facilitating installation and a flush finish to the activity deck surface without any protruding bolts or hardware. The 4" pipe size play product shall be fastened directly to the anchoring system with mechanical fasteners. The dead and live loads shall be distributed onto the anchoring system flange plate. A neoprene sealing gasket shall provide a water tight seal between the play product flange and the anchoring system flange.
 - 2. Wall Mounted Command Center Assembly shall be pre-fabricated water distribution system containing piping, valves and electrical wiring. They shall be factory assembled; and water pressure tested. They shall be equipped with slip-on connection for water inlet and outlets. The solenoid valves shall be pre-wired to the controller.
 - a. Water Distribution Manifold: Shall be constructed of 3 ½" outside diameter stainless steel structural tubing with a power coat painted finish. Each water distribution port shall be a 1" NPT connection. The manifold shall be equipped with a pressure gauge. All welded joints shall be watertight and pressure tested to 150 psi.
 - b. Solenoid Valves: There shall be one (1) solenoid valve installed on each of the water distribution ports. They shall be a normally closed 24 VAC 50/60 cycle solenoid actuated globe/angle pattern design. The valve pressure rating shall not be less than 150 psi. The valve body and bonnet shall be constructed of PVC with stainless steel fasteners. The valve shall have a manual override capability (manual open/close control). It shall house a fully encapsulated, one-piece solenoid. Each Solenoid valve shall have in integrated flow control adjustment valve stem for fine tuning of spray effects.

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- c. Electrical Enclosures, Conduit, Wiring and Connections: All electrical wiring shall be #18 AWG with a 600V rating. All electrical connections, enclosures and conduit shall be NEMA 4X watertight.
- Maestro Main Splash Pad System Controller and Maestro d. Expansion: UL listed programmable logic controller shall be factory programmed and have flexibility to modify the sequences using a transportable USB key, with an internet connection, or by Touch screen user interface. A battery backup and low battery alarm shall protect the system memory. Controller shall have a 24 hour/7 day user programmable agenda to set the operational hours of the facility. The key pad user interface shall control each output, activation devices and timer. The Controller shall be housed in a corrosion resistant molded fiberglass reinforced polyester, NEMA 4X rated enclosure with 304/304L stainless steel exposed hardware and lockable access door. The operating system shall contain a 120V AC and 100VA to 350VA primary/24 VAC secondary transformer with built-in electrostatic shield protection. The operating system shall also contain a universal input 85-264 VAC primary/12 VDC and 12.5A secondary power supplies with built-in electrostatic shield protection. The operating system shall have the capacity to receive signals from activation devices, operating on 6 to 24VDC/VAC, and to have the ability to provide a 24VAC auxiliary signal. The operating system shall have the capacity to operate based on a programmed sequence or based on a randomly generated sequence. The operating system shall have the capacity to accept an entry for a fixed run time interval, control fast acting valves supplied by 24 AC max 1.5 amp each, and the ability to soft-start ramp up to minimize potential water hammer. The system shall automatically purge all water lines based on the user selected time and duration and be configured to purge all lines after a user defined period of inactivity. The operating system shall have capability to be interconnected with any Maestro Expansion by using Ethernet RJ45 Cat6 cables.
- 3. Super Splash (VOR 0130.2008): Constructed of stainless steel tubing with an outside diameter of 4-1/2-inch and a wall thickness of 0.137-inch. The roof paneling shall be fabricated from SEEFLOW Polymer and shall be fastened to the roof frame. The roof frame shall be constructed from both 4-1/2-inch and 2-3/8-inch stainless steel structural tubing. The Super Splash bucket shall be fabricated from a high-density fiberglass outer shell, with a concealed stainless steel inner reinforcing frame. The bucket shall have an incorporated counter weight balance system, and shall pivot on two (2) closed bearing support joints. An incorporated drain pilot hole shall prevent the accumulation of stagnate water during non-operational hours. The feature is anchored to the deck surface by means of the

- SAFESWAP Anchor. The bucket shall fill to a maximum and to not exceed 60 gallons of water. Once the water has reached the 50 gallons point, the bucket will tip forward and release the water onto the roof, causing a large diameter gentle spray effect. The combined hydraulic requirements shall be 25-38 GPM at 10-15 psi.
- 4. The Pico No. 1 (VOR 7127.2008): The feature shall have an overall height of 19-inches above surface, a width of 41-inches and a length of 39-inches. A soft polymer molded HATTM is attached atop a molded polymer main body. The HATTM has an integrated housing to accept one (1) Water Jelly brass nozzle assembly. All nozzles are free of finger entrapment hazards. Attached to the main body are two (2) soft polymer molded PINs allowed to spin freely by means of a mechanism of low friction polymer bushings. Five (5) steel hex Inserts are molded into the main body, used to attach the body to its five (5) stainless steel anchoring plates using tamper-resistant fasteners. An integrated surface mounted manifold with kink-free flexible pipes provides water distribution to the play feature. The SAFESWAPTM anchoring and leveling system shall be used. The hydraulic requirements shall be 5-8 GPM at 1.27-2.2 psi.
- 5. Bear Cannon (VOR 7602.2008): Constructed of 304/304L stainless steel structural tubing with an outside diameter of 4-½-inches and a wall thickness of 0.120-inch. The bear head shall be constructed of heavy gauge stainless steel sheet metal and be 12 inches in diameter with a 6-inch diameter nose welded to the head. Two (2) maneuvering ears shall be welded to the head allowing rotation while ensuring no protrusions or pinch points. TURNTECTM allows the upper section to rotate 360°. The rotation joint shall be not contain flexible hoses. The center point of the 80° spray zone shall be adjustable. An integrated and recessed nozzle shall be mounted flush with the surface of the nose cap. All nozzle systems shall be free of finger entrapment hazards. The SAFESWAPTM anchoring and leveling system shall be used. Hydraulic requirements shall be 4-6 GPM at 5-7 psi.
- 6. Spray Loop (VOR 519.2008): Constructed of 304/304L stainless steel structural tubing with an outside diameter of 3-½-inches and a wall thickness of 0.120-inch. The loop shall be constructed of one continuous piece of tubing rolled to no less than a 72-inch diameter with no joints or ripples. The loop shall be mounted on a reinforced base plate to facilitate installation. The SAFESWAPTM anchoring and leveling system shall be used. Combined hydraulic requirements for all five spray nozzles shall be 5-10 GPM at 10-25 psi.
- 7. Spraylink Jet No. 1 (VOR 3000): Constructed of polymer spray housing (1), fittings and pipings in Rigid Polyvinyl Chloride (PVC) without plasticizer according to industry standards. Each spray head housing shall be fitted with a 304-304L passivated Stainless steel ring thickness of 0.1875-inch, a UHMWPE polymer spray cap and a rubber O-ring assembled with tamper-resistant fasteners. The spray cap shall be free of

- finger entrapment hazards. Installer must follow installation guide provided to assemble the components. The embedded anchoring and leveling system shall be used. Hydraulic requirements shall be 2-3 GPM at 2-4 psi.
- 8. Spraylink Arch (VOR 3002): Constructed of polymer spray housing (1), fittings and pipings in Rigid Polyvinyl Chloride (PVC) without plasticizer according to industry standards. Each spray head housing shall be fitted with a 304-304L passivated Stainless steel ring thickness of 0.1875-inch, a UHMWPE polymer spray cap and a rubber O-ring assembled with tamper-resistant fasteners. The spray cap shall be free of finger entrapment hazards. Installer must follow installation guide provided to assemble the components. The embedded anchoring and leveling system shall be used. Hydraulic requirements shall be 1-2 GPM at 2-6 psi.
- 9. Spraylink Geyser (VOR 3005): Constructed of polymer spray housing (1), fittings and pipings in Rigid Polyvinyl Chloride (PVC) without plasticizer according to industry standards. Each spray head housing shall be fitted with a 304-304L passivated Stainless steel ring thickness of 0.1875-inch, a UHMWPE polymer spray cap and a rubber O-ring assembled with tamper-resistant fasteners. The spray cap shall be free of finger entrapment hazards. Installer must follow installation guide provided to assemble the components. The embedded anchoring and leveling system shall be used. Hydraulic requirements shall be 4-6 GPM at 2-6 psi.
- 10. Spraylink Bloom (VOR 3006): Constructed of polymer spray housing (1), fittings and pipings in Rigid Polyvinyl Chloride (PVC) without plasticizer according to industry standards. Each spray head housing shall be fitted with a 304-304L passivated Stainless steel ring thickness of 0.1875-inch, a UHMWPE polymer spray cap and a rubber O-ring assembled with tamper-resistant fasteners. The spray cap shall be free of finger entrapment hazards. Installer must follow installation guide provided to assemble the components. The embedded anchoring and leveling system shall be used. Hydraulic requirements shall be 7-9 GPM at 3-4 psi.
- 11. SunSpray No. 1 (VOR 7578.2008): The main post shall be constructed of 304/304L stainless steel structural tubing with an outside diameter of 4-½-inches and a wall thickness of .120-inch. It shall also have 304/304L stainless steel structural tubing with an outside diameter of 3-½-inches and wall thickness of 0.120-inch bent into a circle. A 4-inch solid lead-free brass 360° rotational joint consisting of a stainless steel bearing collar and an Ultra-High Molecular Weight Polyethylene spray control collar. A TWIRLTECTM shall be fastened to the main post structure allowing the user to rotate the entire post. The SAFESWAPTM anchoring and leveling system shall be used. Hydraulic requirements shall be 10-15 gpm at 15-20 psi.

- 12. Playsafe Drain No. 4 (VOR-1004.4000): Consists of a basin and a removable cover. The basin shall be constructed of polyethylene and 22.5-inches outside diameter by 10-inches height. The deck grating cover shall be stainless steel and constructed with 22-inch diameter and ½-inch thickness. The opening gaps of the playsafe drain are ½-inch. The removable cover has an antiskid surface, and strainer basket. A form with the drain, which has the capabilities to be leveled, shall be inserted in the hole to create concrete drain box pit. Once the drain box pit is created, the form shall be removed. The water line outlet connected to the drain box shall be 6" in diameter which will allow a maximum of 300 GPM flow rate.
- 13. Bollard Activator No. 3 (VOR-611): Constructed of 304/304L stainless steel structural tubing with an outside diameter of 4-½-inches and a wall thickness of 0.120-inch. The upper part of the feature is constructed with a 45° elbow. The activator shall have no moving parts and run on a low voltage electrical supply. A capacitive sensor switch to be used as an interface for processing user input activation. The activation cap shall consist of a high impact-resistant protective cap. The protective cap shall be constructed of 316 Stainless steel and powder coated, the Steel Button shall be integrated and secured in place using tamper-resistant fasteners. The SAFESWAPTM anchoring and leveling system shall be used. The overall height of the activator shall be 36-inches above the final grade.
- 14. Vault, Rain Diverter Valve and Debris Trap (VOR-5322.0000): The Debris Trap with rain diverter valve shall consist of one (1) access door, one (1) vault, one (1) basket and one (1) rain diverter valve. The access door shall be constructed of aluminum with a lockable access hatch, and exterior dimensions of 42"x 42". The Vault shall be constructed of High Density Polyethylene and shall be 30" inside diameter and an overall height of 47" and suitable for public spaces. The basket shall be constructed of 304/304L stainless steel, structurally strong, durable, and resistant to corrosive environments. The debris trap shall act as the second stage of the filtration process. The debris trap is grade sensitive due to gravity drainage (1% grade minimum). The maximum flow rate is 450 gallon per minute. The Stainless Steel anchoring system shall have an integrated levelling system facilitating installation and a flush finished to the concrete slab surface without any protruding bolts or hardware.

PART 3 - EXECUTION

3.01 DELIVERY

A. The Contractor shall provide for off-loading to a site selected by the Owner, all materials for complete installation of splash pad equipment, features, accessories and appurtenances.

3.02 INSTALLATION

A. Install all splash pad equipment, accessories and appurtenances in a manner to insure proper and sequential operation of the equipment and equipment controls. Installation of equipment not covered herein or in manufacturer's instructions shall be installed as recommended by manufacturer's representative. Provide proper foundations for mounting of equipment, features, accessories, appurtenances, piping and controls including, but not limited to, supports, stands, guides, anchors, clamps and brackets. Foundations for equipment shall conform to equipment manufacturer's recommendation, unless otherwise indicated on contract drawings.

3.03 TESTING AND COMMISSIONING

- A. All tests shall be performed by and everything required for test shall be furnished by the Contractor, including personnel. Before final acceptance of the work, provide final inspection and testing of the completed installation of the splash pad features, controls and equipment by a qualified manufacturer's representative.
 - 1. Contract shall ensure all drains, lines, nozzles, valves and appurtenances are free and clear of debris, PVC shavings, dirt and other contaminants prior to startup and testing the splash pad. Removal all nozzles before flushing the system. Contractor shall clean entire concrete pad of all dirt and debris prior to testing and startup of the splash pad.
 - 2. All splash pad features shall be water pressure tested to 50 PSI before backfill and pouring of concrete slabs. Pressure test shall last a minimum of 4 hours. Pressure test shall not occur until at a minimum of four hours (or more if conditions require) after the final connection is made and pipe is glued. Contractor shall test all drainage and spray systems to insure proper operation per plans and specifications. There shall be no ponding of water on the surface of the splash pad. Contractor shall complete and submit to the manufacturer and Owner manufacturer's pre-startup checklist prior to final startup and flow adjustment by manufacturer's technician.
 - 3. Schedule and administer performance tests for each item as applicable. Contractor shall provide for an authorized manufacturer's technician to perform final startup testing, operation and flow adjustment of splash pad features and equipment. Contractor shall contact manufacturer at least fourteen (14) days prior to startup date to schedule and shall have completed the manufacturer's pre-startup checklist before the startup technician arrives.

3.04 INSTRUCTION OF OPERATING PERSONNEL

Upon completion of the work, and acceptance of the installation, and at a time designated by the Owner, the services of a competent technician regularly employed or authorized by the manufacturer of the splash pad equipment and control center shall be provided for instructing personnel in the proper operation, maintenance, safety and emergency procedures. The period of instruction shall not be less than four (4) hours initially and an additional four (4) hours after the initial thirty (30) days of full system operation. The training shall be conducted at the job site during actual operation and coordinated with the Owner a minimum of one week in advance.

END OF SECTION

SECTION 22 00 00

PLUMBING GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Plumbing General Requirements, as shown on the Plans, as specified and/or directed.
- B. Related work specified elsewhere:
 - 1. Division 1, "General Requirements"
 - 2. Division 22, "Plumbing"
 - 3. Division 23, "Mechanical"
 - 4. Division 26, "Electrical"
 - 5. Division 31, "Earthwork"
 - 6. Division 33, "Utilities"

1.02 REFERENCE STANDARDS

- A. The following is a list of standards that may be referenced in this Section:
 - 1. Code of Federal Regulations (CFR) Publications:
 - a. 29-1910 SUBPART O Machinery and Machine Guarding
 - b. 29-1910.219 Mechanical Power Transmission Apparatus

1.03 SUBMITTALS

Submit shop drawings, manufacturer's data, publication compliance, certified test Α. reports, and manufacturer's certificates of compliance for equipment, materials and finish, and pertinent details for each system where specified in each individual section, and have them approved before procurement, fabrication or delivery of the items to the job site. Shop drawings shall be accompanied by a letter of transmittal in duplicate, and all shop drawings shall be suitably identified with the name of the project, contract number, Contractor's name, date and initials indicating approval of such submittal by the Contractor under the applicable specification. Partial submittals will not be acceptable and will be returned without review. Submittals shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and the specific technical paragraph reference which specifies each item, applicable industry and technical society publication references, and other information necessary to establish contract compliance of each item to be furnished.

- 1. Manufacturer's Data: Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts.
- 2. Shop Drawings: Drawings shall be a minimum of 8.5 inches by 11 inches in size, except as specified otherwise. Drawings shall include floor plans, sectional views, wiring diagrams, and installation details of equipment; and equipment spaces identifying and indicating proposed location, layout and arrangement of items of equipment, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals, and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.
- 3. Manufacturer's Certificates of Compliance: Submit certification from manufacturer attesting that materials and equipment to be furnished for this project comply with the requirements of this specification and of the reference publications. Pre-printed certifications will not be acceptable; certifications shall be the manufacturer's original; certifications shall be not more than one year old. The certification shall not contain statements that could be interpreted to imply that the product does not meet all requirements specified, such as "as good as"; "achieve the same end use and results as materials formulated in accordance with the referenced publications"; "equal or exceed the service and performance of the specified material". The certification shall simply state that the product conforms to the requirements specified. Certificates shall be signed by the manufacturer's official authorized to sign certificates of compliance.
- 4. Reference Standards Compliance: Where equipment or materials are specified to conform to industry and technical society reference standards of organizations such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), American Society of Mechanical Engineers (ASME), American Gas Association (AGA), American Refrigeration Institute (ARI), and Underwriters' Laboratories (UL), proof of such conformance shall be submitted. If an organization uses a label or listing to indicate compliance with a particular reference standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual sections.
 - a. Independent Testing Organization Certificate: In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing and approved by the Engineer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

1.04 OPERATION AND MAINTENANCE MANUAL

A. Furnish an operation and maintenance manual for each item of equipment. Furnish three copies of the manual bound in hardback binders or an approved equivalent. Furnish one complete manual to the Owner's Representative for review and approval not more than 90 calendar days after an item is approved, but at least 60 calendar days prior to field acceptance testing of the item. Furnish the remaining manuals at least 60 days prior to contract completion. Inscribe the following identification on the cover: the words "OPERATION AND MAINTENANCE MANUAL", the name and location of the equipment or the building, the name of the Contractor, and the contract number. The manual shall include the names, addresses, and telephone numbers of each subcontractor installing equipment, and of the local representatives for each item of equipment. The manual shall have a table of contents and be assembled to conform to the table of contents with the tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in. The manual shall include: wiring and control diagrams with data to explain detailed operation and control of each item of equipment; a control sequence describing start up, operation and shut down; description of the function of each principal item of equipment; the procedure for starting; the procedure for operating; shut down instructions; installation instructions; maintenance instructions; lubrication schedule including type, grade, temperature range, and frequency; safety precautions, diagrams, and illustrations; test procedures; performance data; and parts list. The parts lists for equipment shall indicate the sources of supply, recommended spare parts, and the service organization which is reasonably convenient to the project site. The manual shall be complete in all respects for equipment, controls, accessories, and associated appurtenances provided.

1.05 CATALOGED PRODUCTS

A. Materials and equipment shall be cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be manufacturer's latest design that complies with the specification requirements. Materials and equipment shall duplicate items that have been in satisfactory commercial or industrial use. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the items need not be the products of the same manufacturer. Each item of equipment shall have the manufacturer's name, address, model number and serial number on the nameplate securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.06 MANUFACTURER'S RECOMMENDATIONS

A. Unless otherwise stated in the Contract Specifications, all new equipment items, and specialties shall be installed in strict accordance with the recommendations of the manufacturer of the items being installed. Prior to the installation of new

items, the Contractor shall submit to the Owner's representative printed copies of the manufacturer's installation recommendations. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material. Failure to install items in accordance with manufacturer's recommendations can be cause for rejection of the work items installed.

1.07 LAYOUT OF THE WORK

- A. Coordinate the proper relation of the work to the building structure, existing utilities and to the work of all trades. The Contractor shall advise the Owner's Representative of any discrepancy before performing any work.
 - 1. Contract Drawings: The Contract Drawings represent the general intent as to piping and equipment arrangements. All locations and dimensions shown shall be field verified and minor alterations made if so required. Where dimensions are not given for the location and arrangement of mechanical systems, locations may be assumed to be approximate, and may be altered if required. Major modifications to the indicated arrangements shall be approved by the Owner's Representative prior to the installation of mechanical systems. Schematic diagrams represent the overall system requirements and do not necessarily indicate the physical orientation, location or dimensions of that system.
 - 2. Record Drawings: The Contractor shall maintain a record of the progress of the work and shall submit three (3) sets of As-Built Drawings upon completion of the project.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Properly store, adequately protect, and carefully handle equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations, and as approved by the Engineer. Replace damaged or defective items.

1.09 SAFETY REQUIREMENTS

A. Equipment Safety: Fully enclose or properly guard in accordance with 29 CFR 1910.219 belts, pulleys, chains, gears, couplings, projecting setscrews, keys, rotating parts, and other power transmission apparatus, located where persons can come in close proximity thereto. Points of operation, ingoing nip points, and machinery producing flying chips and sparks shall be guarded in accordance with the applicable portions of 29 CFR 1910 SUBPART O. Provide positive means of locking out equipment so that equipment cannot be accidentally started during maintenance procedures. High temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be properly guarded or covered with insulation of the type specified. Provide catwalks, maintenance platforms,

and guardrails where required for safe operation and maintenance of equipment. Provide ladders or stairways to reach catwalks and maintenance platforms. Ensure that access openings leading to equipment are large enough to carry through routine maintenance items such as filters and tools.

1.10 ELECTRICAL REQUIREMENTS

A. Furnish motors, controllers, disconnects and contactors with their respective pieces of equipment. Motors, controllers, disconnects and contactors shall conform to and have electrical connections provided under Division 26-Electrical. Furnish internal wiring for components of packaged equipment as an integral part of the equipment. Extended voltage range motors will not be permitted. Controllers and contactors shall have a maximum of 120 volt control circuits, and shall have auxiliary contacts for use with the controls furnished. When motors and equipment furnished are larger than sizes indicated, the cost of additional electrical service and related work shall be included under this Section. Power wiring and conduit for field installed equipment shall be provided under and conform to the requirements of Division 26 – Electrical. Unless specifically noted otherwise, all control wiring (120 volt or less) shall be provided by Mechanical Contractor and conform to the requirements of Division 26 – Electrical.

1.11 INSTRUCTION TO OWNER'S PERSONNEL

A. When specified in other sections, furnish the services of competent instructors to give full instruction to the designated Owner's personnel in the adjustment, operation, and maintenance, including pertinent safety requirements, of the specified equipment or system. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Owner for regular operation. The number of days (8 hours per day) of instruction furnished shall be as specified in the individual section. When more than 4 days of instruction are specified, use approximately half of the time for classroom instruction. Use other time for instruction with the equipment or system. When significant changes or modifications in the equipment or system are made under the terms of the Contract, provide additional instruction to acquaint the operating personnel with the changes or modifications.

1.12 INSPECTIONS AND CERTIFICATIONS

A. The Contractor shall provide and pay for any third party inspections or certifications required by applicable regulatory agencies for boilers and other mechanical equipment components modified, or furnished and installed as a part of the Contract work.

1.13 SPECIAL CONDITIONS

- A. The Contractor shall be responsible to coordinate with the Owner regarding planned interruptions to mechanical and electrical services.
 - 1. Protection of Existing Work: The Contractor shall take all necessary precautions to insure against damage to existing work to remain in place, or to be reused. The Contractor shall insure that structural elements are not overloaded and additional structural supports required as a result of any cutting, removal or demolition work performed under any part of this Contract are added. The Contractor shall minimize disruption of existing non-contract work areas as much as possible.
 - 2. Upon damage to existing equipment, buildings and/or structures, the Contractor shall immediately notify the Owner. All damages shall be repaired by the Contractor, or shall be replaced if beyond repair to match the existing to the Owner's satisfaction.
 - 3. Protection of Buildings from the Weather: The interior of the buildings and all materials and equipment shall be protected from the weather at all times.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 FIELD PAINTING

A. Conform to Section 09 91 00 – Painting

END OF SECTION

SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Under this Section, the Contractor shall furnish all labor, materials and equipment for identification of plumbing piping and equipment including all pumps, hot water heaters, storage tanks, piping and valves using color bands, lettering, flow direction arrows, and related permanent identification devices for Identification for Plumbing Piping and Equipment, as shown on the Plans, as specified and/or directed.
- B. Related work specified elsewhere:
 - 1. Section 22 00 00 Plumbing General Requirements
 - 2. Section 22 07 00 Plumbing Insulation

1.02 REFERENCE STANDARDS

- A. The following is a list of standards that may be referenced in this section:
 - American National Standards Institute, Inc. (ANSI) Publication:
 - a. A13.1 Scheme for the Identification of Piping Systems
 - b. Z535.1 Safety Color Code

1.03 SUBMITTALS

- A. Manufacturer's Data:
 - 1. Label, Tag and Nameplate materials
 - 2. List of wording, symbols, letter size, and color coding to be used
 - 3. Valve chart
 - 4. Accessory materials

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Pipe labels, valve tags and equipment nameplates shall be as manufactured by Marking Services Incorporated, or approved equal.
 - 1. Nameplates: Three-ply laminated phenolic plastic at least 1/16" thick with black surfaces and white core. Engraving shall be minimum ½" high with appropriate spacing. Text shall be white on black background. Nomenclature shall match the equipment designation as indicated on the Plans and Schedules.

- 2. Valve Tags: Three-ply laminated phenolic plastic at least 1/16" thick with black surfaces and white core. Engraving shall be minimum ½" high with appropriate spacing. Text shall be white on black background. Valve tag shall be minimum 1-1/2" diameter with smooth edges.
- 3. Pipe Markers: Color, text and size shall conform to ASME/ANSI Standard A13.1.
 - a. Plastic Pipe Markers: Strap-type labels shall be factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering with flow direction arrows and identification of fluid being conveyed. Straps shall be self-locking nylon ties.
 - b. Plastic Tape Pipe Markers: Self-adhesive flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings with flow direction arrows and identification of fluid being conveyed.
- 4. Valve Chart: Valve chart(s) shall be printed on 8-1/2"x11" white paper with typewritten black text, minimum 12 point character size. Information to be provided shall be, at a minimum, the number, location, size and function of each line valve installed under this Contract. Chart shall be installed in a glazed frame and permanently mounted to wall in mechanical room or other suitable location coordinated with the Owner.

PART 3 - EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 GENERAL

A. All markers shall be installed in accordance with manufacturer's printed instructions, and shall be neat and uniform in appearance. All tags or markers shall be oriented such that they are readily visible from all normal working locations. All equipment above lift-out ceilings or made accessible by access doors shall be labeled in the same manner as that of exposed equipment.

3.03 NAMEPLATES

A. Install plastic nameplates with corrosive resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer. Equipment to be labeled shall include but not be limited to the following items: pumps, hot water heaters, storage tanks, water treatment equipment, air compressors, plumbing control devices, switches, control panels and other related devices.

3.04 VALVE TAGS

A. Install valve tags on all valves except simple service and drain valves located within 10 feet and sight distance of the device or equipment served. For example, it would not be expected that strainer blow-down values in a machine room would be tagged. Each tag shall be attached to its valve with copper clad annealed iron wire, corrosion resistant chain, or other approved material.

3.05 PIPE MARKERS

A. Exposed piping shall be identified at intervals of 20 feet and at least one time in each room. Provide a pipe marker at each valve. Provide arrow markers at each pipe marker with arrows pointing away from the pipe marker to indicate direction of flow. When flow can be in either or both directions, provide a double ended arrow marker. Provide pipe and arrow marker at every point of pipe entry or exit where line penetrates a wall or service chase. Self-adhesive labels shall be used to identify piping under 6 inches in diameter when insulated and covered. For finished pipe sizes 6 inches and larger, strap type markers with self-locking nylon ties shall be utilized.

3.06 MISCELLANEOUS EQUIPMENT

A. Small items such as inline pumps shall be identified with tags in lieu of nameplates. Submit labeling plan to Engineer for devices and equipment not otherwise specified herein.

END OF SECTION

SECTION 22 07 00

PLUMBING INSULATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Plumbing Insulation as shown on the Plans, as specified and/or directed.
- B. Related work specified elsewhere:
 - 1. Section 22 00 00 Plumbing General Requirements
 - 2. Section 22 11 16 Domestic Water Piping
 - 3. Section 22 33 33 Commercial Electric Domestic Water Heaters
 - 4. Section 22 42 00 Commercial Plumbing Fixtures

1.02 REFERENCE STANDARDS

- A. The following is a list of standards that may be referenced in this Section:
 - 1. American Society for Testing and Materials (ASTM) Publication:
 - a. A167 Stainless and Heat Resisting Chromium Nickel Steel Plate, Sheet and Strip
 - b. C177 Steady State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus, Test Method
 - c. C195 Mineral Fiber Thermal Insulating Cement
 - d. C534 Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
 - e. C547 Mineral Fiber Preformed Pipe Insulation
 - f. C552 Cellular Glass Block and Pipe Thermal Insulation
 - g. C553 Mineral Fiber Blanket and Felt Insulation (Industrial Type)
 - h. C612 Mineral Fiber Block and Board Thermal Insulation
 - i. C795 Wicking Type Thermal Insulation for Use Over Austenitic Stainless Steel
 - j. C921 Properties of Jacketing Materials for Thermal Insulation
 - k. D227 Coal Tar Saturated Organic Felt Used in Roofing and Waterproofing
 - 1. E84 Surface Burning Characteristics of Building Materials
 - m. E96 Water Vapor Transmission of Materials
 - 2. Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS) Publication:
 - a. SP 58 Pipe Hangers and Supports Materials, Design, and Manufacture
 - b. SP 69 Pipe Hangers and Supports Selection and Application

- 3. National Fire Protection Association (NFPA) Publication:
 - a. 255 Surface Burning Characteristics of Building Materials
- 4. Underwriters Laboratories, Inc. (UL) Publication:
 - a. 723 Tests for Surface Burning Characteristics of Building Materials
- 5. Uniform Fire Prevention and Building Code of New York State Publication:
 - a. 2020 Plumbing Code of New York State
 - b. 2020 Energy Conservation Construction Code of New York State

1.03 SUBMITTALS

- A. Manufacturer's Data:
 - 1. Insulation
 - 2. Jackets
 - 3. Vapor-barrier materials
 - 4. Accessory materials
- B. Standards Compliance: Standards compliance labels are requirements on each container or package
 - 1. Insulation
 - 2. Jackets
 - 3. Vapor-barrier materials
 - 4. Accessory materials

1.04 DEFINITIONS

- A. Finished Spaces: Spaces used for habitation or occupancy where rough surfaces are plastered, paneled, or otherwise treated to provide a pleasing appearance.
- B. Unfinished Spaces: Spaces used for storage or work areas where appearance is not a factor, such as unexcavated spaces and crawl space.
- C. Concealed Spaces: Spaces out of sight. For example, above ceilings; below floors; between double walls; furred in areas; pipe and duct shafts; and similar spaces.
- D. Exposed: Open to view. For example, pipe running through a room and not covered by other construction.
- E. Fugitive Treatments: Treatments subject to deterioration due to aging, moisture, high humidity, oxygen, ozone, and heat. Fugitive materials are entrapped materials that can cause deterioration, such as solvents and water vapor.
- F. Outside: Open to view up to 5 feet beyond the exterior side of walls, above the roof, and unexcavated or crawl spaces.

1.05 MANUFACTURER'S STAMP OR LABEL

A. Every package or standard container of insulation, jackets, cements, adhesives, and coatings delivered to the project site for use must have the manufacturer's stamp or label attached giving name of manufacturer, brand, and description of material. Insulation packages and containers shall be asbestos free.

1.06 FLAME SPREAD AND SMOKE DEVELOPED RATINGS

- A. In accordance with NFPA 255, ASTM E84 or UL 723, the materials shall have a flame spread rating of not more than 25 and a smoke developed rating of not more than 50.
 - 1. Materials Tests: Test factory applied materials as assembled. Field applied materials may be tested individually. Use no fugitive or corrosive treatments to impart flame resistance. UL label or satisfactory certified test report from a testing laboratory will be required to indicate that fire hazard ratings for materials proposed for use do not exceed those specified. Flame proofing treatments subject to deterioration due to effects of moisture or high humidity are not acceptable.
 - 2. Materials Exempt From Fire Resistant Rating: Nylon anchors.
- B. Materials Exempt from Fire Resistant Rating When Installed In Outside Locations, Buried, or Encased In Concrete: PVC casing and glass fiber reinforced plastic casing.

PART 2 - PRODUCTS

2.01 PIPING SYSTEMS INSULATION

- A. Piping systems (except buried pipe) requiring insulation, types of insulation required, and insulation thickness shall be as listed in Tables I and II herein. Except for flexible unicellular insulation, insulation thicknesses as specified in Table II shall be one inch greater for insulated piping systems located outside. Unless otherwise specified, insulate all fittings, flanges, and valves, except valve stems, hand wheels, and operators. Use factory premolded, precut, or field fabricated insulation of the same thickness and conductivity as used on adjacent piping. Insulation exterior shall be factory cleanable, grease resistant, non-flaking and non-peeling. Pipe insulation shall conform to the referenced publications in Table I.
 - 1. Flexible Unicellular Insulation: ASTM C534. The minimum density limit of 4.5 pounds per cubic foot may be waived if all other characteristics of the standard are met.
 - 2. Wicking Type Insulation: ASTM C795. Use over austenitic stainless steel.

- 3. Piping Insulation Finishes:
 - a. All Purpose Jacket: Except calcium silicate and unicellular insulation, provide a factory applied all-purpose jacket with or without integral vapor barrier as required by the service. Provide jackets in exposed locations with a white surface suitable for field painting. Allow a maximum water vapor permeance of 0.05 perm per ASTM E96, a puncture resistance of not less than 50 Beach units, and a minimum tensile strength of 35 pounds force per inch of width.
 - b. Vapor Barrier Material: Resistant to flame, moisture penetration, and mold growth. Provide vapor barrier material on pipe insulation as required in Table I.

2.02 ADHESIVES, SEALANTS, AND COATING COMPOUNDS

- A. Adhesive for Securing Insulation to Metal Surfaces and Vapor Barrier Lap Adhesive (For Use in Building Interior Only): ASTM C916, Type I (an adhesive in which the vehicle is nonflammable in liquid (wet) state and which will pass the edge burning test), or Type II (An adhesive in which the vehicle is nonflammable in the liquid (wet) state and which will not pass the edge burning test).
- B. Mineral Fiber Insulation Cement: ASTM C195, thermal conductivity 0.85 maximum at 200 degrees F mean when tested per ASTM C177.
- C. Weatherproof Coating: For outside applications use a weatherproof coating recommended by the manufacturer of the insulation and jackets.

2.03 ACCESSORIES

- A. Staples: ASTM A167, Type 304 stainless steel outside clinch type.
- B. Insulation Bands: 3/4 inch wide; 0.018 inch stainless steel.
- C. Anchor Pins: Provide anchor pins and speed washers recommended by the insulation manufacturer.
- D. Glass Cloth and Tape: Tape shall be 4 inch wide rolls. Class 3 tape shall be 4.5 ounces per square yard. In lieu of glass cloth and tape, open weave glass membrane may be used.
- E. Coal Tar Saturated Organic Felt: ASTM D227, minimum weight of 13 pounds per 100 square feet.
- F. Wire: Soft annealed stainless steel, 0.047 inch nominal diameter.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Do not insulate materials until all system tests have been completed and surfaces to be insulated have been cleaned of dirt, rust, and scale and dried. Ensure full range of motion of equipment actuators. Modify insulation to avoid obstruction with valve handle, safety relief, etc. Allow adequate space for pipe expansion. Install insulation with jackets drawn tight and cement down on longitudinal and end laps. Do not use scrap pieces where a full length section will fit. Insulation shall be continuous through sleeves, wall and ceiling openings. Extend all surface finishes to protect all surfaces, ends, and raw edges of insulation. Apply coatings and adhesives at the manufacturer's recommended coverage per gallon. Individually insulate piping. Provide a moisture and vapor seal where insulation terminates against metal hangers, anchors and other projections through the insulation on surfaces for which a vapor seal is specified. Keep insulation dry during the application of any finish. Bevel and seal the edges of exposed insulation. Unless otherwise indicated, do not insulate the following:
 - 1. Vertical portion of interior roof drain pipelines, chrome plated pipes, and fire protection pipes.
 - 2. Vibration isolating connections.
 - 3. Adjacent insulation.
 - 4. ASME stamps.

3.02 PIPING INSULATION

A. Pipe Insulation (Except Unicellular Insulation): Installation of plumbing insulation including materials and workmanship shall be in accordance with the Energy Conservation Construction Code of New York State, except as modified herein. Place sections of insulation around the pipe and joints tightly butted into place. The jacket laps shall be drawn tight and smooth. Secure jacket with fire resistant adhesive, factory applied self-sealing lap, or stainless steel outward clinching staples spaced not over 4 inches on centers and 1/2 inch minimum from edge of lap. Cover circumferential joints with butt strips, not less than 3 inches wide, of material identical to the jacket material. Overlap longitudinal laps of jacket material not less than 1-1/2 inches. Adhesive used to secure the butt strip shall be the same as used to secure the jacket laps. Apply staples to both edges of the butt strips. When a vapor barrier jacket is required, as indicated in TABLE I, or on the ends of sections of insulation that butt against flanges, unions, valves, and fittings, and joints, use a vapor barrier coating or manufacturer's weatherproof coating for outside service. Apply this vapor barrier coating at all longitudinal and circumferential laps. Patch damaged jacket material by wrapping a strip of jacket material around the pipe and cementing, stapling, and coating as specified for butt strips. Extend the patch not less than 1-1/2 inches past the break in both directions. At penetrations by pressure gauges and thermometers, fill the voids with the vapor barrier coating for outside service. Seal with a brush coat of the

same coating. Do not use staples to secure jacket laps on pipes carrying fluid medium at temperatures below 35 degrees F. Where penetrating roofs, insulate piping to a point flush with the top of the flashing and seal with the vapor barrier coating. Butt tightly the exterior insulation to the top of the flashing and interior insulation. Extend the exterior metal jacket 2 inches down beyond the end of the insulation. Seal the flashing and counterflashing underneath with the vapor barrier coating. In cold water piping in high humidity areas, use cellular glass, or flexible unicellular insulation.

- B. Flexible Unicellular Insulation: Bond cuts, butt joints, ends, and longitudinal joints with adhesive. Miter 90 degree turns and elbows, tees, and valve insulation. Where pipes penetrate fire walls, provide mineral fiber insulation inserts and sheet metal sleeves. Insulate flanges, unions, valves, and fittings in accordance with manufacturer's published instructions. Apply two coats of vinyl lacquer finish to flexible unicellular insulation in outside locations.
- C. Hangers and Anchors: Pipe insulation shall be continuous through pipe hangers. Where pipe is supported by the insulation, provide MSS SP 58, Type 40 galvanized steel shields or MSS SP 58, Type 39 protection saddles conforming to MSS SP 69. Where shields are used on pipes 2 inches and larger, provide insulation inserts at points of hangers and supports. Insulation inserts shall be of cellular glass (minimum 8 pcf), molded glass fiber (minimum 8 pcf), or other approved material of the same thickness as adjacent insulation. Inserts shall have sufficient compressive strength to adequately support the pipe without compressing the inserts to a thickness less than the adjacent insulation. Insulation inserts shall cover the bottom half of the pipe circumference 180 degrees and be not less in length than the protection shield. Vapor barrier facing of the insert shall be of the same material as the facing on the adjacent insulation. Seal inserts into the insulation with vapor barrier coating, or for exterior work, manufacturers recommended weatherproof coating, as applicable. Where protection saddles are used, fill all voids with the same insulation material as used on the adjacent pipe.
- D. Sleeves and Wall Chases: Where penetrating interior walls, extend a metal jacket 2 inches out on either side of the wall and secure on each end with a band. Where penetrating floors, extend a metal jacket from a point below the back-up material to a point 10 inches above the floor with one band at the floor and one not more than one inch from end of metal jacket. Where penetrating exterior walls, extend the metal jackets through the sleeve to a point 2 inches beyond the interior surface of the wall.
- E. Flanges, Unions, Valves and Fittings Insulation (Except Flexible Unicellular) for Hot Piping: Factory fabricated removable and reusable insulation covers may be used. For inside domestic hot water, and exposed hot water piping and drains in handicap areas, place factory premolded, precut or field fabricated segmented insulation of the same thickness and conductivity as the adjoining pipe insulation

around the flange, union, valve, and fitting abutting the adjoining pipe insulation. If nesting size insulation is used, overlap 2 inches or one pipe diameter whichever is larger. Use insulating cement to fill voids. Elbows insulated using segments shall have not less than three segments per elbow. Place and joint the segments with manufacturer's recommended water vapor resistant, fire retardant, and adhesive appropriate for the temperature limit of the service. Upon completion of installation of insulation, apply two coats of lagging adhesive with glass tape embedded between coats. Overlap tape seams one inch. Extend adhesive onto adjoining insulation not less than two inches. The total dry film thickness shall be not less than 1/16 inch. Where unions are indicated not to be insulated, taper the insulation to the union at a 45 degree angle. Coat the insulation and all-purpose jacket with two coats of lagging adhesive and with glass tape embedded between coats. The total dry film thickness shall be not less than 1/16 inch. At the option of the Contractor, factory premolded one piece PVC fitting covers may be used in lieu of two coats of adhesive with tape embedded between coats. Factory premolded field fabricated segment or blanket insert insulation shall be used under the fitting covers. Install factory premolded one piece PVC fitting covers over the insulation and secure by stapling, taping with PVC vapor barrier tape, or with metal or plastic tacks made for securing PVC fitting covers. Do not use PVC fitting covers where exposed to the weather. Limit the use of PVC fitting covers to ambient temperatures below 150 degrees F.

F. Flanges, Unions, Valves, Anchors, Fittings for Cold Piping: Factory fabricated removable and reusable insulation covers may be used. For piping insulation inside the building that service domestic cold water above ceilings, and drinking fountain drain piping to sewer tie in, coat pipe insulation ends with vapor barrier coating not more than six inches from each flange, union, valve, anchor or fitting. Place insulation of the same thickness and conductivity as the adjoining pipe insulation (either premolded or segmented) around the item, butting the adjoining pipe insulation. If nesting size insulation is used, overlap the insulation 2 inches or one pipe diameter. Use loose fill mineral wool or insulating cement to fill the voids. Elbows insulated using segments shall not have less than 3 segments per elbow. Insulation may be secured by wire or tape until finish coating is applied. Apply two coats of vapor barrier coating with glass tape embedded between coats. Overlap tape seams one inch. Extend the coating out onto the adjoining pipe insulation 2 inches. Where unions are shown not to be insulated, the insulation shall be tapered to the union at a 45 degree angle. Seal the insulation and jacket with two coats of vapor barrier coating with glass tape embedded between coats. Insulate anchors attached directly to the pipe for a sufficient distance to prevent condensation but not less than 6 inches from the insulation surface. Insulate flexible connections at pumps and other equipment with unicellular plastic insulation, unless otherwise indicated. At the option of the Contractor, premolded, one piece polyvinyl chloride (PVC) fitting covers may be used in lieu of the embedded glass tape. Factory premolded insulation or field fabricated insulation segments shall be used under the fitting covers. Blanket inserts may be used. Secure the covers with adhesive and vapor barrier tape with a vapor

resistance of maximum 0.05 perm per ASTM E96, or with tacks made for securing PVC covers. Then coat all tape seams and tacks with Type II vapor barrier coating. Do not use premolded PVC fitting covers where exposed to weather. Limit the use of PVC covers to not less than 35 degrees F medium temperatures and below 150 degrees F ambient temperatures.

3.03 PAINTING AND IDENTIFICATION

A. Paint in accordance with Section 09 91 00, "Painting". Piping identification shall be as specified in Section 22 05 53, "Identification for Plumbing Piping and Equipment".

3.04 FIELD INSPECTION

A. Visually inspect to ensure that materials used conform to specifications. Inspect installations progressively for compliance with requirements.

TABLE I INSULATION MATERIAL FOR PIPING							
SERVICE	MATERIAL	SPEC.	ТҮРЕ	CLASS	VAPOR BARRIER REQUIRED		
*Domestic Hot Water and Hot Water Recirculating Piping	Mineral Fiber	ASTM C547		1	No		
	Cellular Glass	ASTM C552	II	2	No		
	Flexible Unicellular	ASTM C534	I or II		No		
Domestic Cold Water Piping Above Ceilings	Mineral Fiber	ASTM C547		1	Yes		
	Cellular Glass	ASTM C552	II	2	No		
	Flexible Unicellular	ASTM C534	I or II		No		
Drinking Fountain, Drain Piping (to sewer tie in)	Mineral Fiber	ASTM C547		1	Yes		
	Cellular Glass	ASTM C552	II	2	No		
	Flexible Unicellular	ASTM C534	I or II		No		
Exposed Domestic Water and Drains Areas (Handicap Personnel)	Flexible Unicellular	ASTM C534	I or II		No		
*NOTE: If there is no condensation condition existing, insulation is not required for CPVC or PVC piping.							

TABLE II PIPING INSULATION WALL THICKNESS								
SERVICE	MATERIAL	TUBE AND PIPE SIZE (INCHES) 1/4 - 3/4						
Domestic Water (Hot and Recirculating), and Insulated Drains	Mineral Fiber	1	1	1-1/2	1-1/2	1-1/2		
	Cellular Glass	1	1	1-1/2	1-1/2	1-1/2		
	Flexible Unicellular	1	1	1-1/2	1-1/2	1-1/2		
Domestic Cold Water	Mineral Fiber	1/2	1/2	1	1	1		
	Cellular Glass	1/2	1/2	1	1	1		
	Flexible Unicellular	1/2	1/2	1	1	1		

END OF SECTION

SECTION 22 11 16

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Domestic Water Piping, as shown on the Plans, as specified and/or directed.
- B. Related work specified elsewhere:
 - 1. Section 22 00 00 Plumbing General Requirements
 - 2. Section 22 33 33 Commercial Electric Domestic Water Heaters
 - 3. Section 22 42 00 Commercial Plumbing Fixtures

1.02 REFERENCE STANDARDS

- A. The following is a list of standards that may be referenced in this Section:
 - 1. American National Standards Institute (ANSI) Publication:
 - a. A112.26.1M Water Hammer Arrester
 - b. B16.18 Cast Copper Alloy Solder Joint Pressure Fittings
 - c. B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
 - d. B16.23 Cast Copper Alloy Solder Joint Drainage Fittings –DWV
 - e. B16.24 Bronze Pipe Flanges and Flanged Fittings, Class 150 and 300
 - f. B16.26 Cast Copper Alloy Fittings for Flared Copper Tubes
 - g. B16.39 Malleable Iron Threaded Pipe Unions, Class 150, 250 and 300
 - 2. American Society of Mechanical Engineers (ASME) Publication:
 - a. B40.100 Pressure Gauges and Attachments
 - b. B40.200 Thermometers, Dial Reading and Remote Reading
 - 3. American Society for Testing and Materials (ASTM) Publication:
 - a. A48 Gray Iron Castings
 - b. A126 Gray Iron Castings for Valves, Flanges, and Pipe Fittings
 - c. B32 Solder Metal
 - d. B61 Steam or Valve Bronze Castings
 - e. B62 Composition Bronze or Ounce Metal Castings
 - f. B88 Seamless Copper Water Tube
 - g. D2846 Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot and Cold Water Distribution Systems
 - h. F439 Socket Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
 - i. F441 Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80

- j. F493 Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings
- 4. American Society of sanitary Engineering (ASSE) Publication:
 - a. 1003 Water Pressure Reducing Valves for Domestic Water Supply Systems
 - b. $10\overline{10}$ Water Hammer Arresters
 - c. 1019 Wall Hydrants, Frost Proof Automatic Draining, Anti backflow Types
- 5. American Water Works Association (AWWA) Publication:
 - a. C104 Cement Mortar Lining for Ductile Iron and Gray Iron Pipe and Fitting for Water
 - b. C105 Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids
 - c. C110 Gray Iron and Ductile Iron Fittings, 3 in. Through 48 in. for Water and Other Liquids
 - d. C111 Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings
 - e. C115 Flanged Ductile Iron and Gray Iron Pipe with Threaded Flanges
 - f. C500 Gate Valves, 3 Through 48 inch NPS, for Water and Sewage Systems
 - g. C504 Rubber Seated Butterfly Valves
 - h. C651 Disinfecting Water Mains
 - i. C700 Cold Water Meters, Displacement Type
 - j. C701 Cold Water Meters, Turbine Type for Customer Service
 - k. C702 Cold Water Meters, Compound Type
- 6. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Publication:
 - a. SP 58 Pipe Hangers and Supports Materials, Design and Manufacture
 - b. SP 67 Butterfly Valves
 - c. SP 69 Pipe Hangers and Supports Selection and Application
 - d. SP 70 Cast Iron Gate Valves, Flanged and Threaded Ends
 - e. SP 80 Bronze Gate, Globe, Angle and Check Valves
 - f. SP 85 Cast Iron Globe and Angle Valves, Flanged and Threaded Ends
- 7. Plumbing and Drainage Institute (PDI) Publication:
 - a. WH201 Water Hammer Arresters
- 8. Uniform Fire Prevention and Building Code of New York State Publication:
 - a. 2020 Plumbing Code of New York State
- 9. Foundation for Cross Connection Control and Hydraulic Research, University of Southern California (FCCCHR) Publication:
 - a. List of Approved Backflow Prevention Assemblies (Obtain current date from NAVFAC HQ, Code 04)

1.03 GENERAL REQUIREMENTS

A. Section 22 00 00, "Plumbing General Requirements", applies to this Section, with the additions and modifications specified herein. Plumbing systems including equipment, materials, installation, and workmanship shall be in accordance with the Plumbing Code of New York State, except as modified herein. In the Plumbing Code referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" had been substituted for the word "should" wherever it appears. Capacity of equipment shall be not less than that indicated. Plumbing systems shall include all water piping buried and aboveground to a limit of 5 feet outside of the building walls unless otherwise specified, or indicated by the Contract Drawings.

1.04 SUBMITTALS

- A. Manufacturer's Data:
 - 1. Pipe and fittings
 - 2. Valves and Valve Boxes
 - 3. Pipe supports (hangers)
 - 4. Gauges and thermometers
 - 5. Strainers
 - 6. Water hammer arresters
 - 7. Backflow preventers
- B. Certificates of Conformance
 - 1. Pipe and fittings
 - 2. Valves
 - 3. Backflow preventers

PART 2 - PRODUCTS

2.01 DOMESTIC WATER PIPING

- A. Aboveground Piping (3-inches and smaller):
 - 1. Copper Tubing: ASTM B88, Type K, with ANSI B16.26 flared joint fittings for all below ground piping. ASTM B88, Type L, with ANSI B16.18 or ANSI B16.22 solder joint fittings using ASTM B32, 95-5 tinantimony or grade Sn96 tin-silver solder, and flux containing not more than 0.2% lead, shall be provided for aboveground piping.
- B. Buried Piping and Aboveground Piping (4-inches and larger, and 3-inches and larger around the water entrance service piping and valves):
 - 1. Cast Ductile Iron Piping: Outside coated, AWWA C104 cement mortar lined, AWWA C151 ductile iron pipe, AWWA C111 rubber gasket joints, and AWWA C110 fittings. Provide concrete thrust blocks at the elbow where the buried piping turns up toward the floor, and restrain the pipe

- riser with steel rods from the elbow to the flange above the floor. Aboveground piping shall have flanged end connections conforming to AWWA C115 for flanged pipe and AWWA C110 for flanged fittings.
- C. Water Valves: Provide valves suitable for minimum of 125 psig and minimum of 180 degrees F hot water. Valves shall have flanged end connections, except sizes smaller than 2.5 inches may have threaded end connections with a union on all but one side of the valve, or solder end connections between bronze valves and copper tubing. Copper alloy and bronze valve body shall be ASTM B61 or ASTM B62 copper alloy. Ball valves may be provided in lieu of gate valves.
 - 1. Gate Valves 2-1/2" and Larger: Class 125 iron body, bronze mounted, ASTM A126 Class B cast iron body and bonnet, flanged ends, Teflon-impregnated packing and two-piece packing gland. Manufacture shall be as by Stockham, Crane, Powell, or equal.
 - 2. Gate Valves 2" and Smaller: Class 125, ASTM B62 cast bronze composition body and bonnet, soldered ends, solid disc, copper-silicon alloy stem, brass packing gland, Teflon-impregnated packing and malleable hand wheel. Manufacture shall be as by Stockham, Crane, or equal.
 - 3. Ball Valves 2" and Smaller: 600 psi cwp, cast brass bodies, two-position hand levers, replaceable reinforced Teflon seats, conventional port, blow-out proof stems, chrome-plated brass ball, soldered ends with extended solder cups. Manufacture shall be as by Stockham, Crane, Apollo, or equal.
 - 4. Globe Valves 2-1/2" and Larger: Class 125 iron body, bronze mounted with ASTM A-126 Class B cast iron body and bonnet, flanged ends, Teflon-impregnated packing and two-piece packing gland assembly. Manufacture shall be as by Stockham, Crane, Powell, or equal.
 - 5. Globe Valves 2" and Smaller: Class 125, ASTM B62 cast bronze composition body and bonnet, soldered ends, copper silicon alloy stem, brass packing gland, Teflon-impregnated packing and malleable hand wheel. Manufacture shall be as by Stockham, Crane, Powell, or equal.
 - 6. Butterfly Valves 2-1/2" and Larger: Wafer type, 200 psi cwp, ASTM A126 Class B cast iron body, replaceable EPDM sleeve, ductile nickel-plated disc, 410 stainless steel stem and EPDM O-ring stem seals. 2-1/2"-6" sizes lever operated; 8"-24" gear operated. Manufacture shall be as by Stockham, Crane, or equal.
 - 7. Check Valves 2-1/2" and Larger: Iron body, bronze mounted, ASTM A126 Class B cast iron body and cap, flanged ends and swing disc type. Manufacture shall be as by Stockham, Crane, Powell, or equal.
 - 8. Check Valves 2" and Smaller: Class 125, soldered ends, ASTM B62 cast bronze composition bodies and caps and swing disc type. Manufacture shall be as by Stockham, Crane, Powell, or equal.
 - 9. Hose Bibbs: Provide angle type copper alloy hose bibb with lockshield and hand wheel. Inlet shall have internal threads. Outlet shall have vacuum breaker with 0.75 inch external hose threads.

- 10. Nonfreeze Wall Hydrant: ASSE 1019, cast bronze, with lockshield and hand wheel, one inch external thread inlet, 0.75 inch external hose thread outlet with automatic draining vacuum breaker. Hydrant shall be of sufficient length to extend through walls and place the valve seat inside the building or in the crawl space. Bonnet and valve stem shall be removable from outside of the building.
- 11. Water Pressure Reducing Valves: ASSE 1003.
- D. Strainers: Class 125, Style Y, cast bronze body, 20 mesh stainless steel screen and shall have blow-off outlet with pipe nipple and gate valve. Manufacture shall be as by Watts, Sarco, or equal.
- E. Gauges: ASME B40.100, single style pressure gauge for water with 4 inch dial, brass or aluminum case, bronze tube, gauge cock, pressure snubber, and syphon. Provide scale range suitable for the intended service.
- F. Thermometers: ASME 40.200, bi metal dial type thermometers with stainless steel case, stem, and fixed thread connection; 5 inch diameter dial with glass face gasketed within the case; accuracy within 1.0 percent of scale range. Provide scale range suitable for the intended service.
- G. Dielectric Connections: Provide at connections between copper and ferrous metal piping materials. ASTM F441, Schedule 80, CPVC threaded pipe nipples, 4 inch minimum length, may be provided for dielectric connections in pipe sizes 2 inches and smaller.
- H. Water Hammer Arresters: PDI WH201, ANSI A112.26M.1, or ASSE 1010, elastomer bellows or plunger type with stainless steel or copper shell. Manufacture shall be as by Josam, Zurn, Watts, or equal.
- I. Valve Boxes: For each buried valve provide ASTM A48 cast iron or ductile iron of a suitable size. Provide cast iron or ductile iron cover for the box with the word "WATER" cast on the cover. Coat cast iron and ductile iron boxes with bituminous paint.
- J. Backflow Preventers: Reduced pressure principle (RPZ) type. Proof shall be furnished that each make, model/design, and size of backflow preventer being furnished for the project is approved by and has a current "Certificate of Approval" from the Foundation for Cross Connection Control and Hydraulic Research, University of Southern California (FCCCHR). Listing of the particular make, model/design, and size in the current FCCCHR List of Approved Backflow Prevention Assemblies will be acceptable as the required proof. Construction shall be of FDA-approved epoxy-coated cast iron unibody with plastic seats. Relief valve shall have stainless steel seat and trim. Backflow Preventer shall be flanged, and equipped with lead free cast copper silicon alloy body ball valve test cocks and non-rising stem resilient seated gate valves. Manufacture shall be as by Watts Series LF009-NRS, or approved equal.

2.02 MISCELLANEOUS PIPING MATERIALS

- A. Pipe Nipples: ANSI B16, copper alloy for use in copper tubing and hot dip galvanized Schedule 80 steel pipe for use in steel piping.
- B. Unions: ANSI B16 for use in copper tubing; ANSI B16.39 hot dip galvanized steel for use in steel piping.
- C. Flanges: ANSI B16.1, Class 125, for use in ferrous piping; ANSI B16.22 or ANSI B16.24 for use in copper tubing; with full face flat type synthetic rubber gaskets.
- D. Escutcheon Plates: One piece or split hinge type metal plates for piping passing through floors, walls, and ceilings in exposed spaces, chromium plated finish on plates in finished spaces, paint finish on plates in unfinished spaces, and with setscrews or other approved positive means to anchor plates in place securely.

E. Pipe Sleeves:

- 1. Sleeves in Masonry and Concrete Walls, Floors, and Roofs: ASTM A53 or ASTM A120, Schedule 40 or Standard Weight, hot dip galvanized steel pipe sleeves.
- 2. Sleeves in Partitions and Other Than Masonry and Concrete Walls, Floors, and Roofs: Hot dip galvanized steel sheet having a nominal weight of not less than 0.90 pounds per square foot.
- F. Pipe Hangers and Supports: Provide MSS SP 58 and MSS SP 69, Type 1 or 6, of the adjustable type, except as modified herein or indicated otherwise. Attachments to steel W or S beams shall be with Type 21, 28, 29, or 30 clamps. Attachments to steel angles and channels (with web vertical) shall be with Type 20 clamp with a beam clamp channel adaptor. Attachments to steel channel web horizontal) shall be with drilled hole on center line and double nut and washer. Attachments to concrete shall be with Type 18 insert or a drilled hole with expansion anchor. Attachments to wood shall be as indicated. Hanger rods and attachments shall be full size of the hanger threaded diameter. Provide Type 40 insulation protection shields for insulated piping. Provide steel support rods. Provide nonmetallic, hair felt, or plastic piping isolators between copper tubing and the hangers.
- G. Access Doors: Provide 12 by 12 inch factory prefabricated and primed flush face steel access doors including steel door frame with continuous hinges and turn screw operated latch. Door frame shall be for installation in plaster and masonry walls. Furnish doors under this Section to provide proper access to concealed valves; install doors under the appropriate section of this Specification.

2.03 PIPE, VALVE AND EQUIPMENT INSULATION

A. Section 22 07 00, "Plumbing Insulation".

3.01 INSTALLATION

- A. Installation of plumbing systems including equipment, materials, and workmanship shall be in accordance with the Plumbing Code of New York State, except as modified herein. When fixtures require both hot water and cold water supplies, provide the hot water supply to the left of the cold water supply. Plastic piping shall not penetrate fire walls or fire floors and shall be used on one side of fire walls and fire floors not closer than 6 inches to the penetration.
 - 1. Threaded Connections: Jointing compound for pipe threads shall be polytetrafluoroethylene (PTFE) pipe thread tape, pipe cement and oil, or PTFE powder and oil; apply only on male threads.
 - 2. Solder End Valves: Remove stems and washers and other item subject to damage by heat during installation. Reassemble valve after soldering is completed. Valves without heat sensitive parts do not require disassembly but shall be opened at least two turns during soldering.
 - 3. Pipe Supports (Hangers): Provide additional supports at the concentrated loads in piping between supports, such as for in-line water pumps and flanged valves.
 - a. Piping to Receive Insulation: Provide temporary wood spacers between the insulation protection shield and the pipe in order to properly slope the piping and to establish final elevations. Temporary wood spacers shall be of the same thickness as the insulation to be provided under Section 22 07 00, "Plumbing Insulation".
 - b. Maximum Spacing Between Supports:
 - 1) Vertical Piping: Support metal piping at each floor, but at not more than 10 foot intervals.
 - 2) Horizontal Piping: Support cast iron piping at 5 foot intervals, except for pipe exceeding 5 foot length, provide supports at intervals equal to the pipe length but not exceeding 10 feet. Support steel piping and copper tubing as follows:

MAXIMUM SPACING (FEET)							
Nominal Pipe Size (Inches)	One and Under	1.25	1.5	2	2.5	3 and Over	
Steel Pipe	7	8	9	10	11	12	
Copper Tube	6	6	8	8	9	10	

- 4. Ductile Iron Pipe Aboveground: Provide flanged joints.
- 5. Installation of Pipe Sleeves: Provide pipe sleeves where piping passes through walls, floors, roofs, and partitions. Secure sleeves in proper

position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, floors, roofs, and partitions. Provide not less than 0.25 inch space between exterior of piping or pipe insulation and interior of sleeve. Firmly pack space with insulation, and calk at both ends of the sleeve with plastic waterproof cement which will dry to a firm but pliable mass, or provide a segmented elastomeric seal. Seal both ends of penetrations through fire walls and fire floors to maintain fire resistive integrity with UL listed fill, void, or cavity material. Extend sleeves in floor slabs 3 inches above the finished floor.

3.02 NAMEPLATES

- A. Provide laminated plastic nameplates for equipment, gauges, thermometers, and valves; stop valves in supplies to fixtures will not require nameplates. Laminated plastic shall be 0.125 inch thick melamine plastic, black with white center core. Surface shall be a matte finish. All corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block lettering. Key the nameplates to a chart and schedule for each system. Frame charts and schedules under glass and place where directed near each system. Furnish two copies of each chart and schedule. Each inscription shall identify its function. Equipment nameplates shall show the following information.
 - 1. Manufacturer, type, and model number
 - 2. Contract number and accepted date
 - 3. Capacity or size
 - 4. System in which installed
 - 5. System which it controls

3.03 CONNECTIONS TO EXISTING WATER SUPPLY SYSTEMS

A. Use tapping or drilling machine valve and mechanical joint type sleeves for connections to be made under pressure. Bolt sleeves around mains; bolt valve conforming to AWWA C500 to the branch. Open valve, attach drilling machine, make tap, close valve, and remove drilling machine, all without interruption of service. Notify the Owner or Municipality in writing at least 30 days prior to the date the connections are required; receive approval before any service is interrupted. Furnish all materials required to make connections into the existing water supply systems and perform all excavating, backfilling, and other incidental labor as required. Furnish the labor and the tapping or drilling machine for making the actual connections to the existing systems.

3.04 FIELD TESTING

- A. Before final acceptance of the work, test each system as in service to demonstrate compliance with the contract requirements. Perform the following tests in addition to the tests specified in the Plumbing Code of New York State, except as modified herein. Correct all defects in the work provided by the Contractor, and repeat the tests until the work is in compliance with contract requirements. Furnish water, electricity, instruments, connecting devices, and personnel for the tests.
 - 1. Domestic Water Piping: Before insulation is applied, hydrostatically test each piping system at not less than 100 psig or system working pressure, whichever is greater with no leakage or reduction in gauge pressure for 2 hours.

3.05 DISINFECTION

A. Thoroughly flush entire system prior to disinfection. Disinfect the new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C601. Fill the piping systems with solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Maintain a minimum of 25 ppm during retention period. Repeat chlorination as required to achieve 25 ppm minimum. Flush the solution from the systems with clean water until maximum residual chlorine content is not greater than 0.2 parts per million.

END OF SECTION

SECTION 22 13 16

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Sanitary Waste and Vent Piping as shown on the Plans, as specified and/or directed.
- B. Related work specified elsewhere:
 - 1. Section 22 00 00 Plumbing General Requirements
 - 2. Section 22 42 00 Commercial Plumbing Fixtures

1.02 REFERENCE STANDARDS

- A. The following is a list of standards that may be referenced in this Section:
 - 1. American National Standards Institute (ANSI) Publication:
 - a. B16.1 Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800
 - b. B16.3 Malleable Iron Threaded Fittings
 - c. B16.12 Cast Iron Threaded Drainage Fittings
 - d. B16.18 Cast Copper Alloy Solder Joint Pressure Fittings
 - e. B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
 - f. B16.23 Cast Copper Alloy Solder Joint Drainage Fittings –DWV
 - g. B16.24 Bronze Pipe Flanges and Flanged Fittings, Class 150 and 300
 - h. B16.26 Cast Copper Alloy Fittings for Flared Copper Tubes
 - B16.29 Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings DWV
 - j. B16.32 Cast Copper Alloy Solder Joint Fittings for Solvent Drainage Systems
 - k. B16.39 Malleable Iron Threaded Pipe Unions, Class 150, 250 and 300
 - 2. American Society for Testing and Materials (ASTM) Publication:
 - a. A47 Ferritic Malleable Iron Castings
 - b. A53 Pipe, Steel, Black and Hot Dipped, Zinc Coated Welded and Seamless
 - c. A74 Cast Iron Soil Pipe and Fittings
 - d. A120 Pipe, Steel, Black and Hot Dipped, Zinc Coated (Galvanized) Welded and Seamless for Ordinary Uses
 - e. A183 Carbon Steel Track Bolts and Nuts
 - f. A536 Ductile Iron Castings
 - g. B32 Solder Metal

- h. B61 Steam or Valve Bronze Castings
- i. B62 Composition Bronze or Ounce Metal Castings
- j. B88 Seamless Copper Water Tube
- k. B306 Copper Drainage Tube (DWV)
- 1. C564 Rubber Gaskets for Cast Iron Soil Pipe and Fittings
- m. D2000 Classification System for Rubber Products in Automotive Applications
- n. D2564 Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings
- o. D2661 Acrylonitrile Butadiene Styrene (ABS) Plastic Drain, Waste, and Vent Pipe and Fittings
- p. D2665 Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe and Fittings
- 3. American Water Works Association (AWWA) Publication:
 - a. C104 Cement Mortar Lining for Ductile Iron and Gray Iron Pipe and Fitting for Water
 - b. C105 Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids
 - c. C110 Gray Iron and Ductile Iron Fittings, 3 in. Through 48 in. for Water and Other Liquids
 - d. C111 Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings
 - e. C115 Flanged Ductile Iron and Gray Iron Pipe with Threaded Flanges
 - f. C151 Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand Lined Molds, for Water and Other Liquids
 - g. C500 Gate Valves, 3 Through 48 inch NPS, for Water and Sewage Systems
- 4. Cast Iron Soil Pipe Institute (CISPI) Publication:
 - a. 301 Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications
 - b. 310 Patented Joint for Use in Connection with Hubless Cast Iron Sanitary System
 - c. HSN Neoprene Rubber Gaskets for Hub and Spigot Cast Iron Soil Pipe and Fittings
- 5. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Publication:
 - a. SP 58 Pipe Hangers and Supports-Materials, Design and Manufacture
 - b. SP 69 Pipe Hangers and Supports-Selection and Application
 - c. SP 70 Cast Iron Gate Valves, Flanged and Threaded Ends
 - d. SP 80 Bronze Gate, Globe, Angle and Check Valves
 - e. SP 85 Cast Iron Globe and Angle Valves, Flanged and Threaded Ends

- 6. Plumbing and Drainage Institute (PDI) Publication:
 - a. G101 Testing and Rating Procedure for Grease Interceptors
- 7. Uniform Fire Prevention and Building Code of New York State Publication:
 - a. 2020 Plumbing Code of New York State

1.03 GENERAL REQUIREMENTS

A. Section 22 00 00, "Plumbing General Requirements", applies to this Section, with the additions and modifications specified herein. Plumbing systems including equipment, materials, installation, and workmanship shall be in accordance with the Plumbing Code of New York State, except as modified herein. In the Plumbing Code referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" had been substituted for the word "should" wherever it appears. Capacity of equipment shall be not less than that indicated. Plumbing systems shall include all water piping buried and aboveground to a limit of 5 feet outside of the building walls unless otherwise specified, or indicated by the Contract Drawings.

1.04 SUBMITTALS

- A. Manufacturer's Data:
 - 1. Pipe and fittings
 - 2. Valves
 - 3. Pipe supports (hangers)
 - 4. Drains
 - 5. Cleanouts
- B. Certificates of Conformance:
 - 1. Pipe and fittings

PART 2 - PRODUCTS

2.01 DWV (DRAIN, WASTE, AND VENT) PIPING

- A. Fittings shall be long radius fittings, except fittings in vent piping may be short radius fittings. Minimum size piping shall be 2 inches for buried piping and 1.5 inches for aboveground piping.
 - 1. Buried Piping: Buried piping includes piping up to but not more than 6 inches aboveground or floor slab on grade.
 - a. Cast Iron Hub and Spigot Pipe and Fittings: ASTM A74 with ASTM C564 or CISPI HSN 85 rubber compression gasket joints, or calked and leaded joints.
 - b. Plastic Pipe, Fittings, and Solvent Cement:
 - 1) Polyvinyl Chloride (PVC) System: ASTM D2665.
 - 2) Acrylonitrile Butadiene Styrene (ABS) System: ASTM D2661, single extrusion pipe.

- 2. Aboveground Piping:
 - a. Cast Iron Hubless Pipe and Fittings: CISPI 301 with CISPI 310 coupling joints.
 - b. Cast Iron Hub and Spigot Pipe and Fittings: ASTM A74 with ASTM C564 or CISPI HSN 85 rubber compression gasket joints, or calked and leaded joints.
 - c. Plastic Pipe, Fittings, and Solvent Cement:
 - 1) Polyvinyl Chloride (PVC) System: ASTM D2665.
 - 2) Acrylonitrile Butadiene Styrene (ABS) System: ASTM D2661, single extrusion pipe.
 - d. Copper Tubing: ASTM B306, with ANSI B16.23, ANSI B16.29, or ANSI B16.32 solder joint fittings using ASTM B32, 95 5 tin antimony or Grade Sn96 tin silver solder, and flux containing not more than 0.2 percent lead.
 - e. Steel Pipe: ASTM A53 or ASTM A120, Schedule 40, hot dip galvanized, threaded end connections; with ANSI B16.12 hot dip galvanized threaded fittings.
- 3. Cleanouts: ANSI A112.36.2M; provide threaded bronze or thermoplastic cleanout plugs.
 - a. Floor Cleanouts: Provide cast iron floor cleanout with flange, adjustable height polished bronze or nickel bronze rim and scoriated floor plate with "CO" cast in the plate, and countersunk screws for installing floor plate flush with finished floor.
 - b. Wall Cleanouts: Provide polished stainless steel or chromium plated bronze cover plate and secure to cleanout plug with countersunk screw.
 - c. Cleanouts Exterior to Buildings: Provide cast iron or polyvinyl chloride (PVC) cleanouts and countersunk plugs. Provide 24 by 24 by 4 inch thick concrete slab with top 1.0 inch above grade with cleanout located in center of slab.
- 4. Drains: ANSI A112.21.1M; provide cast iron drains and clamping rings for use with membrane waterproofing.
 - a. Flush Strainer Floor Drains: Provide with double drainage flange, perforated or slotted cast bronze or nickel bronze strainer, adjustable collar, and P trap. Drains of sizes 2, 3, and 4 inches shall have strainers with minimum free drainage area of 5, 11, and 18 square inches, respectively.
 - b. Shower Floor Drains: Provide as specified for flush strainer floor drains, except that PVC drains may be provided for fiberglass shower stalls where fire separation requirements are not violated.
 - c. Extended Rim Floor Drains: Provide as specified for flush strainer floor drains, except strainer body shall have 1 inch extended rim installed flush with finished floor.

2.02 MISCELLANEOUS PIPING MATERIALS

- A. Pipe Nipples: ANSI B16, copper alloy for use in copper tubing and hot dip galvanized Schedule 80 steel pipe for use in steel piping.
- B. Unions: ANSI B16 for use in copper tubing; ANSI B16.39 hot dip galvanized steel for use in steel piping.
- C. Flanges: ANSI B16.1, Class 125, for use in ferrous piping; ANSI B16.22 or ANSI B16.24 for use in copper tubing; with full face flat type synthetic rubber gaskets.
- D. Escutcheon Plates: One piece or split hinge type metal plates for piping passing through floors, walls, and ceilings in exposed spaces, chromium plated finish on plates in finished spaces, paint finish on plates in unfinished spaces, and with setscrews or other approved positive means to anchor plates in place securely.
- E. Pipe Sleeves:
 - 1. Sleeves in Masonry and Concrete Walls, Floors, and Roofs: ASTM A53 or ASTM A120, Schedule 40 or Standard Weight, hot dip galvanized steel pipe sleeves.
 - 2. Sleeves in Partitions and Other Than Masonry and Concrete Walls, Floors, and Roofs: Hot dip galvanized steel sheet having a nominal weight of not less than 0.90 pounds per square foot.
- F. Pipe Hangers and Supports: Provide MSS SP 58 and MSS SP 69, Type 1 or 6, of the adjustable type, except as modified herein or indicated otherwise. Attachments to steel W or S beams shall be with Type 21, 28, 29, or 30 clamps. Attachments to steel angles and channels (with web vertical) shall be with Type 20 clamp with a beam clamp channel adaptor. Attachments to steel channel web horizontal) shall be with drilled hole on center line and double nut and washer. Attachments to concrete shall be with Type 18 insert or a drilled hole with expansion anchor. Attachments to wood shall be as indicated. Hanger rods and attachments shall be full size of the hanger threaded diameter. Provide Type 40 insulation protection shields for insulated piping. Provide steel support rods. Provide nonmetallic, hair felt, or plastic piping isolators between copper tubing and the hangers.
- G. Access Doors: Provide 12 by 12 inch factory prefabricated and primed flush face steel access doors including steel door frame with continuous hinges and turn screw operated latch. Door frame shall be for installation in plaster and masonry walls. Furnish doors under this Section to provide proper access to concealed valves; install doors under the appropriate section of this Specification.

3.01 INSTALLATION

- A. Installation of sanitary waste and vent systems including equipment, materials, and workmanship shall be in accordance with the Plumbing Code of New York State, except as modified herein. Plastic piping shall not penetrate fire walls or fire floors and shall be used on one side of fire walls and fire floors not closer than 6 inches to the penetration.
 - 1. Threaded Connections: Jointing compound for pipe threads shall be polytetrafluoroethylene (PTFE) pipe thread tape, pipe cement and oil, or PTFE powder and oil; apply only on male threads.
 - 2. Solder End Valves: Remove stems and washers and other item subject to damage by heat during installation. Reassemble valve after soldering is completed. Valves without heat sensitive parts do not require disassembly but shall be opened at least two turns during soldering.
 - 3. Pipe Supports (Hangers): Provide additional supports at the concentrated loads in piping between supports, such as for in-line water pumps and flanged valves.
 - 4. Maximum Spacing Between Supports:
 - a. Vertical Piping: Support metal piping at each floor, but at not more than 10 foot intervals. Support plastic at each floor and at midpoint between floors, but at not more than 5 foot intervals.
 - b. Horizontal Piping: Support cast iron piping at 5 foot intervals, except for pipe exceeding 5 foot length, provide supports at intervals equal to the pipe length but not exceeding 10 feet. Support plastic and glass piping at 4 foot intervals and support plastic piping at each change of direction. Support steel piping and copper tubing as follows:

MAXIMUM SPACING (FEET)						
Nominal Pipe Size (Inches)	One and Under	1.25	1.5	2	2.5	3 and Over
Steel Pipe	7	8	9	10	11	12
Copper Tube	6	6	8	8	9	10

5. Installation of Pipe Sleeves: Provide pipe sleeves where piping passes through walls, floors, roofs, and partitions. Secure sleeves in proper position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, floors, roofs, and partitions. Provide not less than 0.25 inch space between exterior of piping or pipe insulation and interior of sleeve. Firmly pack space with insulation, and calk at both ends of the sleeve with plastic waterproof cement which will dry to a firm but pliable mass, or provide a segmented

elastomeric seal. Seal both ends of penetrations through fire walls and fire floors to maintain fire resistive integrity with UL listed fill, void, or cavity material. Extend sleeves in floor slabs 3 inches above the finished floor, except sleeves are not required where DWV piping passes through concrete floor slabs located on grade.

3.02 NAMEPLATES

- A. Provide laminated plastic nameplates for equipment and valves. Laminated plastic shall be 0.125 inch thick melamine plastic, black with white center core. Surface shall be a matte finish. All corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block lettering. Key the nameplates to a chart and schedule for each system. Frame charts and schedules under glass and place where directed near each system. Furnish two copies of each chart and schedule. Each inscription shall identify its function. Equipment nameplates shall show the following information.
 - 1. Manufacturer, type, and model number
 - 2. Contract number and accepted date
 - 3. Capacity or size
 - 4. System in which installed
 - 5. System which it controls

3.03 FIELD TESTING

- A. Before final acceptance of the work, test each system as in service to demonstrate compliance with the contract requirements. Perform the following tests in addition to the tests specified in the Plumbing Code of New York State, except as modified herein. Correct all defects in the work provided by the Contractor, and repeat the tests until the work is in compliance with contract requirements. Furnish water, electricity, instruments, connecting devices, and personnel for the tests.
 - 1. DWV Piping: Before the installation of fixtures, cap the ends of each system, fill the piping with water to the roof, and allow to stand a minimum of 3 hours with no measurable leakage. If the system is tested in sections, each opening shall be plugged and each section tested with not less than a 10 foot head of water.

END OF SECTION

SECTION 22 33 33

COMMERCIAL ELECTRIC DOMESTIC WATER HEATER

PART 1 - GENERAL

1.01 SUMMARY

- A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Commercial Electric Domestic Water Heater and circulating pumps, as shown on the Plans, as specified and/or directed.
- B. Related work specified elsewhere:
 - 1. Section 22 00 00 Plumbing General Requirements
 - 2. Section 22 07 00 Plumbing Insulation
 - 3. Section 22 11 16 Domestic Water Piping
 - 4. Division 26 Electrical

1.02 REFERENCE STANDARDS

- A. The following is a list of standards that may be referenced in this Section:
 - 1. American National Standards Institute (ANSI) Publication:
 - a. Z21.22 Relief Valves For Hot Water Supply Systems
 - 2. American Society of Mechanical Engineers (ASME) Publication:
 - a. A112.4.1 Water Heater Relief Valve Drain Tubes
 - b. BPVC IV-HLW Heating Boilers Lined Potable Water Heaters
 - c. BPVSEC8 Pressure Vessels (Division1)
 - 3. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Publication:
 - a. 90.1-2013 Energy Standard for Buildings Except Low-Rise Residential Buildings
 - 4. American Society of Sanitary Engineering (ASSE) Publication:
 - a. 1005 Performance of Water Heater Drain Valve (3/4-inch)
 - b. 1017 Performance of Temperature Actuated Mixing Valves for Hot Water Distribution Systems
 - c. 1070 Performance Requirements for Water Temperature Limiting Devices
 - 5. National Electrical Manufacturers Association (NEMA) Publication:
 - a. ICS 6 Industrial Control and Systems: Enclosures
 - 6. NSF International (NSF) Publication:
 - a. 5 Water Heaters, Hot Water Supply Boilers, and Heat Recovery Equipment
 - b. 61 Drinking Water System Components Health Effects
 - c. 372 Drinking Water System Components Lead Content

- 7. Underwriters Laboratories, Inc. (UL) Publication:
 - a. 94 Tests for Flammability of Plastic Materials for Parts in Devices and Appliances
 - b. 174 Household Electric Storage Tank Water Heaters
 - c. 499 Electric Heating Appliances
 - d. 1453 Electric Booster and Commercial Storage Tank Water Heaters
- 8. Uniform Fire Prevention and Building Code of New York State Publication:
 - a. 2020 New York State Plumbing Code
 - b. 2020 New York State Energy Conservation Code

1.03 SUBMITTALS

- A. Manufacturer's Data:
 - 1. Water Heaters
 - 2. Pump
 - 3. Expansion Tank
 - 4. Thermostatic Mixing Valve
- B. Certificates of Conformance:
 - 1. Water Heaters
 - 2. Pump
 - 3. Expansion Tank
 - 4. Thermostatic Mixing Valve
- C. Operation and Maintenance Manuals:
 - 1. Water Heaters
 - 2. Pump
 - 3. Expansion Tank
 - 4. Thermostatic Mixing Valve

PART 2 - PRODUCTS

2.01 DOMESTIC ELECTRIC WATER HEATERS

A. Unit shall be electric domestic hot water heater with insulated seamless glass-lined steel tank construction meeting ASME pressure vessel code, with electrical junction box and heavy duty terminal block. Unit power shall be rated at 240 volts, three phase, 60 cycle AC. Tank shall be cathodically protected with dual extruded high density anode rods. Element operation shall be linear sequencing through individual magnetic contractors. Control circuit shall be factory fused and include an immersion thermistor temperature probe with built in ECO control. Internal circuits shall be fused. Unit shall have LCD display with built-in diagnostic and troubleshooting information. Unit shall be equipped with an

adjustable range thermostat to allow hot water settings between 120°F and 181°F and shall meet or exceed all scheduled performance ratings. Hot water heater shall meet ASHRAE 90.1 standard, shall be UL listed and certified, and approved to NSF 5 standard. Unit shall be supplied with integral heat traps. Unit shall include all scheduled or specified features and meet or exceed all scheduled and specified performance characteristics. Manufacture shall be as by AO Smith Gold Series DVE, or approved equal.

B. Combination Pressure and Temperature Relief Valve: ASME and ANSI Z21.22 rated temperature and pressure relief valve set at not less than 25 psi above maximum system pressure, not to exceed maximum working pressure, and temperature relief setting not to exceed 210°F. Provide with test lever.

2.02 PUMP

- A. Submit the manufacturer's certified characteristic performance curve for the impeller size to be furnished. Select the pump so that the operating point on the characteristic performance curve for the impeller size to be furnished will be to the left (shut-off side) of and not more than 5 percent below the point of maximum efficiency for the impeller to be furnished.
- B. Circulating Inline Water Pumps (DWCP-1): Circulating pump shall be inline type, lead free brass pump body construction suitable for potable water, with performance characteristics as scheduled. Pump shall have adjustable temperature sensor built-in, and timer accessory. Manufacture shall be as by Bell and Gossett, Model e³ ecocirc 6F/BSPRZ with e³ timer, or equal.

2.03 EXPANSION TANK

A. Expansion tank to be welded steel, and constructed and tested hydrostatically in accordance with ASME BPVSEC8 of the Boiler Pressure Vessel Code and stamped 125 psi working pressure. Tank shall be suitable for use with potable water and have integral heavy-duty butyl rubber diaphragm, .302"-32 charging valve connection, drain, and system connection. Expansion Tank shall be as manufactured by Bell & Gossett Model PTA-12, or approved equal.

2.04 THERMOSTATIC MIXING VALVE

A. Valve to be lead free brass body and rotatable union triple-duty check stops, rough bronze finish, ASSE 1017 listed, paraffin-based thermal actuation technology, and a vandal-resistant lockable temperature-setting feature with an outlet temperature range of 90°F to 160°F. Manufacture shall be as by Powers HydroGuard XP Master Series LFMM, or approved equal.

2.05 INSULATION

A. Section 22 07 00, "Plumbing Insulation".

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation of domestic water heater systems including equipment, materials, and workmanship shall be in accordance with the New York State Plumbing Code and New York State Energy Conservation Code, except as modified herein.
 - 1. Water heaters shall be installed level and plumb and securely anchored.
 - 2. Water heaters shall be installed and connected in accordance with manufacturer's written instructions with manufacturer's recommended clearances.

3.02 TESTING

A. Before final acceptance of the work, test each system as in service to demonstrate compliance with the contract requirements. Correct all defects in the work provided by the Contractor, and repeat the tests until the work is in compliance with contract requirements. Furnish water, electricity, instruments, connecting devices, and personnel for the tests.

3.03 DISINFECTION

A. Thoroughly flush entire system prior to disinfection. Disinfect the new water piping in accordance with AWWA C601. Fill the piping systems with solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Maintain a minimum of 25 ppm during retention period. Repeat chlorination as required to achieve 25 ppm minimum. Flush the solution from the systems with clean water until maximum residual chlorine content is not greater than 0.2 parts per million.

3.04 INSTRUCTION OF OPERATING PERSONNEL

A. Upon completion of the work, and acceptance of the installation, and at a time designated by the Owner, the services of a competent technician regularly employed or authorized by the manufacturer of the system shall be provided for instructing personnel in the proper operation, maintenance, safety and emergency procedures. The period of instruction shall be not less than four hours. The training shall be conducted at the job site during actual operation and coordinated with the Owner one week in advance.

END OF SECTION

SECTION 22 42 00

COMMERCIAL PLUMBING FIXTURES

PART 1 - GENERAL

1.01 SUMMARY

- A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Commercial Plumbing Fixtures, as shown on the Plans, as specified and/or directed.
- B. Related work specified elsewhere:
 - 1. Section 22 00 00 Plumbing General Requirements
 - 2. Section 22 07 00 Plumbing Insulation
 - 3. Section 22 11 16 Domestic Water Piping
 - 4. Section 22 13 16 Sanitary Waste and Vent Piping
 - 5. Division 26 Electrical

1.02 REFERENCE STANDARDS

- A. The following is a list of standards that may be referenced in this Section:
 - 1. American National Standards Institute (ANSI) Publication:
 - a. Z124.1 Plastic Bathtub Units
 - b. Z124.2 Gel Coated Glass Fiber Reinforced Polyester Resin Shower Receptors and Shower Stall Units
 - c. Z358.1 Emergency Eye Wash and Shower Equipment
 - 2. American Society of Mechanical Engineers (ASME) Publication:
 - a. A112.6.1M Supports for Off the Floor Plumbing Fixtures for Public Use
 - b. A112.6.2 Framing-Affixed Supports (Carriers) for Off-the-Floor Plumbing Fixtures
 - c. A112.18.1 Plumbing Supply Fittings
 - d. A112.18.2 Plumbing Waste Fittings
 - e. A112.19.1 Enameled Cast Iron Plumbing Fixtures
 - f. A112.19.2 Ceramic Plumbing Fixtures
 - g. A112.19.3 Stainless Steel Plumbing Fixtures
 - h. A112.19.4M Porcelain Enameled Formed Steel Plumbing Fixtures
 - i. A112.19.5 Flush Valves and Spuds for Water Closet Bowls, Tanks, and Urinals
 - j. A112.19.14 Six Liter Water Closets Equipped with a Dual Flushing Device

- 3. American Society of Sanitary Engineering (ASSE) Publication:
 - a. 1001 Atmospheric Type Vacuum Breakers
 - b. 1016 Individual Thermostatic, Pressure Balancing and Combination Balancing and Thermostatic Control Valves for Individual Fixture Fittings
 - c. 1037 Pressurized Flushing Devices for Plumbing Fixtures
 - d. 1070 Water Temperature Limiting Devices
- 4. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Publication:
 - a. 18 Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration
- 5. National Electrical Manufacturers Association (NEMA) Publication:
 - a. ICS 6 Industrial Control and Systems: Enclosures
- 6. NSF International (NSF) Publication:
 - a. 61 Drinking Water System Components Health Effects
 - b. 372 Drinking Water System Components Lead Content
- 7. Underwriters Laboratories, Inc. (UL) Publication:
 - a. 399 Drinking-Water Coolers
- 8. Uniform Fire Prevention and Building Code of New York State Publication:
 - a. 2020 New York State Plumbing Code
 - b. 2020 New York State Energy Conservation Code

1.03 GENERAL REQUIREMENTS

A. Section 22 00 00, "Plumbing General Requirements", applies to this Section, with the additions and modifications specified herein. Plumbing systems including equipment, materials, installation, and workmanship shall be in accordance with the New York State Plumbing Code and New York State Energy Conservation Code, except as modified herein. In the Plumbing Code referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" had been substituted for the word "should" wherever it appears.

1.04 SUBMITTALS

- A. Manufacturer's Data:
 - 1. Plumbing Fixtures
- B. Certificates of Conformance:
 - 1. Water flushing volume of flushometer and water closet combination
 - 2. Water flushing volume of flushometer and urinal combination

PART 2 - PRODUCTS

2.01 FIXTURES, FITTINGS, ACCESSORIES, AND SUPPLIES:

- A. Provide control stop valves in each supply to each fixture. The finish of fittings, accessories, and supplies exposed to view shall be chromium plated per ASME A112.18.1. Center set faucets shall be top mounted with inlets on not greater than 4 inch centers, unless noted otherwise. Provide special roughing in for wheelchair fixtures.
 - 1. Flush Valve Type Water Closets (P-1): ASME A112.19.2, white vitreous china, floor mounted, floor outlet, siphon jet, elongated bowl, white solid plastic elongated open front seat, and ASME A112.19.5 trim. Provide ASSE 1037, ADA-compliant nonhold open flush valve of chrome plated cast brass, including adjustable tailpiece, Chloramine-resistant EPDM Seals, vacuum breaker and angle (control stop) valve with vandal-resistant cap and back check. The water flushing volume of the flush valve and water closet combination shall not exceed 1.28 gallons per flush from 25 to 80 psi; furnish water closet manufacturer's certification of conformance. Manufacture of fixture shall be as by American Standard Madera Model 3461.001, or approved equal.
 - 2. Flush Valve Type Urinals (P-2): ASME A112.19.2, white vitreous china, wall mounted, wall outlet, washout flush action, integral trap, extended side shields, and ASME A112.19.5 trim. Provide nonhold open flush valve of chrome plated cast brass, including adjustable tailpiece, Chloramine-resistant EPDM Seals, vacuum breaker and angle (control stop) valve with back check. The water flushing volume of the flush valve and urinal combination shall not exceed 0.5 gallons per flush from 20 to 80 psi. Furnish urinal manufacturer's certification of conformance. Provide ASME A112.6.1 concealed chair carriers. Manufacture shall be as by American Standard Washbrook Model 6590.001, or approved equal.
 - 3. Countertop Lavatories (P-3): ASME A112.18.1, solid surface molded Terreon countertop with integral sink and covered backsplash, and basin minimum oval dimensions of 16 inches wide by 13 inches front to rear. Provide ASME 112.18.1 solid brass construction, single-post mounting, vandal resistant, UL approved electronic faucet with proximity operation, solenoid valve, above-deck manual temperature control valve, flexible stainless steel hoses with check valves, filter screen and compression fittings, hard-wired with low voltage transformer. Faucet shall have a maximum flow rate of 0.5 gpm with vandal-resistant aerator. Provide with perforated grid strainer drain fittings with offset tailpiece, and 1.25 inch adjustable P traps. Furnish template and mounting kit by lavatory manufacturer. Lavatory manufacture shall be as by Bradley OmniDeck Model LD-3010, or approved equal. Lavatory faucet manufacture shall be as by Bradley Verge Crestt Series, Model S53-3100, or approved equal.

- 4. Service Sink (P-4): ASME A112.18.2 one-piece molded stone 24"x24"x10" deep, floor mounted type with stainless steel grid strainer, hose and hose bracket, and mop hanger. Provide ASME A112.18.1 copper alloy chrome plated wall mounted, top brace combination faucets with ceramic disc valves, integral supply stops, vacuum breaker, pail hook, and 0.75 inch external hose threads on spout. Manufacture shall be as by Fiat Model MSBIDTG2424, or approved equal.
- 5. Electric Water Cooler (P-5): ASHRAE 18, ASME A112.19.3, ADA compliant wall-mounted bubbler style with air-cooled condensing unit, 8.0 gph minimum capacity, stainless steel splash receptor, and all stainless steel cabinet, with 27-inch minimum knee clearance from front to bottom of unit to floor and 36-inch maximum spout height above floor. Bubblers shall also be controlled by push levers, by push bars, or touch pads one on each side or one on front and both sides of the cabinet. Manufacture shall be as by Elkay Model EZSVR8, or approved equal.
- 6. Shower Stall Units (P-6): ANSI Z124.2, ADA compliant barrier free white plastic or gel-coated fiberglass above floor rough version receptor with slip resistant bathing surfaces and three walls integrally molded in one piece or made in sections for field assembly to fit 39-inch x 39-inch opening and ½-inch threshold. Provide horizontal L-shaped stainless steel grab bar, vertical stainless steel assist grab bar, L-shaped fold-up seat and stainless steel curtain rod. Provide brass body shower drains with nickel bronze perforated grid strainers and 2 inch adjustable P trap. Provide ASME A112.18.1, ball joint, self-cleaning adjustable spray pattern, hand held shower system kit with 2.5 gpm maximum flow controlled fixed hand shower head, 30-inch wall slide bar, in-line vacuum breaker, 60-inch metal hose, adjustable hot limit safety stop, connected to concealed pipe connected to copper alloy single lever pressure balance type mixing valve cartridge with front access integral screwdriver stops. Anchor the mixing valves and the pipe to the shower head in wall to prevent movement. Shower stall shall be as manufactured by Aquatic Model 1363BFSCST, or equal. Shower faucet system and mixing valve shall be as manufactured by American Standard, Model 1662.221, or equal.
- 7. Outdoor Shower (P-7): ANSI Z124.2, ADA compliant wall shower fabricated of 14 gauge type 304 stainless steel with exterior #4 satin finish. Exposed trim shall be chrome-plated brass. Fixture shall be provided with mounting bracket and hardware, two conical showerheads (one mounted at 72" and one at 48" above finished grade), two hemispherical pushbuttons and ADA compliant control valve for a complete system. Fixture shall include pneumatically operated, single temperature air control valves using atmospheric air. Control valve shall be metering type with non-hold open feature, adjustable timing from 5 to 60 seconds, and 1.6 GPM flow restrictor. Manufacture shall be as by Acorn Model 1741ADAAFA, or approved equal. Unit shall be provided with ASSE 1070 compliant, lead

free thermostatic mixing valve with cast copper silicon alloy body, integral filter washers and check valves, and adjustment cap with locking feature. Manufacture shall be as by Watts Model LFMMVM1, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation of plumbing systems including fixtures, equipment, materials, and workmanship shall be in accordance with the New York State Plumbing Code, except as modified herein. When fixtures require both hot water and cold water supplies, provide the hot water supply to the left of the cold water supply. Plastic piping shall not penetrate fire walls or fire floors and shall be used on one side of fire walls and fire floors not closer than 6 inches to the penetration.
 - 1. Threaded Connections: Jointing compound for pipe threads shall be polytetrafluoroethylene (PTFE) pipe thread tape, pipe cement and oil, or PTFE powder and oil; apply only on male threads.
 - 2. Solder End Valves: Remove stems and washers and other item subject to damage by heat during installation. Reassemble valve after soldering is completed. Valves without heat sensitive parts do not require disassembly but shall be opened at least two turns during soldering.
 - 3. Pipe Supports (Hangers): Provide additional supports at the concentrated loads in piping between supports, such as for in-line water pumps and flanged valves.

3.02 NAMEPLATES

- A. Provide laminated plastic nameplates for equipment, gauges, thermometers, and valves; stop valves in supplies to fixtures will not require nameplates. Laminated plastic shall be 0.125 inch thick melamine plastic, black with white center core. Surface shall be a matte finish. All corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block lettering. Key the nameplates to a chart and schedule for each system. Frame charts and schedules under glass and place where directed near each system. Furnish two copies of each chart and schedule. Each inscription shall identify its function. Equipment nameplates shall show the following information.
 - 1. Manufacturer, type, and model number
 - 2. Contract number and accepted date
 - 3. Capacity or size
 - 4. System in which installed
 - 5. System which it controls

3.03 FIELD TESTING

A. Before final acceptance of the work, test each system as in service to demonstrate compliance with the contract requirements. Correct all defects in the work provided by the Contractor, and repeat the tests until the work is in compliance with contract requirements. Furnish water, electricity, instruments, connecting devices, and personnel for the tests.

END OF SECTION

SECTION 23 05 00

MECHANICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Mechanical General Requirements, as shown on the Plans, as specified and/or directed.
- B. Related work specified elsewhere:
 - 1. Division 1, "General Requirements"
 - 2. Division 22, "Plumbing"
 - 3. Division 23, "Mechanical"
 - 4. Division 26, "Electrical"

1.02 REFERENCE STANDARDS

- A. The following is a list of standards that may be referenced in this section:
 - 1. Code of Federal Regulations (CFR) Publications:
 - a. 29-1910 SUBPART O Machinery and Machine Guarding
 - b. 29-1910.219 Mechanical Power Transmission Apparatus

1.03 SUBMITTALS

- A. Submit shop drawings, manufacturer's data, publication compliance, certified test reports, and manufacturer's certificates of compliance for equipment, materials and finish, and pertinent details for each system where specified in each individual section, and have them approved before procurement, fabrication or delivery of the items to the job site. Shop drawings shall be accompanied by a letter of transmittal in duplicate, and all shop drawings shall be suitably identified with the name of the project, contract number, Contractor's name, date and initials indicating approval of such submittal by the Contractor under the applicable specification. Partial submittals will not be acceptable and will be returned without review. Submittals shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and the specific technical paragraph reference which specifies each item, applicable industry and technical society publication references, and other information necessary to establish contract compliance of each item to be furnished.
 - 1. Manufacturer's Data: Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts.

- 2. Shop Drawings: Drawings shall be a minimum of 8.5 inches by 11 inches in size, except as specified otherwise. Drawings shall include floor plans, sectional views, wiring diagrams, and installation details of equipment; and equipment spaces identifying and indicating proposed location, layout and arrangement of items of equipment, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals, and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.
- 3. Manufacturer's Certificates of Compliance: Submit certification from manufacturer attesting that materials and equipment to be furnished for this project comply with the requirements of this specification and of the reference publications. Pre-printed certifications will not be acceptable; certifications shall be the manufacturer's original; certifications shall be not more than one year old. The certification shall not contain statements that could be interpreted to imply that the product does not meet all requirements specified, such as "as good as"; "achieve the same end use and results as materials formulated in accordance with the referenced publications"; "equal or exceed the service and performance of the specified material". The certification shall simply state that the product conforms to the requirements specified. Certificates shall be signed by the manufacturer's official authorized to sign certificates of compliance.
- 4. Reference Standards Compliance: Where equipment or materials are specified to conform to industry and technical society reference standards of organizations such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), American Society of Mechanical Engineers (ASME), American Gas Association (AGA), American Refrigeration Institute (ARI), and Underwriters' Laboratories (UL), proof of such conformance shall be submitted. If an organization uses a label or listing to indicate compliance with a particular reference standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual sections.
- B. Independent Testing Organization Certificate: In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing and approved by the Engineer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

1.04 OPERATION AND MAINTENANCE MANUAL

A. Furnish an operation and maintenance manual for each item of equipment. Furnish three copies of the manual bound in hardback binders or an approved equivalent. Furnish one complete manual to the Owner's Representative for review and approval not more than 90 calendar days after an item is approved, but at least 60 calendar days prior to field acceptance testing of the item. Furnish the remaining manuals at least 60 days prior to contract completion. Inscribe the following identification on the cover: the words "OPERATION AND MAINTENANCE MANUAL", the name and location of the equipment or the building, the name of the Contractor, and the contract number. The manual shall include the names, addresses, and telephone numbers of each subcontractor installing equipment, and of the local representatives for each item of equipment. The manual shall have a table of contents and be assembled to conform to the table of contents with the tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in. The manual shall include: wiring and control diagrams with data to explain detailed operation and control of each item of equipment; a control sequence describing start up, operation and shut down; description of the function of each principal item of equipment; the procedure for starting; the procedure for operating; shut down instructions; installation instructions; maintenance instructions; lubrication schedule including type, grade, temperature range, and frequency; safety precautions, diagrams, and illustrations; test procedures; performance data; and parts list. The parts lists for equipment shall indicate the sources of supply, recommended spare parts, and the service organization which is reasonably convenient to the project site. The manual shall be complete in all respects for equipment, controls, accessories, and associated appurtenances provided.

1.05 CATALOGED PRODUCTS

A. Materials and equipment shall be cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be manufacturer's latest design that complies with the specification requirements. Materials and equipment shall duplicate items that have been in satisfactory commercial or industrial use. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the items need not be the products of the same manufacturer. Each item of equipment shall have the manufacturer's name, address, model number and serial number on the nameplate securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.06 MANUFACTURER'S RECOMMENDATIONS

A. Unless otherwise stated in the Contract Specifications, all new equipment items, and specialties shall be installed in strict accordance with the recommendations of the manufacturer of the items being installed. Prior to the installation of new items, the Contractor shall submit to the Owner's representative printed copies of the manufacturer's installation recommendations. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material. Failure to install items in accordance with manufacturer's recommendations can be cause for rejection of the work items installed.

1.07 LAYOUT OF THE WORK

- A. Coordinate the proper relation of the work to the building structure, existing utilities and to the work of all trades. The Contractor shall advise the Owner's Representative of any discrepancy before performing any work.
 - 1. Contract Drawings: The Contract Drawings represent the general intent as to piping and equipment arrangements. All locations and dimensions shown shall be field verified and minor alterations made if so required. Where dimensions are not given for the location and arrangement of mechanical systems, locations may be assumed to be approximate, and may be altered if required. Major modifications to the indicated arrangements shall be approved by the Owner's Representative prior to the installation of mechanical systems. Schematic diagrams represent the overall system requirements and do not necessarily indicate the physical orientation, location or dimensions of that system.
 - 2. Record Drawings: The Contractor shall maintain a record of the progress of the work and shall submit three (3) sets of As-Built Drawings upon completion of the project.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Properly store, adequately protect, and carefully handle equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations, and as approved by the Engineer. Replace damaged or defective items.

1.09 SAFETY REQUIREMENTS

A. Equipment Safety: Fully enclose or properly guard in accordance with 29 CFR 1910.219 belts, pulleys, chains, gears, couplings, projecting setscrews, keys, rotating parts, and other power transmission apparatus, located where persons can come in close proximity thereto. Points of operation, ingoing nip points, and machinery producing flying chips and sparks shall be guarded in accordance with the applicable portions of 29 CFR 1910 SUBPART O. Provide positive means of

locking out equipment so that equipment cannot be accidentally started during maintenance procedures. High temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be properly guarded or covered with insulation of the type specified. Provide catwalks, maintenance platforms, and guardrails where required for safe operation and maintenance of equipment. Provide ladders or stairways to reach catwalks and maintenance platforms. Ensure that access openings leading to equipment are large enough to carry through routine maintenance items such as filters and tools.

1.10 ELECTRICAL REQUIREMENTS

A. Furnish motors, controllers, disconnects and contactors with their respective pieces of equipment. Motors, controllers, disconnects and contactors shall conform to and have electrical connections provided under Division 26-Electrical. Furnish internal wiring for components of packaged equipment as an integral part of the equipment. Extended voltage range motors will not be permitted. Controllers and contactors shall have a maximum of 120 volt control circuits, and shall have auxiliary contacts for use with the controls furnished. When motors and equipment furnished are larger than sizes indicated, the cost of additional electrical service and related work shall be included under this Section. Power wiring and conduit for field installed equipment shall be provided under and conform to the requirements of Division 26 – Electrical. Unless specifically noted otherwise, all control wiring (120 volt or less) shall be provided by Mechanical Contractor and conform to the requirements of Division 26-Electrical.

1.11 INSTRUCTION TO OWNER'S PERSONNEL

A. When specified in other sections, furnish the services of competent instructors to give full instruction to the designated Owner's personnel in the adjustment, operation, and maintenance, including pertinent safety requirements, of the specified equipment or system. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Owner for regular operation. The number of days (8 hours per day) of instruction furnished shall be as specified in the individual section. When more than 4 days of instruction are specified, use approximately half of the time for classroom instruction. Use other time for instruction with the equipment or system. When significant changes or modifications in the equipment or system are made under the terms of the Contract, provide additional instruction to acquaint the operating personnel with the changes or modifications.

1.12 INSPECTIONS AND CERTIFICATIONS

A. The Contractor shall provide and pay for any third party inspections or certifications required by applicable regulatory agencies for boilers and other mechanical equipment components modified, or furnished and installed as a part of the Contract work.

1.13 SPECIAL CONDITIONS

- A. The Contractor shall be responsible to coordinate with the Owner regarding planned interruptions to mechanical and electrical services.
 - 1. Protection of Existing Work: The Contractor shall take all necessary precautions to insure against damage to existing work to remain in place, or to be reused. The Contractor shall insure that structural elements are not overloaded and additional structural supports required as a result of any cutting, removal or demolition work performed under any part of this Contract are added. The Contractor shall minimize disruption of existing non-contract work areas as much as possible.
 - 2. Upon damage to existing equipment, buildings and/or structures, the Contractor shall immediately notify the Owner. All damages shall be repaired by the Contractor, or shall be replaced if beyond repair to match the existing to the Owner's satisfaction.
 - 3. Protection of Buildings from the Weather: The interior of the buildings and all materials and equipment shall be protected from the weather at all times.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 FIELD PAINTING

A. Conform to Section 09 91 00 – Painting

END OF SECTION

SECTION 23 31 13

DUCTWORK AND DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Ductwork and Ductwork Accessories, as shown on the Plans, as specified and/or directed.
- B. Related work specified elsewhere:
 - 1. Division 1 General Requirements
 - 2. Section 23 05 00 General Mechanical Requirements

1.02 REFERENCE STANDARDS

- A. The following is a list of standards that may be referenced in this Section:
 - 1. Air Diffusion Control (ADC) Publication:
 - a. 1062-R4 Certification, Rating and Test Manual
 - b. AD Measurement of Room to Room Sound Transmissions Through Plenum Air Systems
 - 2. Air Movement and Control Association, Inc. (AMCA) Publication:
 - a. 500 Test Methods for Louvers, Dampers and Shutters
 - 3. American Society for Testing and Materials (ASTM) Publication:
 - a. A123 Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
 - b. A167 Stainless and Heat Resisting Chromium Nickel Steel Plate, Sheet, and Strip
 - c. A653 Steel Sheet, Zinc-Iron Alloy coated (Galvanized) by the Hot Dip Process
 - d. B117 Salt Spray (Fog) Testing
 - e. B127 Nickel Copper Alloy (UNS N04400) Plate, Sheet, and Strip
 - f. B209 Aluminum and Aluminum-Alloy Sheet and Plate
 - g. C423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 - h. C553 Mineral Fiber Blanket and Felt Insulation (Industrial Type)
 - D822 Operating Light and Water Exposure Apparatus (Carbon Arc Type) for Testing Paint, Varnish, Lacquer, and Related Products
 - j. D1654 Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
 - k. E84 Test Method for Surface Burning Characteristics of Building Materials

- 1. E90 Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
- m. E96 Water Vapor Transmission of Materials
- 4. National Fire Protection Association (NFPA) Publication:
 - a. 90A Installation of Air Conditioning and Ventilating Systems
- 5. Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA) Publication:
 - a. HVACTAB HVAC Systems Testing, Adjusting and Balancing (HVACTAB)
 - b. HVACDCS HVAC Duct Construction Standards Metal and Flexible (HVACDCS)
 - c. HVACALTM HVAC Air Duct Leakage Test Manual (HVACALTM)
- 6. Underwriters Laboratories, Inc. (UL) Publications:
 - a. 181 Factory Made Air Duct Connectors
 - b. 555 Fire Dampers and Ceiling Dampers
 - c. 555S Leakage Rated Dampers for Use in Smoke Control Systems
 - d. 586 High Efficiency, Particulate, Air Filter Units
 - e. 723 Test for Surface Burning Characteristics of Building Materials
- 7. Uniform Fire Prevention and Building Code of New York State Publication:
 - a. 2020 Mechanical Code
 - b. 2020 Energy Conservation Construction Code

1.03 SUBMITTALS

- A. Manufacturer's Catalog Data:
 - 1. Dampers
 - 2. Louvers
 - 3. Sheet Metals
 - 4. Test Holes
- B. Drawings:
 - 1. Ductwork Layout Plan
 - 2. Location of test holes
- C. Field Test Reports:
 - 1. Testing and balancing of air systems

1.04 QUALITY ASSURANCE

A. SMACNA Duct Construction Manuals: The SMACNA recommendations shall be considered as mandatory requirements. Substitute the word "shall" for the word "should" in these manuals. No negative pressure construction for 4 inch, 6 inch, or 10 inch water gauge is provided herein.

1.05 TESTING FOR CORROSION PROTECTION

- A. Comply with ASTM A123 or protect the equipment with a corrosion inhibiting coating or paint system that has proved capable of satisfactorily withstanding corrosion in accordance with ASTM B117. Test 125 hours for equipment installed indoors and 500 hours for equipment installed outdoors or subjected to marine atmosphere. Each specimen shall have a standard scratch as defined in ASTM D1654.
 - 1. Corrosion Criteria: Upon completion of exposure, coating or paint shall show no indication of deterioration or loss of adhesion, nor shall there be indication of rust or corrosion extending further than 1/8 inch on either side of original scratch.
 - 2. Thickness of Coating: Thickness of coating or paint system on the actual equipment shall be identical to that on the test specimens with respect to materials, conditions of application, and dry film thickness.

1.06 PRESSURE VELOCITY CLASSIFICATION

A. SMACNA HVACDCS, Section 1, and as indicated.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Galvanized Steel Sheets: ASTM A653; coating designation G90.
- B. Galvanized Steel Hot Dipped After Fabrication: ASTM A123.
- C. Aluminum Alloy Sheets: ASTM B209
- D. Corrosion Resisting (Stainless) Steel Sheets: ASTM A167.
- E. Duct Liner Adhesives: SMACNA HVACDCS, fire resistant adhesive.

2.02 DUCTS OF PRESSURE CLASSES 2-INCH OR LESS WATER GAUGE

- A. Construction, metal gauge, hangars and supports, and reinforcements shall conform with SMACNA HVACDCS. Ductwork shall be airtight and shall not vibrate or pulsate when system is in operation. Air leakage shall be less than 5 percent of the system capacity. Construct ductwork of galvanized steel.
 - 1. Curved Elbows: Make a center line radius not less than 1-1/2 times the width or diameter of the duct.
 - 2. Joints: Make airtight. No dust marks from air leaks shall show at duct joints or connections to grilles, registers, and diffusers.

- 3. Laps: Make laps at joints in the direction of airflow. Space button punch or bolt connection in standing seams at fixed centers not greater than 6 inches. Longitudinal locks or seams, known as "Button Punch Snap Lock" may be used in lieu of Pittsburg Lock.
- 4. Fittings: Elbows, vaned elbows, take offs, branch connections, transitions, splitters, volume dampers, fire dampers, flexible connections, and access door shall conform with SMACNA HVACDCS, Section 2. Factory fabricate test holes to be airtight and noncorrosive with screw cap and gasket.

2.03 FLEXIBLE CONNECTORS

A. UL 181, Class I, UL listed, SMACNA HVACDCS, and additional requirements herein specified. Connectors to be ASTM A653, 24-gauge galvanized steel, with commercial neoprene fire retardant coating meeting NFPA 701 with 500 lb tensile strength at a temperature range of -40°F to 200°F. Use to connect between rigid ducts and equipment inlets and outlets as indicated. There shall be no erosion, delamination, loose fibers, or odors from the ducts into the air stream.

2.04 DUCT SLEEVES AND PREPARED OPENINGS

- A. Duct Sleeves and Closure Collars: Fabricate from minimum 20 gauge galvanized steel. Where sleeves are installed in bearing walls, provide structural steel sleeves as indicated.
- B. Prepared Openings: Provide one inch clearance between the duct and the sleeve.

2.05 DAMPERS AND LOUVERS

- A. Construct dampers and louvers with two gauges heavier than ducts in which installed. Except as modified herein, the construction shall be of aluminum or galvanized steel with interlocking edges and maximum 10 inch blade width. Conform with SMACNA HVACDCS. Dampers shall be opposed blade type where indicated.
- B. Backdraft Dampers (Gravity Dampers or Shutters): Factory fabricated, with statically and dynamically balanced blades that open automatically when the fan starts and close by gravity when the fan stops. Provide the edges of blades with felt or rubber strips to prevent rattling.
- C. Manual Volume Dampers: Balancing, factory fabricated type. Equip dampers with accessible mechanism such as quadrant operators or 3/16 inch rods brought through the side of ducts with locking setscrew and bushing. Where quadrant operators are used, they shall be chrome plated or enamel painted with all exposed edges rounded.

D. Louvers: Combination type, performance based on testing in accordance with AMCA Standard 500. Fold or bead the edges of louver blades to exclude driving rain. Make louver frames of heavy duty extruded aluminum, drainable design and shall include extended sills. Provide bird (insect) screen constructed of the same type metal as the louvers in a removable, rewireable frame. All louver components to be factory assembled. Provide louvers will 70% Kynar PVDF finish, color to be chosen by Owner. All performance and size characteristics shall be as scheduled. Combination type shall have an operable damper blades, dual-durometer extruded vinyl blade seals for tight shutoff, side linkage out of airstream, and synthetic sleeve type bearings. Provide combination louvers with two-position 120V damper actuators, spring set to return to closed position and interlocked with associated fan, with sufficient power to limit air leakage.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation shall conform to NFPA 90A, SMACNA HVACDCS. Provide mounting and supporting of ductwork and accessories including, but not limited to, structural supports, hangers, vibration isolators, stands, clamps and brackets, access doors, and dampers. Use electrical isolation between dissimilar metals. Electrical isolation may be fluorinated elastomers or sponge rubber gaskets. Install ductwork accessories as indicated in accordance with the manufacturer's printed instruction. Allow clearance for inspection, repair, replacement, and service.
 - 1. Ductwork: When air distribution systems are operated, there shall be no chatter, vibration, or dust marks. After ducts are thermally or acoustically insulated, ensure air flow area equal to duct cross section dimensions indicated.
 - a. Field Changes to Ductwork: Those required to suit the sizes of factory fabricated equipment actually furnished, shall be designed to minimize expansion and contraction. Use gradual transitions in field changes as well as modifications to connecting ducts.
 - b. Dampers: When installed on ducts to be thermally insulated, equip each damper operator with stand-off mounting brackets, bases, or adapters to provide clearance between the duct and operator not less than the thickness of insulation. Stand-off mounting items shall be integral with the operator or standard accessory of damper manufacturer.
 - c. Duct Sleeves and Prepared Openings: Install for duct mains, duct branches, and ducts passing through roofs and ceilings. The Contractor shall be responsible for the proper size and location of sleeves and prepared openings.

- 1) Duct Sleeves: Allow one inch clearance between duct and sleeve or one inch clearance between insulation and sleeve for insulated ducts, except at grilles, registers, and diffusers.
- 2) Prepared Openings: Allow one inch clearance between duct and opening or one inch clearance between insulation and opening for insulated ducts, except at grilles, registers, and diffusers.
- 3) Closure Collars: Provide not less than 4 inches wide on each side of walls or floors where sleeves or prepared openings are installed. Fit collars snugly around ducts and insulation. Grind smooth edges of collar to preclude tearing or puncturing insulation covering or vapor barrier. Use nails with maximum 6 inch centers on collars.
- 2. Duct Hangers and Supports: SMACNA HVACDCS, Section 4. Unless otherwise indicated, provide not less than two one inch by 1/16 inch galvanized strap iron hangers spaced one on each side of duct. Anchor risers in the center of the vertical run to allow ends of riser free vertical movements. Attach supports only to structural framing members and concrete slabs. Do not anchor supports to metal decking unless a means is provided and approved for preventing the anchors from puncturing the metal decking. Where supports are required between structural framing member, provide suitable intermediate metal framing. Where C clamps are used, use retainer clips.
 - a. Flexible Connectors: Provide flexible connectors between fans and ducts or casings and where ducts are of dissimilar metals. For round ducts, securely fasten flexible connectors by zinc coated steel clinch type draw bands. For rectangular ducts, lock flexible connectors to metal collars.
- 3. Flashings: Provide waterproof flashings where ducts pass through exterior walls and roofs.
- 4. Inspection Plates and Test Holes: Provide, where required, in ductwork or casings for all balance measurements. Test holes shall be factory fabricated, airtight, and noncorrosive with screw cap and gasket. Extend cap through insulation.
- 5. Cleaning of Ducts: Remove all debris and dirt from ducts and wipe clean. Before installing air outlets, use air handler to blow dry air through entire system at maximum attainable velocity. Provide temporary air filters for this operation.

3.02 TESTING AND COMMISSIONING

A. The Contractor is responsible for the administration and direction of tests. Furnish instruments, equipment, connecting devices, and personnel for the tests. Notify Engineer 5 days before inspection or testing is scheduled. Correct all defects in the work. Repeat tests until the work is in compliance.

1. Comply with SMACNA HVACTAB to achieve and confirm compliance with drawings and specifications, prepare complete report of final test results and submit in quadruplicate.

END OF SECTION

SECTION 23 34 01

HVAC FANS

PART 1 - GENERAL

1.01 SUMMARY

- A. Under this Section, the Contractor shall furnish all labor, materials and equipment for HVAC Fans, as shown on the Plans, as specified and/or directed.
- B. Related work specified elsewhere:
 - 1. Section 23 05 00 Mechanical General Requirements
 - 2. Section 23 31 13 Ductwork and Ductwork Accessories
 - 3. Division 26 Electrical

1.02 REFERENCE STANDARDS

- A. The following is a list of standards that may be referenced in this Section:
 - 1. Air Movement and Control Association, Inc. (AMCA) Publications:
 - a. 210 Laboratory Method of Testing Fans for Rating
 - b. 220 Test Method for Air Curtains
 - c. 300 Reverberant Room Method for Sound Testing of Fans
 - 2. Air-Conditioning, Heating and Refrigeration Institute (AHRI) Publications:
 - a. 880 Air Terminals
 - 3. Acoustical Society of America (ASA) Publication:
 - a. 13 Determination of Sound Levels of Noise Sources in a Special Reverberation Test Room
 - 4. American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) Publication:
 - a. 68 Testing In-Duct Sound Power Measurement Procedure for Fans
 - 5. American Society for Testing and Materials (ASTM) Publications:
 - a. A123 Zinc (Hot Dip Galvanized) Coatings on Iron Steel Products
 - b. B117 Salt Spray (Fog) Testing
 - c. D1654 Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
 - 6. National Electrical Manufacturers Association (NEMA) Publications:
 - a. ICS2 Industrial Control Devices, Controllers and Assemblies
 - b. ICS6 Enclosures for Industrial Controls and Systems
 - c. MG1 Motors and Generators
 - 7. National Fire Protection Association (NFPA) Publications:
 - a. 70 National Electrical Code
 - b. 90A Installation of Air Conditioning and Ventilating Systems

- 8. Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA) Publications:
 - a. HVACTAB HVAC Systems Testing, Adjusting and Balancing (HVACTAB)
- 9. Underwriters Laboratories, Inc. (UL) Publications:
 - a. 507 Electric Fans
 - b. 705 Power Ventilators
 - c. 1278 Wall- or Ceiling-Hung Electric Room Heaters
 - d. 1995 Terminal Units
- 10. Uniform Fire Prevention and Building Code of New York State Publications:
 - a. 2020 Mechanical Code
 - b. 2020 Energy Conservation Construction Code

1.03 SUBMITTALS

- A. Manufacturer's Data: Shop Drawings and Catalog Cuts. Submit shop drawings and catalog information showing plan, elevations, dimensions, capacities, accessories, controls, wiring diagrams, and ratings for the following:
 - 1. Fans
- B. Certificates of Compliance:
 - 1. Fans
- C. Operation and Maintenance Manuals:
 - 1. Fans

1.04 MOTORS

A. NEMA MG1. Motor starters shall conform to NEMA ICS1 and NEMA ICS2. Determine specific motor characteristics to insure provision of correctly sized starters and overload heaters. Motors shall be designed to operate at full capacity with a voltage variation of plus or minus 10 percent of the motor voltage rating. Motor size shall be sufficient for the duty to be performed and shall not exceed its full load nameplate current rating when driven equipment is operated at specified capacity under the most severe conditions likely to be encountered. When motor size provided differs from the size indicated or specified, the Contractor shall make the necessary adjustments to the wiring, disconnect devices, and branch circuit protection to accommodate the equipment actually provided.

1.05 TESTING FOR CORROSION PROTECTION

A. Comply with ASTM A123, or protect the equipment with a corrosion inhibiting coating or paint system that has proved capable of satisfactorily withstanding corrosion in accordance with ASTM B117. Test 125 hours for equipment installed indoors and 500 hours for equipment installed outdoors or subjected to a marine atmosphere. Each specimen shall have a standard scratch as defined in ASTM D1654.

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- B. Corrosion Criteria: Upon completion of exposure, coating or paint shall show no indication of deterioration, loss of adhesion, or any indication of rust or corrosion extending further than 1/8 inch on either side of original scratch.
- C. Thickness of Coating: Thickness of coating or paint system on the actual equipment shall be identical to that on the test specimens with respect to materials, conditions of application, and dry film thickness.
 - 1. Mild Steel and Factory Primed Surfaces:
 - a. Synthetic Resin Primer: 36 percent plus or minus 6 percent solids content by volume; 1 coat, 3 mils minimum dry film thickness.
 - b. Vinyl Copolymer: 23 percent plus or minus 4 percent solids content by volume; 2 coats, 1-1/2 mils minimum dry film thickness per coat.
 - 2. Nonferrous Heat Exchanger Fin Coil Surfaces: Vinyl copolymer, 4 coats, 1-1/2 mils minimum dry film thickness per coat.
 - 3. Galvanized Surfaces:
 - a. Polyamide Epoxy Primer: 48 percent plus or minus 2 percent solids content by volume; 1 coat, 2 mils minimum dry film thickness.
 - b. Vinyl Copolymer: 23 percent plus or minus 4 percent solids content by volume; 2 coats, 1-1/2 mils minimum dry film thickness per coat.
 - 4. Aluminum Surfaces Other than Fin Coil Surfaces:
 - a. Polyamide Epoxy Primer: 48 percent plus or minus 2 percent solid contact by volume; 1 coat, 2 mils minimum dry film thickness.
 - b. Vinyl Copolymer: 23 percent plus or minus 4 percent solids content by volume; 2 coats, 1-1/2 mils minimum dry film thickness per coat.

PART 2 - PRODUCTS

2.01 FANS

- A. Sound rating per AMCA 300; statically and dynamically balanced, with air capacities, brake horsepowers, fan types, fan arrangement, sound power levels or loudness level, and static pressure, as indicated. Fan bearing life shall have a minimum average life of 200,000 hours at design operating conditions. Provide guard (bird) screens for outdoor inlets and outlets. Equip with automatic (backdraft) dampers. Have thermal overload protection in the operating disconnect switches within the building.
- B. Centrifugal Fans: AMCA 210 with AMCA seal, galvanized steel housing, forward-curved type, direct drive motors, and injected molded polypropylene fan wheel and housing. Inlet box shall be 22-gauge galvanized steel with isolation mounted motor and galvanized steel motor mount. Motor shall be permanently

4.23 HVAC FANS 409.005.001 23 34 01-3 lubricated, with built-in impedance or thermal overload protection, and disconnect plug. Provide with backdraft damper, isolator kit, 120V pre-wired fan speed controller, white aluminum grille, interlock operation with light switch and insulated housing. Provide with brick vent exhaust opening, 4-inch deep frame and 45 degree blades in locations indicated on contract drawings. Manufacture shall be as by Greenheck Model CSP-A, or approved equal.

C. Propeller Fans: AMCA 210 with AMCA seal, UL listed, V belt drive motors. Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners, with motor, bearings and drive mounted on a tubular steel power assembly and bolted to a minimum 14-gauge wall panel with continuously welded corners and an integral venturi. All steel fan components shall be coated with an electrostatically applied 2 mil baked polyester powder coating. Propeller shall be a high-efficiency fabricated extruded aluminum airfoil design with blades securely fastened to a cast aluminum hub. The hub shall be keyed and locked to the fan shaft utilizing two set screws. Propeller shall be balanced in accordance with AMCA Standard 204-05. Motor shall be NEMA design B with class B insulation rated for continuous duty and furnished at the specified voltage, phase and enclosure. Bearing shall be of heavy-duty regreasable ball type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed. Belts shall be oil and heat resistance, static conducting. Drives shall be precision machined cast iron type, keyed and security attached to the wheel and motor shafts. Provide unit with motorized discharge shutter, galvanized steel blades and frame, stainless steel pivots, vinyl blade edge seals and 120 V actuator. Unit shall be provided with galvanized steel wall collar, wire guard, wall-mounted on-off switch, and minimum 18-gauge galvanized steel knock-down type weather hood with ½-inch mesh bird screen. Manufacture shall be as by Loren Cook Model EWB, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install air distribution equipment as indicated and in accordance with the manufacturer's instructions. Provide clearance for inspection, repair, replacement, and service. Electrical work shall conform with NFPA 70 and Division 26, "Electrical". Provide overload protection in the operating disconnect switches and magnetic starters.

3.02 FIELD INSPECTION AND TESTS

A. Schedule and administer the specified tests. Provide personnel, instruments, and equipment for such tests. Correct defects and repeat the respective inspection and tests. Give the Engineer ample notice of the dates and times scheduled for tests and trial operations. Conduct inspection and testing in the presence of the Engineer.

HVAC FANS 4.23 23 34 01-4 409.005.001 1. Field Inspection: Prior to initial operation, inspect equipment installation for conformance with drawings and specifications.

B. Field Tests:

- 1. Preliminary Tests: For each item of air handling and distribution equipment and its components, perform an operational test for a minimum period of 4 hours.
- 2. Testing and Balancing: Comply with SMACNA HVACTAB to achieve and confirm compliance with drawings and specifications, prepare complete report of final test results and submit in quadruplicate.

3.03 INSTRUCTION OF OPERATING PERSONNEL

A. Upon completion of the work, and acceptance of the installation, and at a time designated by the Owner, the services of a competent technician regularly employed or authorized by the manufacturer of the compactor shall be provided for instructing personnel in the proper operation, maintenance, safety and emergency procedures. The period of instruction shall be not less than two hours. The training shall be conducted at the job site during actual operation and coordinated with the Owner one week in advance.

END OF SECTION

4.23 HVAC FANS 409.005.001 23 34 01-5

SECTION 23 37 13

DIFFUSERS, REGISTERS AND GRILLES

PART 1 - GENERAL

1.01 SUMMARY

- A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Diffusers, Registers and Grilles, as shown on the Plans, as specified and/or directed.
- B. Related work specified elsewhere:
 - 1. Section 23 05 00 Mechanical General Requirements
 - 2. Section 23 31 13 Ductwork and Ductwork Accessories

1.02 REFERENCE STANDARDS

- A. The following is a list of standards that may be referenced in this Section:
 - 1. Air Diffusion Control (ADC) Publication:
 - a. 1062-R4 Certification, Rating and Test Manual
 - b. AD Measurement of Room to Room Sound Transmissions Through Plenum Air Systems
 - 2. Air Conditioning, Heating and Refrigeration Institute (AHRI) Publication:
 - a. 881 Performance Rating of Air Terminals
 - 3. American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) Publication:
 - a. 70 Performance of Air Outlets and Air Inlets Testing Method
 - 4. American Society for Testing and Materials (ASTM) Publication:
 - a. A123 Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
 - b. A527 Steel Sheet, Zinc Coated (Galvanized) by the Hot Dip Process Lock Forming Quality
 - c. B117 Corrosive Environments Salt Spray Test
 - d. C423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 - e. C553 Mineral Fiber Blanket and Felt Insulation for Commercial and Industrial Applications
 - f. D870 Water Immersion Test
 - g. D2794 Reverse Impact Cracking Test
 - 5. National Fire Protection Association (NFPA) Publication:
 - a. 90A Installation of Air Conditioning and Ventilating Systems
 - 6. Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA) Publications:
 - a. HVACTAB HVAC Systems Testing, Adjusting and Balancing (HVACTAB)

- b. HVACDCS HVAC Duct Construction Standards Metal and Flexible (HVACDCS)
- 7. Underwriters Laboratories, Inc. (UL) Publication:
 - a. 181 Factory Made Air Duct Connectors
- 8. Uniform Fire Prevention and Building Code of New York State Publication:
 - a. 2020 Mechanical Code

1.03 SUBMITTALS

A. Manufacturer's Data:

- 1. Diffusers, registers and grilles
 - Submit a schedule of all inlets and outlets indicating location, catalog model number, manufacturer, dimensional information, sound pressure level rating, nominal rated volumetric flow rate (cfm), neck or face velocity at specified cfm, pressure drop at specified cfm, throw and drop for outlets, range for diffusers, and maximum and minimum cfm modulation.

B. Test Reports:

- 1. Sound pressure level rating
 - a. Submit for inlets and outlets including diffusers, registers and grilles.

1.04 QUALITY ASSURANCE

A. SMACNA Duct Construction Manuals: The SMACNA recommendations shall be considered as mandatory requirements. Substitute the word "shall" for the word "should" in these manuals.

PART 2 - PRODUCTS

2.01 DIFFUSERS, REGISTERS, AND GRILLES

- A. Material and Finishes: Construct diffusers, registers, and grilles of aluminum. Exterior and exposed edges shall be rolled, or otherwise stiffened and rounded. Air outlets shall be factory treated and painted with a baked on anodic acrylic paint and pass a 100-hour ASTM B117 Corrosive Environments Salt Spray Test without creepage, blistering or deterioration of film. The paint must also meet testing requirements in accordance with ASTM B870 and D2794. Colors shall be selected or approved by the Engineer.
- B. Sound Pressure Level: Manufacturer certified sound pressure level rating of inlets and outlets in accordance with ADC 1062 R4. Conform with the following permissible room sound pressure levels:

NC Range, dB	Typical Application
20 - 25	Private Offices and Conference Rooms
30 - 40	Corridors
25 - 30	Classrooms
20 - 25	Courtrooms

- C. Throw: Defined as distance from the diffuser, register, or grille to the point which the air velocity falls below 50 feet per minute. Throw shall not exceed 1.5 times the outlet mounting height.
- D. Drop: Maximum drop of air stream shall not be so great that it is within 5 feet of the floor at the end of the throw.
- E. Return/Exhaust Registers: Provide exhaust and return registers as specified for supply registers, except that they shall have a single set of non-directional face bars or vanes having the same appearance as the supply registers. Set face bars or vanes at 35 degrees. Registers shall be in mounted frame. Manufacture shall be as by Titus Model 350 RL, or approved equal

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall conform to NFPA 90A, SMACNA HVACDCS. Install diffusers, registers, grilles and accessories as indicated in accordance with the manufacturer's printed instruction. Allow clearance for inspection, repair, replacement, and service.

3.02 FIELD TESTS AND INSPECTIONS

- A. The Contractor is responsible for the administration and direction of tests. Furnish instruments, equipment, connecting devices, and personnel for the tests. Correct all defects in the work. Repeat tests until the work is in compliance.
 - 1. Balancing and Testing of Air Systems: Comply with SMACNA HVACTAB to achieve and confirm compliance with drawings and specifications, prepare complete report of final test results and submit in quadruplicate.

END OF SECTION

SECTION 23 81 26

UNITARY AIR CONDITIONING SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Unitary Air Conditioning Systems, refrigerant piping and specialties, and piping insulation, as shown on the Plans, as specified, and/or directed.
- B. Related Work specified elsewhere:
 - 1. Section 23 05 00 Mechanical General Requirements
 - 2. Section 23 31 13 Ductwork and Ductwork Accessories
 - 3. Section 23 37 13 Diffusers, Registers and Grilles
 - 4. Division 26 Electrical

1.02 REFERENCE STANDARDS

- A. The following is a list of standards that may be referenced in this section:
 - 1. Air Conditioning, Heating and Refrigeration Institute (AHRI) Publication:
 - a. 210 Unitary Air Conditioning Equipment
 - b. 260 Application, Installation and Servicing of Unitary Systems
 - c. 350 Sound Rating of Non-Ducted Indoor Air Conditioning Equipment
 - d. 360 Commercial and Industrial Unitary Air Conditioning Equipment
 - e. 710 Liquid-Line Driers
 - f. 715 Liquid-Line Filters
 - g. 730 Suction-Line Filters and Filter-Driers
 - h. 750 Thermostatic Refrigerant Expansion Valves
 - i. 760 Solenoid Valves for Use with Volatile Refrigerants
 - j. 770 Refrigerant Pressure Regulating Valves
 - k. DCAACP Directory of Certified Applied Air Conditioning Products
 - 1. DCUAC Directory of Certified Unitary Air Conditioners
 - 2. American National Standards Institute (ANSI) Publication:
 - a. B16.10 Face to Face and End to End Dimensions of Ferrous Valves
 - b. B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
 - c. B31.5 Refrigeration Piping
 - d. B31.9 Building Services Piping
 - e. B40.100 Pressure Gauges and Gauge Attachments
 - f. B40.200 Thermometers, Direct Reading and Remote Reading

- 3. American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) Publication:
 - a. 15 Safety Code for Mechanical Refrigeration
 - b. 17 Thermostatic Refrigerant Expansion Valves, Method of Testing
 - c. 52 Method of Testing Air-Cleaning Devices Used in General Ventilation for Removing Particular Matter
 - d. 63 Liquid Line Refrigerant Driers, Method of Testing
 - e. 78 Suction Line Filters and Driers, Method of Testing
 - f. 90.1-2016 Energy Standard for Buildings Except Low-rise Residential Buildings
 - g. 158 Refrigerant Solenoid Valves, Method of Testing
 - h. 193 Method of Testing for Determining the Airtightness of HVAC Equipment
 - i. SHPD Handbook and Product Directory Systems
- 4. American Society for Testing and Materials (ASTM) Publication:
 - a. A53 Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless
 - b. A120 Pipe, Steel, Black and Hot Dipped Zinc Coated (Galvanized) Welded and Seamless, for Ordinary Uses
 - c. A386 Zinc Coating (Hot Dip) on Assembled Steel Products
 - d. B32 Solder Metal
 - e. B88 Seamless Copper Water Tube
 - f. B117 Salt Spray (Fog) Testing
 - g. B209 Aluminum and Aluminum Alloy Sheet and Plate
 - h. B210 Aluminum Alloy Drawn Seamless Tubes
 - i. B280 Seamless Copper Tube for Air Conditioning and Refrigeration Field Service
 - j. C534 Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
 - k. D1654 Painted or Coated Specimens Subjected to Corrosive Environments
 - 1. D1785 PolyVinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120
 - m. D2564 Solvent Cements for PolyVinyl Chloride (PVC) Plastic Piping Systems
 - n. E84 Test for Surface Burning Characteristics of Building Materials
- 5. American Welding Society, Inc. (AWS) Publication:
 - a. A5.8 Brazing Filler Metal
- 6. The Copper Development Association, Inc., Publication:
 - a. Copper Tube Handbook
- 7. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Publication:
 - a. SP 58 Pipe Hangers and Supports Materials and Design
 - b. SP 69 Pipe Hangers and Supports Selection and Application

- c. SP70 Cast Iron Gate Valves, Flanged and Threaded Ends
- d. SP80 Bronze Gate, Globe, Angle and Check Valves
- e. SP83 Carbon Steel Pipe Unions Socket Welding and Threaded
- 8. National Electrical Manufacturers Association (NEMA) Publication:
 - a. MG1 Motors and Generators
 - b. ICS1 Industrial Control and Systems
 - c. ICS2 Industrial Controls Devices, Controllers and Assemblies
 - d. ICS6 Enclosures For Industrial Controls and Systems
- 9. Underwriters Laboratories, Inc. (UL) Publication:
 - a. 109 Tube Fittings for Flammable and Combustible Fluids, Refrigerants and Marine Use
 - b. 207 Refrigerant-Containing Components and Accessories
 - c. 429 Electrically Operated Valves
 - d. 484 Room Air Conditioners
 - e. 873 Temperature Indicating and Regulating Equipment
 - f. 1995 Heating and Cooling Equipment
 - g. 2182 Standard for Refrigerants
- 10. Uniform Fire Prevention and Building Code of New York State Publication:
 - a. 2020 Energy Conservation Construction Code
 - b. 2020 Mechanical Code

1.03 SUBMITTALS

- A. Manufacturer's Data:
 - 1. Ductless Split Air Conditioning Units
 - 2. Refrigerant Piping and Specialties
 - a. Piping and Fittings
 - b. Valves
 - c. Piping Accessories
 - d. Hangers and Supports
 - e. Sight Glass
 - f. Filter Driers
 - g. Control Valves and Accessories
 - h. Pressure Gauges
 - i. Strainers
 - j. Thermal Expansion Valves
 - k. Thermometers
 - 3. Pipe Insulation:
 - a. Insulation
 - b. Jackets
 - c. Vapor barrier materials
 - d. Accessory materials

- B. Operation and Maintenance Manuals:
 - 1. Ductless Split Air Conditioning Units

1.04 SAFETY STANDARD

- A. Design, manufacture, and installation of mechanical refrigeration equipment shall conform to ASHRAE 15.
- B. Refrigerant Piping Safety: ANSI 15.
 - 1. Refrigerant Handling: Follow safety regulations and refrigerant manufacturer's instructions to prevent hazardous exposure to personnel.
 - 2. Rotating Equipment Safety: Fully guard couplings, motor shafts, gears and other exposed rotating or rapidly moving parts in accordance with ASME B15.1. The guards shall be cast iron or expanded metal. Guard parts shall be rigid, secured, and readily removable without disassembling the guarded unit.
- C. Flame Spread and Smoke Developed Ratings: In accordance with NFPA 255, ASTM E84 or UL 723, the materials shall have a flame spread rating of not more than 25 and a smoke developed rating of not more than 50.
 - 1. Materials Tests: Test factory applied materials as assembled. Field applied materials may be tested individually. Use no fugitive or corrosive treatments to impart flame resistance. UL label or satisfactory certified test report from a testing laboratory will be required to indicate that fire hazard ratings for materials proposed for use do not exceed those specified. Flame proofing treatments subject to deterioration due to effects of moisture or high humidity are not acceptable.
 - 2. Materials Exempt From Fire Resistant Rating: Nylon anchors.

1.05 CORROSION PREVENTION:

- A. Special protection is not required for equipment that has a zinc coating conforming to ASTM A386 or a duplex coating of zinc and paint. Where expressly stipulated in equipment requirements paragraphs below, the affected equipment items shall be protected by the manufacturer with a corrosion inhibiting coating or paint system that has been proved capable of satisfactorily withstanding the following test. Test method shall be ASTM B117. Period of test shall be 125 hours for equipment intended for installation indoors; test period shall be 500 hours for equipment which will be installed outdoors or which will be otherwise subjected to marine atmosphere. Each specimen shall have a standard scratch as defined in ASTM D1654.
 - 1. Corrosion Criteria: Upon completion of exposure, coating or paint shall show no indication of deterioration or loss of adhesion, nor shall there be indication of rust or corrosion extending further than 1/8 inch on either side of original scratch.

2. Thickness of Coating: Thickness of coating or paint system on the actual equipment shall be identical to that on the test specimens with respect to materials, conditions of application, and dry film thickness.

1.06 MOTORS

A. Motor starters shall conform to NEMA ICS1 and NEMA ICS2. Determine specific motor characteristics to insure provision of correctly sized starters and overload heaters. Motors shall be designed to operate at full capacity with a voltage variation of plus or minus 10 percent of the motor voltage rating. Motor size shall be sufficient for the duty to be performed and shall not exceed its full load nameplate current rating when driven equipment is operated at specified capacity under the most severe conditions likely to be encountered. When motor size provided differs from the size indicated or specified, the Contractor shall make the necessary adjustments to the wiring, disconnect devices, and branch circuit protection to accommodate the equipment actually provided.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Ductless Split Air Conditioning Units: Provide a split air-conditioning system consisting of ductless units with wall-mounted evaporator section and associated decoration panel, wall-mounted controller/thermostat, remote controller, and outdoor condenser/compressor unit. The separate assemblies shall be designed to be used together and ratings shall be based on the use of the matched assemblies. The units shall be independently tested and listed with UL or ETL and shall bear the appropriate listing labels. The units have a minimum SEER of 21 in accordance with AHRI Standard 210. A full charge of the appropriate refrigerant, R410A shall be provided. Units shall meet or exceed all specified and scheduled operating parameters. Manufacturer shall be as by Trane Model TPKA and TRUY, or approved equal.
 - 1. Indoor Unit: The indoor unit shall be completely factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, condensate drain pan, control circuit board and fan motor. The unit shall have a self-diagnostic function, time delay mechanism, an auto restart function, an emergency operation function and a test run switch. Indoor unit and refrigerant pipes shall be charged with dehydrated air, instead of refrigerant, before shipment from the factory.
 - a. Cabinet: The casing shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation, and be wall mounted with vane setting for airflow direction control and auto fan speed mode.

- b. Mounting Provisions: Provide unit with all necessary brackets, isolators, and hardware to permit mounting as indicated.
- c. Fan and Motor: The evaporator fan shall be an assembly with a statically and dynamically balanced cross flow fan direct driven by a single motor with permanently lubricated bearings and thermally protected. The indoor fan shall consist of a minimum of three speeds. Unit shall have adjustable motorized louvers with the ability to change the airflow from horizontally and vertically.
- d. Filter: Return air shall be filtered by means of a washable filter with mildew proof resin and antibacterial treatment, easily removable without the use of tools and without removing the unit from its mounts. Contractor is responsible to ensure there is sufficient clearance to replace the filter while the unit is installed.
- e. Coil: The evaporator coil shall direct expansion type constructed of copper tubes expanded into aluminum fins to form a mechanical bond. The coils shall be pressure tested at the factory. A condensate pan and drain shall be provided under the coil with integral condensate pump and built in drain pan overflow safety alarm. A thermistor shall be located on the liquid and gas line.
- f. Control: The indoor unit shall include a self-diagnostic function. The microprocessor located in the remote 7-day programmable thermostat shall have the capability of sensing return air temperature and indoor coil temperature, receiving and processing commands from the controller, providing emergency operation and controlling the outdoor unit. The system shall be capable of automatically restarting when power is restored after power interruption.
- 2. Outdoor Unit: The outdoor unit shall be designed specifically for use and packaged with the indoor units from the manufacturer. The outdoor unit shall interface with the indoor units and perform all functions necessary for operation. The outdoor unit shall be completely factory assembled, piped and wired. Each unit shall be run tested at the factory.
 - a. Cabinet: The casing shall be fabricated of galvanized steel,
 bonderized and finished with a powder-coated baked enamel.
 Provide unit with wall mounting bracket of powder-coated steel as a factory-made accessory to the outdoor unit.
 - b. Fan and Motor: The unit shall be furnished with a direct drive propeller type fan and the unit shall have a horizontal discharge airflow. The motor shall have thermal overload protection and utilize permanently lubricated bearings. The fan motor shall be mounted for quiet operation. The fan shall be provided with a raised guard to prevent contact with moving parts.
 - c. Compressor: The compressors shall be of a high performance hermetically sealed scroll type, variable speed inverter driven, and one on/off control. Unit shall be capable of operating at a

- temperature range of 0°F to 115°F. The compressor shall be equipped with a high pressure switch, over- current relay, inverter overload protector, fusible plugs, and internal thermal overload and shall be mounted to avoid the transmission of vibration. The unit shall be equipped with wind baffles for low ambient operation and hail guard.
- d. Coil: The condenser coil shall be of nonferrous construction with plate fins on copper tubing. The coil shall be protected with an integral metal guard. Refrigerant flow from the condenser shall be controlled by means of an electronic expansion valve.
- Control: Operation of the outdoor unit shall be controlled by a e. remote wired, 7-day programmable controller.
- В. Refrigerant Piping, Fittings, and Accessories:
 - Refrigerant Piping: Dimensions and material requirements for pipe, pipe fittings and components shall conform to ANSI 15 and ANSI B31.5 and shall be compatible with fluids used and capable of withstanding the pressures and temperatures of the service. Tubing used for refrigerant service shall be cleaned, sealed, capped, or plugged prior to shipment from the manufacturer's plant.
 - Field Assembled Piping Copper Pipe and Fittings: Seamless copper tubing, hard drawn, Type K or L for exposed above ground use, ASTM B88. Fittings for copper tubing shall be wrought copper, brazing, or solder joint type, ANSI B16.22. Soft annealed copper tubing conforming to ASTM B280 may be used where flare connections to equipment are required only in nominal sizes less than 1 inch.
 - b. Factory Charged Tubing - Tubing shall be extra soft, deoxidized, bright annealed copper conforming to ASTM B280, factory dehydrated and furnished with a balanced charge of refrigerant recommended by the manufacturer of equipment being connected. The tubing shall contain quick-connectors with caps or plugs to protect couplings. Include couplings for suction and liquid line connections of the indoor and outdoor sections.
 - Joints: Joints shall be brazed, flared or flanged (ANSI 150 lb c. Steel).
 - d. Fittings: ANSI 16.22 for solder-joint fittings. UL 109 for flared tube fittings.
 - Brazing Materials: AWS 5.8 brazing filler metal type BAg 5 with e. AWS Type 3 flux, except type BCuP 5 or BCuP 6 may be used for brazing copper-to copper joints.
 - f. Soldering Materials: ASTM B32, Grade Sb5, tin antimony alloy. Soldering flux shall consist of petrolatum base impregnated with zinc and ammonium chlorides.

2. Valves:

- a. Ball Valves 1/2 Inch Through 2-5/8 Inches (ODS): Furnish UL listed, full port ball valves, forged brass body, stainless steel stock plate, brass ball with internal relief port, bi-directional, suitable for use with refrigerant type (as required) over a temperature range from -40°F to 300°F and a maximum operating pressure of 700 psig. Furnish with forged brass body solder ends and mechanical stop to ensure positive open or closed position. Seals shall be dual at each end constructed of Teflon. Manufacture shall be as by Sporlan EBV Series, or approved equal.
- b. Thermal Expansion Valves (TXV): Furnish thermal expansion valves for refrigerant type as scheduled on the Contract Drawings. Expansion valves shall have replaceable, interchangeable components and external superheat adjustment. Cages shall be interchangeable. Valves shall be as manufactured by Alco Controls, Series T, or approved equal.
- c. Refrigerant Solenoid Valves: Provide two-way normally closed diaphragm valves, U.L. listed, suitable for use with refrigerant type (as required). Valves shall be provided with copper extension tubes sized as required. All valves shall have full ID port size with maximum operating pressure of 300 psi, and operable in any position. Valve control voltage shall be 120V AC. Manufacturer shall be as by Emerson Climate Technologies, Model 240RA, or approved equal.
- 3. Sight Glass: Furnish a moisture-liquid indicator with removable cartridge that changes color when wet to indicate moisture. Furnish line size with solder ends suitable for use with refrigerant type (as required). Manufacture shall be as by Emerson Climate Technologies (Type AMI-1SS), or approved equal.
- 4. Liquid Filter-Drier: Furnish steel shell filter-drier with forged tongue-and-groove flanged end suitable for use with refrigerant type (as required) and maximum rated pressure of 650 psig. Core shall be replaceable type.

 Manufacture shall be as by Sporlan Valve Co. (Catch-All Type C, RC-4864 core), or approved equal.
- 5. Suction Filter-Drier: Furnish steel shell filter-drier with forged tongue-and-groove flanged end suitable for use with refrigerant type (as required). Provide each filter dryer with an activated core element and a felt type element. Manufacture shall by as by Sporlan Valve Co. (Catch-All Type C, RC-4864 activated core element, RFE-48-BD felt element), or approved equal.
- 6. Flexible Connector: Provide braided bronze-wire construction with corrugated phosphorus bronze annular hose and copper tube solder ends. Connectors shall be line sized with a maximum working pressure of 340 psig (liquid lines) or 245 psig (suction lines). Manufacture shall be as by Superior Valve Co., or approved equal.

- C. Piping Systems Insulation: Unless otherwise specified, insulate refrigerant suction piping, all fittings, flanges, and valves, except valve stems, hand wheels, and operators. Use factory premolded, precut, or field fabricated insulation of the same thickness and conductivity as used on adjacent piping. Insulation exterior shall be factory cleanable, grease resistant, non-flaking and non-peeling. Insulation material shall be ASTM C534 flexible unicellular, Type I or II, and shall have a wall thickness of no less than 1-1/2 inches.
 - 1. Flexible Unicellular Insulation: ASTM C534. The minimum density limit of 4.5 pounds per cubic foot may be waived if all other characteristics of the standard are met.
 - 2. Vinyl Lacquer piping insulation finish: Two coats of vinyl lacquer finish or equivalent according to the manufacturer's recommendations for unicellular insulation located outside.
 - 3. Adhesive for Securing Insulation to Metal Surfaces and Vapor Barrier Lap Adhesive (For Use in Building Interior Only): ASTM C916, Type I (an adhesive in which the vehicle is nonflammable in liquid (wet) state and which will pass the edge burning test), or Type II (An adhesive in which the vehicle is nonflammable in the liquid (wet) state and which will not pass the edge burning test).
 - 4. Accessories:
 - a. Staples: ASTM A167, Type 304 stainless steel outside clinch type.
 - b. Insulation Bands: 3/4 inch wide; 0.018-inch stainless steel.
 - c. Anchor Pins: Provide anchor pins and speed washers recommended by the insulation manufacturer.
 - d. Glass Cloth and Tape: Tape shall be 4 inch wide rolls. Class 3 tape shall be 4.5 ounces per square yard. In lieu of glass cloth and tape, open weave glass membrane may be used.
 - e. Wire: Soft annealed stainless steel, 0.047 inch nominal diameter.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Ductless Split System: ARHI 260, and as specified herein. Install system as indicated, in accordance with the requirements of ASHRAE 15, and as recommended in the manufacturer's installation and operational instructions.
 - 1. General: Install equipment and components in a manner to insure proper and sequential operation of the equipment and equipment controls. Installation of equipment not covered herein or in manufacturer's instructions shall be installed as recommended by manufacturer's representative.
 - 2. Provide proper foundations for mounting of equipment, accessories, appurtenances, piping and controls including, but not limited to, supports, vibration isolators, stands, guides, anchors, clamps and brackets. Foundations for equipment shall conform to equipment manufacturer's

recommendation, unless otherwise indicated on drawings. Set anchor bolts and sleeves accurately using properly constructed templates. Anchor bolts shall be of adequate length and provided with welded on plates on the head end embedded in the concrete. Level equipment bases, using jacks or steel wedges, and neatly grout in with a nonshrinking type of grouting mortar. Locate equipment to allow working space for all necessary servicing such as shaft removal, disassembling compressor cylinders and pistons, replacing or adjusting drives, motors, or shaft seals, access to automatic controls, refrigerant charging, lubrication, oil draining and working clearance under overhead lines. Provide electric isolation between dissimilar metals for the purpose of minimizing galvanic corrosion.

- 3. Electrical Work: Electric motor driven equipment specified herein shall be provided complete with motors, motor starters, and controls. Electrical equipment and wiring shall be in accordance with Division 26. Provide manual or automatic control and protective devices required for the operation herein specified and any control wiring required for controls and devices but not indicated.
- B. Refrigerant Piping: Install piping and piping components to ensure proper and efficient operation of the equipment and controls and in accordance with manufacturer's printed instructions. Provide proper supports for the mounting of vibration isolators, stands, guides, anchors, clamps and brackets. Arrange piping connections to equipment so that removal of equipment or components of equipment including tube withdrawal from chillers, pump casing, shaft seals and similar work can be accomplished with the least amount of disassembly or removal of the piping system. Provide piping connected to equipment with vibration isolators with flexible connections which shall conform to vibration and sound isolation requirements for the system. Electric isolation shall be provided between dissimilar metals to reduce the rate of galvanic corrosion.
 - 1. Cut to the measurements established at the site and work into place without springing or forcing. Install piping with line flexibility included to absorb the expansion and contraction due to temperature changes of the piping systems. Piping line flexibility shall be achieved by the use of pipe bends or loops.
 - 2. Pipe Bends: Acceptable in lieu of pipe fittings where space permits. The pipe bends shall have a uniform radius of at least five times the nominal pipe diameter. The pipe bends shall be free of any flattening, wrinkling, or thinning of the pipe walls other than minor external surface distortions. In occupied space, pipe bend radii shall not exceed five times the nominal pipe diameter.
 - a. Pipe bends for annealed copper tubing in lieu of fittings may be used where space permits. The bends for annealed copper tubing shall conform to "Copper Tube Handbook" published by the Copper Development Association, Inc. The tubing bends shall be free of any appreciable flattening, wrinkling, or thinning of the tubing walls.

- 3. Brazing and Soldering:
 - a. Brazing and Brazing Procedure Qualification for refrigerant piping systems shall conform to ANSI B31.5. Brazing procedure for joints shall be in accordance with the procedure as outlined in the "Copper Tube Handbook" published by the Copper Development Association, Inc., except that during the brazing operation the tubing shall be protected from forming an oxide film on the inside of the tubing by slowly flowing dry nitrogen to expel the air.
 - b. Soldering: The preparation and procedures for the soldering of joints shall conform to ANSI B31.9 and ANSI B31.5 and shall be in accordance with the procedure as outlined in the "Copper Tube Handbook" published by the Copper Development Association, Inc.
- 4. Dielectric Unions or Flanges: Provide between ferrous and nonferrous piping, equipment, and fittings; except that bronze valves and fittings may be used without dielectric couplings for ferrous to ferrous or nonferrous to-nonferrous connections. Flanges and unions shall conform to the requirements of ANSI B16.10.
- 5. Pipe Hangers and Supports: Where not shown, design and fabrication of pipe hangers, supports, and welding attachments shall conform to MSS SP 58. Hanger types and supports for bare and covered pipes shall conform to MSS SP 69 for the system temperature range. Unless otherwise indicated, horizontal and vertical piping attachments shall conform to MSS SP 58. Provide metal protection shields and inserts for insulated piping.
 - a. Maximum spacing between supports:
 - 1) Vertical Piping: Support metal piping at no more than 10-foot intervals
 - 2) Horizontal Piping: For piping 1-1/2" and under, spacing between supports shall not exceed 6 inches.
- 6. Pipe Sleeves: Provide sleeves where pipes and tubing pass through masonry or concrete walls, floors, roof, and partitions. Sleeves in outside walls below and above grade, in floor, or in roof slabs, shall be steel pipe. Sleeves in partitions shall be zinc coated sheet steel having a nominal weight of not less than 0.906 pound per square foot. Space between pipe, tubing, or insulation and the sleeve shall be not less than 1/4 inch. Hold sleeves securely in proper position and location before and during construction. All sleeves shall be of sufficient length to pass through entire thickness of walls, partitions, or slabs. Sleeves in floor slabs shall extend 2 inches above the finished floor. Firmly pack space between the pipe or tubing and the sleeve with oakum and calk on both ends of the sleeve with elastic cement.
- 7. Fabrication and Assembly of Piping and Components: Fabrication, heating, soldering, brazing, and welding of piping and components shall conform to ANSI B31.5 and ANSI 15 and as specified herein. Clean, seal, plug, or cap piping prior to delivery to the site. Refrigerant piping shall be

- brazed with 15 percent silver solder in accordance with AWS A5.8, minimum melting point 1500 degrees F for pressures up to 120 psi. Refrigerant connections to components shall have stop valves to permit servicing of the components without pumping out other than the components themselves. Refrigerant piping shall slope in the direction of refrigerant flow.
- 8. Refrigerant Driers: Install in the main liquid line leaving the high pressure receiver or condenser receiver, with isolating service valves and valved bypass lines which are the same size as the liquid line in which the drier is installed. Install driers with the cover accessible for removing the cartridge.
- 9. Sight Glass Liquid Indicator: Install in the main high pressure liquid line. Indicator connection shall be the same size as the liquid line in which installed.
- 10. Cleaning: Clean all piping and components of scale and thoroughly flush out all foreign matter. Clean all strainers and valves thoroughly. Wipe equipment clean, removing all traces of oil, dust, dirt, or paint spots.

 Maintain the system in this clean condition until final approval.
- C. Piping Insulation: Do not insulate materials until all system tests have been completed and surfaces to be insulated have been cleaned of dirt, rust, and scale and dried. Modify insulation to avoid obstruction with valve handle, safety relief, etc. Allow adequate space for pipe expansion. Insulation shall be continuous through sleeves, wall and ceiling openings. Extend all surface finishes to protect all surfaces, ends, and raw edges of insulation. Apply coatings and adhesives at the manufacturer's recommended coverage per gallon. Individually insulate piping. Keep insulation dry during the application of any finish. Bevel and seal the edges of exposed insulation.
 - 1. Flexible Unicellular Insulation: Bond cuts, butt joints, ends, and longitudinal joints with adhesive. Miter 90 degree turns and elbows, tees, and valve insulation. Where pipes penetrate fire walls, provide mineral fiber insulation inserts and sheet metal sleeves. Insulate flanges, unions, valves, and fittings in accordance with manufacturer's published instructions. Apply two coats of vinyl lacquer finish to flexible unicellular insulation in outside locations.
 - 2. Hangers and Anchors: Pipe insulation shall be continuous through pipe hangers. Where pipe is supported by the insulation, provide MSS SP 58, Type 40 galvanized steel shields or MSS SP 58, Type 39 protection saddles conforming to MSS SP 69.

3.02 FIELD TESTS

A. Tests: All tests shall be performed by and everything required for test shall be furnished by the Contractor, including personnel. Equipment and materials certified as having been successfully tested by the manufacturer in accordance with referenced specifications and standards will not require retesting before

installation. Equipment and materials not tested at the place of manufacture shall be tested before or after installation, as applicable, where necessary to determine compliance with referenced specifications and standards.

- 1. Leak Testing: Upon completion of installation of the air conditioning equipment, test all factory and field installed refrigerant piping with an electronic type leak detector to acquire a leak tight refrigerant system. If leaks are detected at time of installation or during the guarantee period, remove the entire refrigerant charge from the system, correct the leaks, and retest the system.
- 2. Evacuation, Dehydration, and Charging: After field charged refrigerant system is found to be without leaks or after leaks have been repaired on field charged and factory charged systems, evacuate the system using a reliable gage and a vacuum pump capable of pulling a vacuum of at least 1 mm Hg absolute. Evacuate system in accordance with the triple evacuation and blotter method or, in accordance with equipment manufacturer's printed instructions. System leak testing, evacuation, dehydration, and charging with refrigerant shall comply with the requirements contained in ARI 260.
- 3. Startup and Operation Tests: Test the air conditioning systems and systems components for proper operation. Adjust safety and automatic control instruments as necessary to insure proper operation and sequence. The operational test shall be not less than 8 hours.
- 4. Performance Tests: Upon completion of evacuation, charging, startup, final leak testing, and proper adjustment of controls, systems shall be performance tested to demonstrate compliance with performance and capacity requirements. Test systems for not less than 8 hours, during which time hourly readings shall be recorded. At the end of the test period, the readings shall be averaged and the average shall be considered to be the system performance.

3.03 INSTRUCTION OF OPERATING PERSONNEL

A. Upon completion of the work, and acceptance of the installation, and at a time designated by the Owner, the services of a competent technician regularly employed or authorized by the manufacturer of the system shall be provided for instructing personnel in the proper operation, maintenance, safety and emergency procedures. The period of instruction shall be not less than four hours. The training shall be conducted at the job site during actual operation and coordinated with the Owner one week in advance.

END OF SECTION

SECTION 26 05 01

ELECTRICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Electrical General Requirements, as shown on the Plans, as specified and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. Federal Specification (Fed. Spec.):
 - a. L-P-387A Plastic Sheet, Laminated, Thermosetting (for Design Plates)
 - 2. American National Standards Institute (ANSI) Publications:
 - a. C37.20 Switchgear Assemblies, Including Metal-Enclosed Bus
 - b. Z35.1 Accident Prevention Signs
 - 3. Institute of Electrical and Electronics Engineers (IEEE) Publication:
 - a. 100 Standard Dictionary of Electrical and Electronics Terms
 - 4. National Electrical Manufacturers Association (NEMA) Publication:
 - a. ICS 6 Enclosures for Industrial Controls and Systems
 - 5. National Fire Protection Association (NFPA) Publications:
 - a. 70B Electrical Equipment Maintenance
 - b. 70 National Electrical Code

1.03 APPLICATION

A. This Section applies to all sections of Division 26, "Electrical", of this project except as specified otherwise in each individual section.

1.04 DEFINITION OF ELECTRICAL TERMS

A. Unless otherwise specified or indicated, electrical terms used in these Specifications, and on the drawings, shall be as defined in IEEE Standard No. 100.

1.05 ELECTRICAL UTILITY COORDINATION & ELECTRICAL SYSTEM VERIFICATION

- A. Contractor shall coordinate all pre and post construction activities with the Electrical Utility (EU) provider per the EUs written bulletin/specification requirements. For new service, Contractor must submit a complete set of shop drawings of the new service entrance equipment for the utility's approval.
- B. Prior to shop drawing submittals, prior to commencing any demolition and/or prior to commencing any new construction activities, electrical characteristics for all existing and/or proposed electrical systems (including service, premises wiring systems and/or separately derived systems) shall be verified by this Contractor.
- C. The Contractor shall coordinate and confirm, in writing, the following information from the Electrical Utility prior to commencement of any work under this Contract:
 - 1. Voltage
 - 2. Number of phases
 - 3. Type of system grounding
 - 4. Metering arrangement and Style
 - 5. Electrical Service Capacity
- D. Should the Contractor's verification of any existing or proposed electrical system indicate a discrepancy with the Contract Documents, report them immediately to the Owner and/or Owners designated representative.
- E. Submitting shop drawings and/or commencing any work under this Contract prior to all electrical systems verification/confirmation as required above signifies that Contractor accepts all existing and proposed electrical system characteristics and conditions.

1.06 SUBMITTALS

A. Obtain approval before procurement, fabrication, or delivery of items to the job site. Partial submittals will not be acceptable and will be returned without review. Submittals shall include the manufacturer's name, trade name, place of manufacture, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable Federal, Military, industry, and technical society publication references, and other information necessary to establish contract compliance of each item to be furnished. Furnish a minimum of six (6) copies of shop drawings for each major device specified or electronic shop drawings as specified herein. All hard copy shop drawings shall be a minimum of 8.5 inches by 11 inches in size.

- B. Shop Drawings: In addition to the requirements specified elsewhere, shop drawings shall meet the following requirements. Drawings shall include complete ratings information, wiring diagrams, and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to assure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices. If equipment is disapproved, revise drawings to show acceptable equipment and resubmit.
- C. Manufacturer's Data: Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts.
- D. Publication Compliance: Where equipment or materials are specified to conform to industry and technical society publications of organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), and Underwriters' Laboratories Inc. (UL), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word "shall" had been substituted for "should" wherever it appears. In lieu of the label or listing, submit a certificate from an approved independent testing organization, adequately equipped and competent to perform such services, stating that the item has been tested in accordance with the specified organization's test methods and that the item conforms to the specified organization's publication.
- E. Submittals Required: Supply shop drawing submittal information as otherwise noted in each individual section.
- F. Electronic Shop Drawings: If allowed by other sections of these Contract Documents, electronic submittals shall be submitted to Engineer in accordance with procedures outlined in these Contract Documents, as established at a preconstruction meeting and/or per Engineer's written instructions.
 - 1. Electronic shop drawings shall be submitted in an OCR (searchable) PDF file format or per Engineer's instructions. Each shop drawing shall be a single electronic file with correct orientation of all sheets contained within.
 - 2. Electronic shop drawings shall be scaled to print at 8.5 inches by 11 inches (for general information, manufacturer's product data, etc.) and as required for drawings (layout drawings, coordination drawings, schematics, site drawings, electronic copy), except as specified otherwise.
 - 3. Engineer shall make final determination on clarity of electronic shop drawings and will reject electronic shop drawing if resolution is not acceptable.

1.07 OPERATION AND MAINTENANCE MANUAL

- A. Submit as required for systems and equipment indicated in the technical sections. Furnish three (3) copies, bound in hardback binders or an approved equivalent. Furnish one complete manual prior to performance of systems or equipment tests, and furnish the remaining manuals prior to contract completion. Inscribe the following identification on the cover: the words "OPERATION AND MAINTENANCE MANUAL", the name and location of the system, equipment, building, name of Contractor, and contract number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the system or equipment. Include a table of contents and assemble the manual to conform to the table of contents, with the tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in. The manual shall include:
 - 1. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the system or equipment.
 - 2. A control sequence describing startup, operation, and shutdown.
 - 3. Description of the function of each principal item of equipment.
 - 4. Installation and maintenance instructions.
 - 5. Safety precautions.
 - 6. Diagrams and illustrations.
 - 7. Testing methods.
 - 8. Performance data.
 Lubrication schedule including type, grade, temperature range, and frequency.
 - 9. Parts list. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.
 - 10. Appendix: List qualified permanent servicing organizations for support of the equipment, including addresses and certified qualifications.
- B. Electronic Version: Provide a complete O&M as a single PDF file, or multiple files if there are significant amounts of data. PDF file(s) shall be an optical character recognition (OCR) or searchable file.

1.08 SPARE PARTS

A. Provide spare parts for all equipment installed under this Contract, as indicated in individual specification sections.

1.09 POSTED OPERATING INSTRUCTIONS

A. Furnish approved operating instructions for systems and equipment indicated in the technical sections for use by operation and maintenance personnel. The operating instructions shall include wiring diagrams, control diagrams, and control sequence for each principal system and equipment. Print or engrave operating instructions and frame under glass or in approved laminated plastic.

Post instructions as directed. Attach or post operating instructions adjacent to each principal system and equipment including startup, proper adjustment, operating, lubrication, shutdown, safety precautions, procedure in the event of equipment failure, and other items of instruction as recommended by the manufacturer of each system or equipment. Provide weather-resistant materials or weatherproof enclosures for operating instructions exposed to the weather. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.10 INSTRUCTION TO OWNER'S PERSONNEL

A. Where indicated in the technical sections, furnish the services of competent instructors to give full instruction to Owner's personnel in the adjustment, operation, and maintenance of systems and equipment, including pertinent safety requirements as required. Each instructor shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Owner for regular operation. The number of man days (8 hours) of instruction furnished shall be as specified in each individual section.

1.11 LAYOUT OF THE WORK

- A. Coordinate the proper relation of the work to the building structure, existing utilities and to the work of all trades. Visit the premises and become familiar with the dimensions in the field, and advise the Owner's Representative of any discrepancy before performing any work.
 - 1. Contract Drawings: The Contract Drawings represent the general intent as to layout and equipment arrangements. All locations and dimensions shown shall be field verified and minor alterations made if so required. Where dimensions are not given for the location and arrangement of mechanical systems, locations may be assumed to be approximate, and may be altered if required. Major modifications to the indicated arrangements shall be approved by the Owner's Representative prior to the installation of mechanical systems. Schematic diagrams represent the overall system requirements and do not necessarily indicate the physical orientation, location or dimensions of that system.

- 2. Coordination Drawings: Each Contractor and/or his Subcontractor shall submit drawings showing the coordination of work between work of their respective trade and with the work of the other trades and structural and architectural elements of the work. Items to be shown on the drawings shall include, but are not limited to, ductwork systems, control dampers, HVAC piping, plumbing piping, plumbing fixtures, fire protection piping, sprinkler head layout, smoke detectors, heat detectors, light fixtures, electrical equipment, pull boxes, and conduit runs that utilize a 1-inch diameter or larger conduit. Drawings shall be in sufficient detail to show overall dimensions of related items, clearances and relative location of work in the allotted spaces. Drawings shall indicate any routing changes that are required to be made to resolve clearance problems between the elements of various trades.
 - a. Each Contractor and/or his Subcontractor shall be solely responsible for the generation of the coordination drawings including distribution to, and collection of related information from each Contractor or Subcontractor. Drawings shall be produced in AutoCAD format and submitted on sheets no larger than 24 x 36-inches. Upon written request, background drawings will be provided to the Contractor for the purpose of coordination drawing development. The Owner or Engineer does not warranty the accuracy of any background drawings provided and the Contractor shall be responsible to field verify all background drawings. Submit complete drawings to Engineer a minimum of one week prior to the intended start of the related construction.
- 3. Record Drawings: The Contractor shall maintain a record of the progress of the work and shall submit three (3) hard copy sets of As-Built Drawings upon completion of the project.

1.12 DELIVERY AND STORAGE

A. Handle, store, and protect equipment and materials in accordance with the manufacturer's recommendations and with the requirements of NFPA 70B, Appendix I, titled "Equipment Storage and Maintenance During Construction". Replace damaged or defective items with new items.

1.13 SPECIAL CONDITIONS

A. When performing work within active areas, the Contractor shall be responsible to coordinate with the Owner regarding planned interruptions to electrical services and/or road access. Contractor must maintain in service the existing electrical services at the existing property unless otherwise coordinated with the Owner.

- B. Protection of Existing Work: The Contractor shall take all necessary precautions to ensure against damage to existing work to remain in place, or to be reused. The Contractor shall ensure that structural elements are not overloaded and additional structural supports required as a result of any cutting, removal or demolition work performed under any part of this Contract are added. Unless specified otherwise, the Contractor shall submit for review detailed shop drawings applicable to the Contract work for all structural supports, hangers and related devices, structural modifications, temporary rigging and associated rigging plans. Commencement of such work prior to the submission and review of applicable shop drawings shall be at the sole risk of the Contractor.
- C. Upon damage to existing equipment, buildings, and/or structures, the Contractor shall immediately notify the Owner. All damages shall be repaired by the Contractor, or shall be replaced if beyond repair, to match the existing to the Owner's satisfaction.
- D. Protection of Buildings from the Weather: The interior of the buildings and all materials and equipment shall be protected from the weather at all times.
- E. Protection of Personnel: Where the safety of non-contractor personnel is endangered in the area of the work, barricades shall be used. Additional protection shall be provided if required, to preserve the safety of non-contractor personnel in the immediate area of the work.
- F. Contractor shall maintain open road access at all times to the existing property. Contractor shall stage construction such that at least one lane of the existing access road is open at all times. Contractor shall coordinate with the Owner a minimum of one week prior to any planned road closings.
- G. Construction in Existing Buildings: Verify with Owner expected routing of new wire and/or conduit within existing equipment or buildings prior to field construction of systems. Coordinate with the Owner a minimum of ten (10) working days prior to any planned disruption of existing working systems.

1.14 CATALOGED PRODUCTS/SERVICE AVAILABILITY

A. Materials and equipment shall be current products by manufacturers regularly engaged in the production of such products. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The 2-year period shall be satisfactorily completed by a product for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory

field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished. The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the Contract.

1.15 MANUFACTURER'S RECOMMENDATIONS

A. Where installation procedures or any part thereof are required to be in accordance with manufacturer's recommendations, furnish printed copies of the recommendations prior to installation. Installation of the item shall not proceed until recommendations are received. Failure to furnish recommendations shall be cause for rejection of the equipment or material. Obtain manufacturer's recommendations from the Owner for equipment and/or material provided by the Owner.

1.16 MOTORS AND MOTOR CONTROLS FOR MECHANICAL EQUIPMENT

A. The electrical components of mechanical equipment, such as motors, motor starters, control or push button stations, float or pressure switches, solenoid valves, and other devices functioning to control mechanical equipment, and control wiring and conduit for circuits rated 100 volts or less, are specified in the section covering the associated mechanical equipment, rather than in Division 26, unless otherwise shown. The interconnecting power wiring and conduit, control wiring rated 120 volts (nominal) and conduit, and the electrical power circuits shall be furnished and installed under Division 26 in accordance with other sections and/or as shown on the Contract Drawings.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. All materials, equipment, and devices shall, as a minimum, meet the requirements of UL where UL standards are established for those items, and the requirements of NFPA 70. All items shall be new unless specified or indicated otherwise.

2.02 NAMEPLATES

A. Fed. Spec. L-P-387. Provide laminated plastic nameplates for each panelboard, equipment enclosure, relay, switch, and device. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125-inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the black core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be a minimum of 0.25-inch high normal block style.

B. For sites with power generation equipment: Provide permanent nameplate at service entrance equipment indicating type and location of on-site generation power source (generator, PV, co-gen, etc.) in accordance with NEC Article 705. Provide same nameplate at generation sources main disconnect indication type and location of service entrance equipment.

PART 3 - EXECUTION

3.01 NAMEPLATE MOUNTING

- A. Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.
- B. Provide nameplates for all equipment as required by other sections.
- C. Provide nameplates for all owner furnished equipment that is installed by this Contractor.

3.02 PAINTING OF EQUIPMENT

A. Factory Applied: Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test, except equipment specified to meet requirements of ANSI C37.20 shall have a finish as specified in ANSI C37.20.

3.03 TESTS

- A. General: Perform and record all tests in the presence of the Owner's authorized representative and/or the Engineer. Furnish all instruments and personnel. Perform preliminary tests and correct all defective material and/or workmanship prior to witness of tests. Perform tests as indicated and as otherwise noted in other Sections of the Division 26.
- B. Conduct field tests in the sequence listed below:
 - 1. Insulation Resistance Tests: As required per individual specification sections.
- C. Load Balance Test: Make test by energizing all lighting, motors and other electrical equipment simultaneously for a three-hour period. Alter fuses, circuit breakers, circuit connections, etc., as required for satisfactory performance. Take voltage and amperage readings on each circuit at all panels.

- D. Check the amperage draw, voltage and direction of rotation of each motor in the presence of the equipment contractor and the Owner's representative. Make all necessary changes to obtain proper rotation, motor terminal voltage, motor protection, etc. Revise heater elements as necessary for proper motor protection. Similarly check all other electrically connected equipment.
 - 1. Make the test at a time during the day or night that is mutually satisfactory to the Owner at least one week prior to substantial completion. Make all arrangements and notify all parties in writing at least seventy-two hours prior to the test.
- E. Equipment Operation Test Show by demonstration in service that all circuits are in good operating condition. Cycle all control equipment under load at least five times.
- F. Equipment and apparatus factory tests Manufacturer's normal quality control tests are acceptable, unless specific factory witnessed tests are specified in other sections.
- G. Perform all other field tests as required in individual specification sections.

3.04 CLEANING

- A. When directed, just prior to final acceptance, clean all equipment including, but not limited to, the following:
 - 1. Lighting fixtures, panelboards, control centers, switchgear, receptacles and switch plates Remove all tags and labels; leave ready for use
 - 2. All equipment to be painted, removing all rust, etc., and leave ready for painting
 - 3. Building, by removing all debris, conduits, wire, insulation, cartons, etc., left as a result of this work.

3.05 THIRD PARTY INSPECTION AND MISC SERVICES COORDINATION

- A. Contractor shall provide and pay for inspection of electrical work by an AHJ approved electrical inspection agency.
- B. Contractor shall coordinate with the Owner and the Telephone Company regarding telephone service requirements and connection.
- C. Contractor shall coordinate with the Owner and the Internet Provider regarding telephone service requirements and connection.
- D. Contractor shall coordinate with the Owner regarding connections to existing systems and work within existing buildings and equipment.

3.06 WORK WITHIN EXISTING BUILDINGS

A. Contractor shall install new feeder breakers in existing panels and shall install new conduit and wire systems within existing buildings. Contractor shall use care in installation of new work and shall protect existing work and finishes in his work area. Contractor shall immediately notify Owner of any damages to existing equipment or finishes and shall restore damaged items to Owner's satisfaction.

END OF SECTION

SECTION 26 05 19

WIRING/CABLE, 600 VOLTS AND UNDER

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Under this Section, the Contractor shall furnish all labor, materials, equipment and accessories for Wiring/Cable, 600 Volts and Under, as shown on the Plans, as specified and/or directed.
- B. For type MC cable, refer to Contract Drawings for areas where MC cable is allowed. MC cable shall be allowed only for branch circuit wiring (lighting and receptacles).

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only and shall be the most current version.
 - 1. National Electrical Manufacturers Association (NECA) Publication:
 - a. Standard of Installation
 - 2. International Electrical Testing Association (NETA) Publication:
 - a. ATS Electrical Power Distribution Equipment and Systems
 - 3. National Fire Protection Association (NFPA) Publication:
 - a. 70 National Electrical Code
 - 4. American Society for Testing and Materials (ASTM) Publications:
 - a. B1 Hard-Drawn Copper Wire
 - b. B8 Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
 - c. E14 Fire Tests of Through-Penetration Fire Stops
 - 5. Underwriters Laboratories, Inc. (UL) Publications:
 - a. 854 Service Entrance Cables
 - b. 486A Wire Connector and Soldering Lugs for Use with Copper Conductors
 - c. 486C Splicing Wiring Connectors
 - d. 1569 Metal-Clad Cables

1.03 SUBMITTALS

- A. Product Data: Catalog sheets, specifications and installation instructions.
- B. Specification required test results.

1.04 PRODUCT DELIVERY

- A. Mark and tag insulated conductors and cables for delivery to the site. Include:
 - 1. Contractor's name.
 - 2. Project title and number.
 - 3. Date of manufacture (month & year).
 - 4. Manufacturer's name.
 - 5. Environmental suitability information (listed or marked "sunlight resistant" where exposed to direct rays of sun; wet locations listed/marked for use in wet locations; other applications listed/marked suitable for the applications).

PART 2 - PRODUCTS

2.01 INSULATED CONDUCTORS AND CABLES

- A. Date of Manufacture: No insulated conductor more than one year old when delivered to the site will be acceptable.
- B. Acceptable Companies: American Insulated Wire Corp., BICC General Cable Industries, Inc., Cerro Wire & Cable Co. Inc., Pirelli Cable Corp., Owl Cable Corp., or Southwire Co.
- C. Conductors: Annealed uncoated copper or annealed coated copper in conformance with the applicable standards for the type of insulation to be applied on the conductor. Conductor sizes No. 12 and larger shall be stranded.
- D. Types:
 - 1. Lighting and Power Wiring:
 - a. Insulation: Unless specified or indicated otherwise or required by NFPA 70, power and lighting wires shall be 600-volt, Type THW, THWN, XHHW, or RHW, except that grounding wire may be Type TW. Where lighting fixtures require 90-degree C conductors, provide only conductors with 90-degree C insulation or better.
 - b. Metal-Clad Cable, NFPA 70 Article 334 Type MC:
 - c. Interlocked flexible galvanized steel armor sheath, conforming to UL requirements for type MC metal clad cable.
 - d. Insulated copper conductors, suitable for 600 volts, rated 90°C, one of the types listed in NFPA 70 Table 310-13 or of a type identified for use in Type MC cable.
 - e. Internal full size copper ground conductor with green insulation.
 - f. Acceptable Companies: AFC Cable Systems Inc., Coleman Cable Co.

- g. Connectors for MC cable: AFC Fitting Inc.'s AFC Series, Arlington Industries Inc.'s Saddle grip, or Thomas & Betts Co.'s Tite-Bite with anti-short bushings.
 - MI: AFC Cable Systems' Type MI Cable, or BICC/Pyrotenax Mineral Insulated System 1850 Pyrotenax Cable:
 - a) Copper conductors.
 - b) Sheathing containing asbestos fibers shall not be used.

In corrosive areas where indicated on drawings, utilize the following:

- c) PVC or HDPE jacketing (where shown on drawings).
- d) 600 volt rating.
- e) Fittings and accessories as required for a complete system to suit listing and installation conditions.
- 2. Class 1, 2, 3 Wiring: Minimum size for branch circuits shall be No. 12 AWG; for Class 1 remote-control and signal circuits, No. 14 AWG; and for Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.
- 3. VFD Cables: VFD equipment shall be wired from line side (for standalone VFDs) and load side of VFD (standalone VFDs and MCC VFDs) to motor utilizing VFD rated cable. Cable specifications are as follows:
 - a. 600V UL 1277 Type TC per 2005 NEC Article 336
 - b. Copper Conductors
 - c. Class B Stranding per ASTM
 - d. XLPE Insulation XHHW-2 Rated Circuit Conductors (14 AWG and larger)
 - e. 90°C Wet/Dry
 - f. Class I & II; Division 2 Hazardous Locations
 - g. Overall UL 1685 Vertical Tray Flame Test
 - h. IEEE 1202/383 Vertical Tray Flame Test
 - Overall Shield

2.02 CONNECTORS

A. General:

- 1. Connectors specified are part of a system. Furnish connectors and components, and use specific tools and methods as recommended by connector manufacturer to form complete connector system.
- 2. Connectors shall be capable of continuous operation at the current rating of the cables on which they are used.
- 3. Connectors shall be UL 486 A listed, or UL 486 B listed for combination dual rated copper/aluminum connectors (marked AL7CU for 75 degrees C rated circuits and AL9CU for 90 degrees C rated circuits).

B. Splices:

- 1. Spring Type:
 - a. Rated 105° C, 600V; Buchanan/Ideal Industries Inc.'s B-Cap, Electrical Products Div./3M's Scotchlok Type Y, R, G, B, O/B+, R/Y+, or B/G+, or Ideal Industries Inc.'s Wing Nuts or Wire Nuts.
 - b. Rated 150° C, 600V; Ideal Industries Inc.'s High Temperature Wire-Nut Model 73B, 59B.
- 2. Indent Type with Insulating Jacket: Rated 105° C, 600V; Buchanan/Ideal Industries Inc.'s Crimp Connectors, Ideal Industries Inc.'s Crimp Connectors, Penn-Union Corp.'s Penn-Crimps, or Thomas & Betts Corp.'s STA-KON.
- 3. Indent Type (Uninsulated): Anderson/Hubbell's Versa-Crimp, VERSAtile, Blackburn/T&B Corp.'s Color-Coded Compression Connectors, Electrical Products Div./3M's Scotchlok 10000, 11000 Series, Framatome Connectors/Burndy's Hydent, Penn-Union Corp.'s BCU, BBCU Series, or Thomas & Betts Corp.'s Compression Connectors.
- 4. Connector Blocks: NIS Industries Inc.'s Polaris System, or Thomas & Betts Corp.'s Blackburn AMT Series.
- 5. Resin Splice Kits: Electrical Products Div./3M's Scotchcast Brand Kit Nos. 82A Series, 82-B1 or 90-B1, or Scotchcast Brand Resin Pressure Splicing Method.
- 6. Heat Shrinkable Splices: Electrical Products Div./3M's ITCSN, Raychem Corp.'s Thermofit Type WCS, or Thomas & Betts Corp.'s SHRINK-KON Insulators.
- 7. Cold Shrink Splices: Electrical Products Div./3M's 8420 Series.
- C. Gutter Taps: Anderson/Hubbell's GP/GT with GTC Series Covers, Blackburn/T&B Corp.'s H-Tap Type CF with Type C Covers, Framatome Connectors/Burndy's Polytap KPU-AC, H-Crimpit Type YH with CF-FR Series Covers, ILSCO's GTA Series with GTC Series Covers, Ideal Industries Inc.'s Power-Connect GP, GT Series with GIC covers, NSI Industries Inc.'s Polaris System, OZ/Gedney Co.'s PMX or PT with PMXC, PTC Covers, Penn-Union Corp.'s CDT Series, or Thomas & Betts Corp.'s Color-Keyed H Tap CHT with HTC Covers.
- D. Terminals: Nylon insulated pressure terminal connectors by Amp-Tyco/Electronics, Electrical Products Div./3M, Framatome Connectors/Burndy, Ideal Industries Inc., Panduit Corp., Penn-Union Corp., Thomas & Betts Corp., or Wiremold Co.
- E. Lugs:
 - 1. Single Cable (Compression Type Lugs): Copper, 1 or 2 hole style (to suit conditions), long barrel; Anderson/Hubbell's VERSAtile VHCL, Blackburn/T&B Corp.'s Color-Coded CTL, LCN, Framatome Connectors/Burndy's Hylug YA, Electrical Products Div./3M Scotchlok 31036 or 31145 Series, Ideal Industries Inc.'s CCB or CCBL, NSI

- Industries Inc.'s L, LN Series, Penn-Union Corp.'s BBLU Series, or Thomas & Betts Corp.'s 54930BE or 54850BE Series.
- 2. Single Cable (Mechanical Type Lugs): Copper, one or 2 hole style (to suit conditions); Blackburn/T&B Corp.'s Color-Keyed Locktite Series, Framatome Connectors/Burndy's Qiklug Series, NSI Industries Inc.'s Type TL, Penn-Union Corp.'s VI-TITE Terminal Lug Series, or Thomas & Betts Corp.'s Locktite Series.
- 3. Multiple Cable (Mechanical Type Lugs): Copper, configuration to suit conditions; Framatome Connectors/Burndy's Qiklug Series, NSI Industries Inc.'s Type TL, Penn-Union Corp.'s VI-TITE Terminal Lug Series, or Thomas & Betts Corp.'s Color-Keyed Locktite Series.

2.03 TAPES

A. Insulation Tapes:

- 1. Plastic Tape: Electrical Products Div./3M's Scotch Super 33+ or Scotch 88, Plymouth Rubber Co.'s Plymouth/ Bishop Premium 85CW.
- 2. Rubber Tape: Electrical Products Div./3M's Scotch 130C, or Plymouth Rubber Co.'s Plymouth/Bishop W963 Plysafe.
- B. Moisture Sealing Tape: Electrical Products Div./3M's Scotch 2200 or 2210, or Plymouth Rubber Co.'s Plymouth/Bishop 4000 Plyseal-V.
- C. Electrical Filler Tape: Electrical Products Div./3M's Scotchfil, or Plymouth Rubber Co.'s Plymouth/Bishop 125 Electrical Filler Tape.
- D. Color Coding Tape: Electrical Products Div./3M's Scotch 35, or Plymouth Rubber Co.'s Plymouth/Bishop Premium 37 Color Coding.

E. Arc Proofing Tapes:

- 1. Arc Proofing Tape: Electrical Products Div./3M's Scotch 77, Mac Products Inc.'s AP Series, or Plymouth Rubber Co.'s Plymouth/Bishop 53 Plyarc.
- 2. Glass Cloth Tape: Electrical Products Div./3M's Scotch 27/Scotch 69, Mac Products Inc.'s TAPGLA 5066,, or Plymouth Rubber Co.'s Plymouth/Bishop 77 Plyglas.
- 3. Glass-Fiber Cord: Mac Products Inc.'s MAC 0527.

2.04 WIRE-PULLING COMPOUNDS

A. To suit type of insulation; American Polywater Corp.'s Polywater Series, Electric Products Div./3M's WL, WLX, or WLW, Greenlee Textron Inc.'s Y-ER-EAS, Cable Cream, Cable Gel, Winter Gel, Ideal Industries Inc.'s Yellow 77, Aqua-Gel II, Agua-Gel CW, or Thomas & Betts Corp.'s Series 15-230 Cable Pulling Lubricants, or Series 15-631 Wire Slick.

2.05 TAGS

- A. Precision engrave letters and numbers with uniform margins, character size minimum 3/16 inch high.
- B. Phenolic: Two color laminated engraver's stock, 1/16 inch minimum thickness, machine engraved to expose inner core color (white).
- C. Aluminum: Standard aluminum alloy plate stock, minimum .032 inch thick, engraved areas enamel filled or background enameled with natural aluminum engraved characters.

2.06 WIRE MANAGEMENT PRODUCTS

A. Cable Clamps and Clips, Cable Ties, Spiral Wraps, etc: Catamount/T&B Corp., or Ideal Industries Inc.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install conductors in raceways after the raceway system is completed. Exceptions: Type TC, MI, or other type specifically indicated on the drawings not to be installed in raceways.
- B. No grease, oil, or lubricant other than wire-pulling compounds specified may be used to facilitate the installation of conductors. Completely and thoroughly swab raceway/wire before installing wire/cable.
- C. All splices and connections shall be made in accessible boxes and cabinets only.

3.02 CIRCUITING

- A. Wiring and cables of different systems shall not be run in same raceway. Power wiring shall not be run in same raceway for remote control/signal wiring.
- B. Class 2, 3 plenum rated cables shall be run without raceway when concealed above accessible ceilings unless otherwise indicated on Contract Drawings. These cables shall be run parallel and perpendicular to building surfaces, and shall be neatly bundled and shall be supported independently from the accessible ceiling utilizing bridle rings or similar. Cables shall effectively be routed horizontal. Provide conduit sleeves at wall penetrations.

3.03 COMMON NEUTRAL CONDUCTOR

A. A common neutral shall not be used. Provide individual neutral per each circuit.

3.04 COLOR CODING

- A. Color Coding for 120/208/240 Volt Electric Light and Power Wiring:
 - 1. Color Code:
 - a. 2 wire circuit black, white.
 - b. 3 wire circuit black, red, white.
 - c. 4 wire circuit black, red, blue, white.
 - 2. White to be used only for an insulated grounded conductor (neutral). If neutral is not required use black and red, or black, red and blue for phase to phase circuits.
 - a. "White" for Sizes No. 6 AWG or Smaller:
 - 1) Continuous white outer finish, or:
 - 2) Three continuous white stripes on other than green insulation along its continuous length.
 - b. "White" for Sizes Larger Than No. 6 AWG:
 - 1) Continuous white outer finish, or:
 - 2) Three continuous white stripes on other than green insulation along its continuous length, or:
 - 3) Distinctive white markings (color coding tape) encircling the conductor, installed on the conductor at time of its installation. Install white color coding tape at terminations, and at 1' 0" intervals in gutters, pull boxes, and manholes.
 - 3. Colors (Black, Red, Blue):
 - a. For Branch Circuits: Continuous color outer finish.
 - b. For Feeders:
 - 1) Continuous color outer finish, or:
 - 2) Color coding tapes encircling the conductors, installed on the conductors at time of their installation. Install color coding tapes at terminations, and at 1' 0" intervals in gutter, pull boxes, and manholes.
- B. Color Coding For 277/480 Volt Electric Light and Power Wiring:
 - 1. Color Code:
 - a. 2 wire circuit brown, gray.
 - b. 3 wire circuit brown, yellow, gray.
 - c. 4 wire circuit brown, orange, yellow, gray.
 - 2. Gray to be used only for an insulated grounded conductor (neutral). If neutral is not required use brown and yellow, or brown, yellow and orange for phase to phase circuits.
 - a. "Gray" For Sizes No. 6 AWG or Smaller:
 - 1) Continuous gray outer finish.
 - b. "Gray" For Sizes Larger Than No. 6 AWG:
 - Distinctive gray markings (color coding tape) encircling the conductor, installed on the conductor at time of its installation. Install gray color coding tape at terminations, and at 1' 0" intervals in gutters, pull boxes, and manholes.

- c. Colors (Brown, Yellow, Orange):
- d. For Branch Circuits: Continuous color outer finish.
- e. For Feeders:
 - 1) Continuous color outer finish, or:
 - 2) Color coding tapes encircling the conductors, installed on the conductors at the time of their installation. Install color coding tapes at terminations, and at 1' 0" intervals in gutters, pull boxes, and manholes.
- C. More Than One Nominal Voltage System Within A building: Permanently post the color coding scheme at each branch-circuit panelboard.
- D. Existing Color Coding Scheme: Where an existing color coding scheme is in use, match the existing color coding if it is in accordance with the requirements of NFPA 70.
- E. Color Code For Wiring Other Than Light and Power: In accordance with ICEA/NEMA WC-30 "Color Coding of Wires and Cables". Other coding methods may be used, as approved.
- F. On 3-phase, 4-wire delta system, high leg shall be orange, as required by NFPA 70.

3.05 IDENTIFICATION

- A. Identification Tags: Use tags to identify feeders and designated circuits. Install tags so that they are easily read without moving adjacent feeders or requiring removal of arc proofing tapes. Attach tags with non-ferrous wire or brass chain.
 - 1. Interior Feeders: Identify each feeder in pull boxes and gutters. Identify by feeder number and size.
 - 2. Exterior Feeders: Identify each feeder in manholes and in interior pull boxes and gutters. Identify by feeder number and size, and also indicate building number and panel designation from which feeder originates.
 - 3. Street and Grounds Lighting Circuits: Identify each circuit in manholes and lighting standard bases. Identify by circuit number and size, and also indicate building number and panel designation from which circuit originates.
- B. Identification Plaque: Where a building or structure is supplied by more than one service, or has any combination of feeders, branch circuits, or services passing through it, install a permanent plaque or directory at each service, feeder and branch circuit disconnect location denoting all other services, feeders, or branch circuits supplying that building or structure or passing through that building or structure and the area served by each.

C. All control conductors as specified herein shall be labeled at each termination point. Labeling shall be permanently labeled with printed Brady type labels or equivalent.

3.06 WIRE MANAGEMENT

A. Use wire management products to bundle, route, and support wiring in junction boxes, pull boxes, wireways, gutters, channels, and other locations where wiring is accessible.

3.07 EQUIPMENT GROUNDING CONDUCTOR

- A. Install Equipment Grounding Conductor:
 - 1. Where specified in other Sections or indicated on the Contract Drawings.
 - 2. In conjunction with circuits recommended by equipment manufacturers to have equipment grounding conductor.
- B. Equipment grounding conductor is not intended as a current carrying conductor under normal operating circumstances.
- C. Color Coding For Equipment Grounding Conductor:
 - 1. Color Code: Green.
 - 2. "Green" For sizes No. 6 AWG or Smaller:
 - a. Continuous green outer finish, or:
 - b. Continuous green outer finish with one or more yellow stripes, or:
 - c. Bare copper (see exception below).
 - 3. "Green" For Sizes Larger Than No. 6:
 - a. Stripping the insulation or covering from the entire exposed length (see exception below).
 - b. Marking the exposed insulation or covering with green color coding tapes.
 - c. Identify at each end and at every point where the equipment grounding conductor is accessible.
 - 4. Exception For use of Bare Copper: Not allowed for use where NFPA 70 specifically requires equipment grounding conductor to be insulated, or where specified in other sections or indicated on the drawings to be insulated.

3.08 SPECIAL GROUNDING CONDUCTORS

- A. Technical Power System Grounding (Equipment grounding conductor isolated from the premises grounded conductor except at a single grounded termination point): Install an insulated grounding conductor running with the circuit conductors for isolated receptacles or utilization equipment requiring an isolated ground.
 - 1. Color Code: Green.

- 2. "Green" For Isolated Grounding Conductor:
 - a. Continuous green outer finish, or:
 - b. Continuous green outer finish with one or more yellow stripes, and:
 - c. Different than the "green" used for the equipment grounding conductor run with the circuit (where required).
- 3. Install label at every point where the conductor is accessible, identifying it as an "Isolated Grounding Conductor".

3.09 ARC PROOFING

- A. Arc proof 600V and under cables only where routed in a manhole/handhole that also contains medium voltage cable/feeders as follows:
 - 1. Arc proof new 600V and under cables.
 - 2. Arc proof existing 600V and under cables that are spliced to new 600V and under cables.
 - 3. Arc proof each 600V and under cable as a unit (except cables consisting of multiple sets of conductors).
 - 4. Arc proof 600V and under cables consisting of multiple sets of conductors by arc proofing each set of conductors as a unit.
 - 5. Arc proof with half-lapped layer of 55 mils thick arc proofing tape and random wrapped or laced with glass cloth tape or glass-fiber cord. For arc proofing tape less than 55 mils thick, add layers to equivalent of 55 mils thick arc proofing tape.

3.10 INSULATED CONDUCTOR AND CABLE SCHEDULE - TYPES AND USE

- A. Electric Light and Power Circuits:
 - 1. FEP, THHN, THW, THW-2, THWN, THWN-2, XHH, XHHW, or XHHW-2: Wiring in dry or damp locations (except where special type insulation is required).
 - 2. THWN, THWN-2, XHHW, XHHW-2, USE, or USE-2: Wiring in wet locations (except where type USE or USE-2 insulated conductors are specifically required, or special type insulation is required).
 - 3. THHN, THWN or THWN-2: Wiring installed in existing raceway systems (except where special type insulation is required).
 - 4. THHN, THW-2, THWN-2, XHHW, or XHHW-2: Wiring for electric discharge lighting circuits (fluorescent, HID), except where fixture listing requires wiring rated higher than 90° C.
 - 5. THWN Marked "Gasoline and Oil Resistant": Wiring to gasoline and fuel oil pumps.
 - 6. USE, or USE-2: Wiring indicated on the drawings to be direct burial in earth.

- 7. USE, or USE-2 Marked "Sunlight Resistant":
 - a. Service entrance wiring from overhead service to the service equipment.
 - b. Wiring exposed to the weather and unprotected (except where special type insulation is required).
- 8. MC: Where allowed for 120V, 20A max circuits per the Contract Drawings or part as specified herein:
 - a. Branch circuit wiring in wood framed construction (wood joists and wood stud partitions):
 - 1) Install conductors parallel with joists or studs and attach to the side of these timbers by galvanized straps spaced not more than 6 feet apart.
 - 2) Install conductors through holes bored in the center of the timbers when running at right angles to joists or studs.
 - 3) Do not attach the conductors to the edge of joists or studs.
 - b. Branch circuit wiring in movable metal partitions and movable gypsum partitions.
 - 1) Install conductors in accordance with partition manufacturer's recommendations.
 - c. Branch circuit wiring in metal stud partitions:
 - 1) Install conductors parallel with studs and attach to the side by galvanized straps spaced not more than 6 feet apart.
 - 2) Install conductors through holes bored in the center of the metal member when running at right angles to studs.
 - d. Conductors shall be protected by listed bushings or listed grommets covering all metal edges.
 - 1) Do not attach the conductors to the edge of studs.
- 9. MI:
- 10. Wiring for underplaster extensions.
- 11. Wiring in areas where indicated on the Contract Drawings.
- 12. Where MI cable is installed in areas subjecting cable to corrosion, use PVC or HDPE jacketed MI cable (nonmetallic jacketed cable is not suitable for use in ducts, plenums or other spaces used for environmental air).
- B. Emergency Feeder Circuits: Use electrical circuit protective system.
- C. Class 1 Circuits: Use Class 1 wiring specified in Part 2 (except where special type insulation is required).
- D. Class 2 Circuits: Use Class 2 wiring specified in Part 2 (except where special type insulation is required).
- E. Class 3 Circuits: Use Class 3 wiring specified in Part 2 (except where special type insulation is required).

3.11 CONNECTOR SCHEDULE - TYPES AND USE

A. Temperature Rating: Use connectors that have a temperature rating, equal to, or greater than the temperature rating of the conductors to which they are connected.

B. Splices:

- 1. Dry Locations:
 - a. For Conductors No. 8 AWG or Smaller: Use spring type pressure connectors, indent type pressure connectors with insulating jackets, or connector blocks (except where special type splices are required).
 - b. For Conductors No. 6 AWG or Larger: Use connector blocks or uninsulated indent type pressure connectors. Fill indentions in uninsulated connectors with electrical filler tape and apply insulation tape to insulation equivalent of the conductor, or insulate with heat shrinkable splices or cold shrink splices.
 - c. Gutter Taps in Panelboards: For uninsulated type gutter taps fill indentions with electrical filler tape and apply insulation tape to insulation equivalent of the conductor, or insulate with gutter tap cover.
- 2. Damp Locations: As specified for dry locations, except apply moisture sealing tape over the entire insulated connection (moisture sealing tape not required if heat shrinkable splices or cold shrink splices are used).
- 3. Wet Locations: Use uninsulated indent type pressure connectors and insulate with resin splice kits, cold shrink splices or heat shrinkable splices. Exception: Splices aboveground which are totally enclosed and protected in NEMA 3R, 4, 4X enclosures may be spliced as specified for damp locations.

C. Terminations:

- 1. For Conductors No. 10 AWG or Smaller: Use terminals for:
 - a. Connecting wiring to equipment designed for use with terminals.
- 2. For Conductors No. 8 AWG or Larger: Use compression or mechanical type lugs for:
 - a. Connecting cables to flat bus bars.
 - b. Connecting cables to equipment designed for use with lugs.
- 3. For Conductor Sizes Larger Than Terminal Capacity On Equipment:
 Reduce the larger conductor to the maximum conductor size that terminal
 can accommodate (reduced section not longer than one foot). Use
 compression or mechanical type connectors suitable for reducing
 connection.

3.12 TESTING

A. Insulation Resistance Tests: Make tests after all wiring is completed and connected ready for the attachment of fixture and/or equipment. Repeat test when all fixtures and/or equipment are connected ready for use. Make tests with an instrument capable of measuring the resistance involved at a voltage of at least 500 VDC for equipment rated at 100 to 500 VAC, 1500 VDC for equipment rated at 151 to 600 VAC. Apply voltage continuously for one minute prior to taking reading. Measure insulation resistance between each pair of insulated conductor separately and between each insulated conductor and ground. Make tests at each panelboard distribution panel, and switchboard on every circuit with the circuit protective device open but connected. The minimum acceptable measured insulation resistance for wiring completed and ready for connection of fixtures and/or equipment is 50 meg ohms.

END OF SECTION

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GROUNDING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Grounding and bonding of electrical installations as shown on the Plans, as specified and/or directed.
- B. Existing site conditions may necessitate use of alternative grounding systems to achieve required ohm values. Existing site conditions are to include minimum soil cover over bedrock and exposed bedrock.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. American National Standards Institute (ANSI), Electronic Industries Alliance (EIA), Telecommunications Industry Association (TIA) Publication: (ANSI/EIA/TIA)
 - a. 607 Commercial Building Grounding and Bonding Requirements for Telecommunications
 - 2. Institute of Electrical and Electronics Engineers (IEEE) Publications:
 - a. 81 Guide for Measuring Earth Receptivity, Ground Impedance and Earth Surface Potential of a Ground System
 - b. 142 Recommended Practice for Grounding of Industrial and Commercial Power Systems
 - c. 1100 Recommended Practice for Powering and Grounding Sensitive Electronic Equipment
 - 3. National Fire Protection Association (NFPA) Publication:
 - a. 70 National Electrical Code (NEC)
 - 4. Underwriters Laboratories, Inc. (UL) Publications:
 - a. 83 Thermoplastic-Insulated Wires and Cables
 - b. 44 Rubber-Insulated Wires and Cables
 - c. 467 Grounding and Bonding Equipment

1.03 SUBMITTALS

- A. Product Data. Provide data for grounding electrodes and connectors.
- B. Test Reports: Indicate overall resistance to ground.

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- C. Manufacturer's Instructions: Include instructions for preparation, installation and examination of exothermic connectors, as applicable.
- D. Certifications: Two weeks prior to final inspection, deliver to the Owner's designated representative four copies of the certification that the material and installation is in accordance with the drawings and specifications and has been properly installed.

PART 2 - PRODUCTS

2.01 GROUNDING WIRES

- A. General Purpose: UL and NEC approved types, copper, with TW, THW, XHHW or dual rated THHN-THWN insulation color identified green.
- B. Isolated Power System: Type XHHW insulation with a dielectric constant of 3.5 or less.
- C. Size wire not less than what is shown and not less than required by the NEC.
- D. Stranded bare copper ground conductor where indicated on drawings.

2.02 GROUND RODS

A. Copper clad steel, 3/4-inch diameter by 10 feet long.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Ground as shown and as hereinafter specified in accordance with the NEC.
- B. System Grounding:
 - Ground the electrical service system neutral at service entrance equipment to grounding electrodes. Concrete encased electrodes shall be connected as the most effective grounding electrodes. Provide a completely grounded system in accordance with Article 250 of the NEC.
 - 2. Ground each separately-derived system neutral to separate grounding electrode system. Transformer, UPS systems, power conditioners, inverters, or other power supplies are separately derived systems. Standby or emergency generators are separately derived systems if the neutral is bonded to the generator frame and if there is no direct connection of the generator neutral conductor to the service neutral conductor.
 - 3. Provide communications system grounding conductor connected to separate electrode (ground bus) that is shall be installed in each IT room.

GROUNDING 4.23 26 05 26-2 409.005.001 Bond together system neutrals, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, cable trays, auxiliary gutters, meter fittings, boxes, cable armor, cable sheath, ground bus in electrical rooms and IT rooms, metal frame of the building or structure, ground ring, lightning down lead conductor, grounding conductor in raceways and cables, receptacle ground connectors, and metal underground water pipe. Bonding jumpers shall be installed around non-metal fittings or insulating joints to ensure electrical continuity. Bonding shall be provided where necessary to ensure electrical continuity and the capacity to conduct safely any fault current likely to be imposed.

- 4. Secondary service neutrals ground at the supply side of the secondary disconnecting means and at the related transformers.
- 5. Separately derived systems (transformers downstream from the service entrance) ground the secondary neutral.
- 6. Isolation transformers and isolated power systems shall not be system grounded.

C. Equipment Grounding:

1. Metallic structures, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits shall be grounded for personnel safety and to provide a low impedance path for possible ground fault currents.

3.02 PRIMARY EQUIPMENT AND CIRCUITS

A. Switchgear: Provide a bare grounding electrode conductor from the switchgear ground bus to a grounding electrode system, metal underground water pipe and driven ground rods for the grounding electrode. Where a new foundation/footer is constructed for a building/structure the grounding electrode system shall also be bonded to the concrete-encased electrode (reinforcing steel in foundation/footer). Coordinate with General Contractor.

B. Duct Banks and Manholes:

- 1. Provide a bare equipment grounding conductor in each duct bank containing medium or high voltage cables. Connect the grounding conductors to the switchgear ground bus, to all manhole hardware, to the cable shielding of medium or high voltage cable splices and terminations, and equipment enclosures.
- 2. Provide a grounding conductor having at least 50 percent ampacity of the largest phase conductor in the duct bank.
- 3. Connect the equipment grounding conductor to the ground rod.
- C. Outdoor Fences: Connect outdoor fences around electrical equipment to the grounding electrode system.

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- D. Metallic Conduit: Metallic conduits which terminate without mechanical connection to a housing of electrical equipment by means of locknut and bushings or adapters, provided with grounding bushings. Connect bushings with a bare grounding conductor to the equipment ground bus.
- E. Lightning Arresters: Connect lightning arrester grounds to the equipment ground bus, or ground rods as applicable.

3.03 SECONDARY EQUIPMENT AND CIRCUITS

- A. Main Bonding Jumper: Connect the secondary service neutral to the ground bus in the service equipment.
- B. Water Pipe and Supplemental Electrode:
 - 1. Provide a ground conductor connection between the service equipment ground bus and the metallic water pipe system. Jumper insulating joints/meter in the water pipe.
 - 2. Provide a supplemental ground electrode and bond to the water pipe ground, or connect to the service equipment ground bus.
 - 3. Where a new foundation/footer is constructed for a building/structure, the grounding electrode system shall also be bonded to the concrete-encased electrode (reinforcing steel in foundation/ footer). Coordinate with General Contractor.
- C. Service Disconnect (Separate Individual Enclosure): Provide a ground bar bolted to the enclosure with lugs for connecting the various grounding conductors.
- D. Switchgear and Switchboards:
 - 1. Connect the various feeder green grounding conductors to the ground bus in the enclosure with suitable pressure connectors.
 - 2. Connect the grounding electrode conductor to the ground bus.
 - 3. Connect the neutral to the ground bus (main bonding jumper).
 - 4. Connect metallic conduits, which terminate without mechanical connection to the housing, by grounding bushings and ground wire to the ground bus.
- E. Conduit Systems:
 - 1. Ground all metallic conduit systems.
 - 2. Non-metallic conduit systems shall contain a grounding conductor.
 - 3. Conduit provided for mechanical protection containing only a grounding conductor, bond to that conductor at the entrance and exit from the conduit.
- F. Feeders and Branch Circuits: Install green grounding conductors with feeders and branch circuits as follows:
 - 1. Feeders.
 - 2. Branch Circuits.

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- 3. Receptacle Outlets.
- 4. Directly Connected Equipment, Appliances and Devices.
- 5. Motors and Motor Controllers.
- 6. Fixed Equipment and Appurtenances.
- 7. Items of equipment where the final connection is made with flexible metal conduit shall have a grounding wire.
- 8. Additional locations and systems as shown.

G. Boxes, Cabinets, Enclosures and Panelboards:

- 1. Bond the grounding wires to each pull box, junction box, outlet box, cabinets, and other enclosures through which the ground wires pass.
- 2. Provide lugs in each box and enclosure for ground wire termination.
- 3. Provide ground bars in panelboards, bolted to the housing, with sufficient lugs for terminating the ground wires.

H. Motors and Starters:

- 1. Provide lugs in motor terminal box and starter housing for ground wire termination.
- 2. Make ground wire connections to ground bus in motor control centers.
- I. Receptacles are not approved for grounding through their mounting screws.

 Ground with a ground wire from green ground terminal on the receptacle to the outlet box ground screw.
- J. Ground lighting fixtures to the green grounding conductor of the wiring system. During renovation, provide the green ground if it is not part of the system, or ground the fixtures through the conduit systems per means acceptable under the NEC. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.
- K. Fixed electrical appliances and equipment shall have a ground lug installed for termination of the green ground conductor.

3.04 CONDUCTIVE PIPING

A. Bond all conductive piping systems in the building to the electrical system ground. Bonding connections shall be made as close as practical to the water pipe ground or service equipment ground bus.

3.05 GROUND RESISTANCE

- A. Grounding system ground resistance must comply with NEC. Provide additional ground rods as required until resistance reading is compliant with NEC.
- B. Services at power company interface points shall comply with the power company ground resistance requirements.

4.23 GROUNDING 409.005.001 26 05 26-5 C. Make necessary modifications to the ground electrodes for compliance that is needed without additional cost to the Owner, including the provisions of a multirod system.

3.06 GROUND ROD INSTALLATION

- A. Drive each rod vertically in the earth for not less than ten feet in depth.
- B. Where permanently concealed ground connections are required, make the connections by the exothermic process to form solid metal joints. Make accessible ground connections with mechanical pressure type ground connectors.
- C. Where rock prevents the driving of vertical ground rods, install grounding electrodes in horizontal trenches to achieve the specified resistance.
- D. In manhole, install ground rods with 4 to 6 inches above the floor with connections of grounding conductors fully visible and accessible.

END OF SECTION

GROUNDING 4.23 26 05 26-6 409.005.001

SECTION 26 05 34

CONDUIT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Conduit as shown on the Plans, as specified, and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. American National Standards Institute (ANSI) Publications:
 - a. C80.1 Rigid Steel Conduit, Zinc Coated
 - b. C80.3 Electrical Metallic Tubing, Zinc Coated
 - c. C80.5 Rigid Aluminum Conduit
 - 2. National Electrical Manufacturers Association (NEMA) Publications:
 - a. FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
 - b. RN 1 Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
 - c. TC 2 Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
 - d. TC 3 PVC Fittings for Use with Rigid PVC Conduit and Tubing
 - 3. National Electrical Contractors Association (NECA) Publication:
 - Standard of Installation

1.03 SECTION INCLUDES

- A. Rigid steel conduit.
- B. PVC coated rigid steel conduit.
- C. Flexible metal conduit.
- D. Liquid-tight flexible metal conduit.
- E. Electrical metallic tubing.
- F. Nonmetallic conduit.
- G. Flexible nonmetallic conduit.

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- H. Electrical nonmetallic tubing.
- I. Fittings and conduit bodies.

1.04 RELATED SECTIONS

A. Section 26 05 01, "Electrical General Requirements", applies to this Section with additions and modifications specified herein.

1.05 SUBMITTALS

A. Conduit and fittings (each type).

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- B. Protect PVC conduit from sunlight.

1.07 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on the Contract Drawings.
- B. Field verify all conduit routing and coordinate proposed conduit routing with all existing equipment, structure features, proposed equipment locations for equipment furnished by this Contractor and all other Contractors, Owner furnished equipment, etc. prior to rough-in.
- C. Conduit routing, when shown on the Contract Drawings, are in approximate locations unless dimensioned. Route as required to complete wiring system.
- D. Plans (drawings) are diagrammatic and show only approximate locations of equipment, fixtures, devices, etc. Plans may not show exact quantity and locations of junction and pull boxes required for a complete installation. Exact locations and routing of conduit shall be determined in the field and shall suit the job conditions. Quantities and locations of outlet, junction, and pull boxes shall be provided to suit the installed arrangement and meet all NEC and local code requirements.

1.08 QUALITY ASSURANCE

- A. In each standard referred to herein, consider the advisory provisions to be mandatory, as though the word "shall" has been substituted for "should" wherever it appears.
- B. Verify routing and termination locations of conduit prior to rough-in.

CONDUIT 4.23 26 05 34-2 409.005.001 C. Conduit routing when shown on the Contract Drawings are in approximate locations unless dimensioned. Route as required to complete wiring system.

1.09 QUALITY ASSURANCE

A. In each standard referred to herein, consider the advisory provisions to be mandatory, as though the word "shall" has been substituted for "should" wherever it appears.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials, equipment, and devices shall, as a minimum, meet requirements of UL, where UL standards are established for these items, and requirements of NFPA 70.
- B. Provide conduit types in specific installations as scheduled on Contract Drawings. Specific conduit material and installation specifications for the scheduled conduit type are specified herein.

2.02 CONDUIT AND FITTINGS

- A. Rigid Steel Conduit (Zinc-coated): ANSI C80.1, UL 6.
- B. Rigid Aluminum Conduit: ANSI C80.5, UL 6.
- C. Rigid Nonmetallic Conduit: UL 651, UL 1684
 - 1. PVC Type EPC-40 and EPC-80, in accordance with NEMA TC2.
 - 2. Fiberglass conduit in accordance with NEMA TC14.
- D. Intermediate Metal Conduit (IMC): UL 1242, zinc-coated steel only.
- E. Electrical Metallic Tubing (EMT): UL 797, ANSI C80.3.
- F. Electrical Nonmetallic Tubing (ENT): NEMA TC13.
- G. Plastic-coated Rigid Steel and IMC Conduit: NEMA RN1, Type 40 (40 mils thick).
- H. Flexible Metal Conduit: UL 1.
 - 1. Liquid-tight Flexible Metal Conduit, Steel: UL 360.
- I. Fittings for Metal Conduit, EMT, and Flexible Metal Conduit: UL 514B. Ferrous fittings shall be cadmium- or zinc-coated in accordance with UL 514B. Fittings shall match conduit type and material.

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- 1. Fittings for Rigid Metal Conduit and IMC: Threaded-type. Split couplings unacceptable.
- 2. Fittings for EMT: set screw type.
- 3. Fittings for Use in Hazardous Locations: UL 886.
- J. Fittings for Rigid Nonmetallic Conduit: NEMA TC3. Fittings shall match conduit type and material.

2.03 FIBER OPTIC SYSTEMS

- A. For conduit systems that are intended for the installation of fiber optic cables, all conduit bends radii shall meet or exceed minimum radius in accordance with installed fiber optic bending limitation specifications.
- B. Where conduit bodies are used in 90 degree sections of conduit runs, only "Optical LB", or equivalent shall be used.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Electrical installations shall conform to requirements of NFPA 70 and to requirements specified herein.
- B. Underground Service: Underground service conductors and associated conduit shall be continuous from service entrance equipment to outdoor power system connection.
- C. Hazardous Locations: Work in hazardous locations, as defined by NFPA 70, shall be performed in strict accordance with NFPA 70 for particular "Class", "Division", and "Group" of hazardous locations involved. Provide conduit and cable seals where required by NFPA 70. Conduit shall have tapered threads.
- D. Service Entrance Identification: Service entrance disconnect devices, switches, or enclosures shall be labeled or identified as such.
 - 1. Labels: Wherever work results in service entrance disconnect devices in more than one enclosure, as permitted by NFPA 70, each enclosure, new and existing, shall be labeled as one of several enclosures containing service entrance disconnect devices. Label, at minimum, shall indicate number of service disconnect devices housed by enclosure and shall indicate total number of enclosures that contain service disconnect

CONDUIT 4.23 26 05 34-4 409.005.001 devices. Provide laminated plastic labels. Use lettering of at least 0.25 inch in height, and engrave on black-on-white matte finish. Service entrance disconnect devices in more than one enclosure shall be provided only as permitted by NFPA 70.

- E. Wiring Methods: Provide insulated conductors installed in conduit, except where specifically indicated or specified otherwise or required by NFPA 70 to be installed otherwise. Provide insulated, green equipment grounding conductor in feeder and branch circuits, including lighting circuits. Grounding conductor shall be separate from electrical system neutral conductor. Provide insulated, green conductor for grounding conductors installed in conduit or raceways. Minimum conduit size shall be 1/2 inch in diameter for low voltage lighting and power circuits. Vertical distribution in multiple story buildings shall be made with metal conduit in fire-rated shafts. Metal conduit shall extend through shafts for minimum distance of 6 inches. Conduit which penetrates fire walls, fire partitions, or floors for minimum distance of 6 inches.
 - 1. Aluminum Conduit: Do not install underground or encase in concrete. Do not use brass or bronze fittings.
 - 2. Restrictions Applicable to EMT:
 - a. Do not install underground.
 - b. Do not encase in concrete.
 - c. Do not use in areas subject to severe physical damage.
 - d. Do not use in hazardous areas.
 - e. Do not use outdoors.
 - 3. Nonmetallic Conduit: Conduit shall not penetrate fire walls, fire partitions, or floors.
 - 4. ENT: ENT may be provided in walls, floors, and ceilings only when protected by thermal barriers identified as having minimum 15-minute finish rating. If ENT is used, provide required thermal barriers, whether indicated or not.
 - a. Following restrictions apply to ENT:
 - b. Do not route exposed.
 - c. Do not route above suspended ceilings (i.e., between suspended ceilings and permanent ceilings).
 - d. Do not use in feeder circuits.
 - e. Do not install underground.
 - f. Do not encase in concrete.
 - g. Do not use in areas subject to severe physical damage including, but not limited to, mechanical equipment rooms, electrical equipment rooms, hospitals, power plants, missile magazines, and other such areas.
 - h. Do not use in hazardous areas.
 - i. Do not use outdoors.

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- j. Do not use in sizes larger than 2 inches.
- k. Do not use in penetrating fire rated walls, partitions, etc.
- 5. Restrictions applicable to PVC Schedule 40 and PVC Schedule 80.
 - a. Do not use in feeder circuits unless otherwise indicated.
 - b. Do not use in areas subject to severe physical damage including, but not limited to, mechanical equipment rooms, electrical equipment rooms, hospitals, power plants, missile magazines, and other such areas.
 - c. Do not use in hazardous areas.
 - d. Do not use in penetrating fire-rated walls or partitions, fire rated floors, etc.
- 6. Service Entrance Conduit, Overhead: Rigid steel or IMC from service entrance to service entrance fitting or weatherhead outside building.
- 7. Service Entrance Conduit, Underground: Galvanized rigid steel or steel IMC. Underground portion shall be encased in minimum of 3 inches of concrete and shall be installed minimum 18 inches below slab or grade.
- 8. Underground Conduit Other Than Service Entrance: Plastic-coated rigid steel; plastic-coated steel IMC; PVC, Type EPC-40; or fiberglass. Convert nonmetallic conduit, other than PVC Schedule 40 or 80, to plastic-coated rigid, or IMC, steel conduit before rising through floor slab; plastic coating shall extend minimum 6 inches above floor.
- 9. Conduit in Floor Slabs: Rigid steel; steel IMC; fiberglass, or PVC, Type EPC-40.
- 10. Conduit Interior to Buildings for 400 Hz Circuits: Aluminum or nonmetallic. Where 400-Hz circuit runs underground or through concrete, conduit shall be PVC Schedule 80.
- 11. Conduit for Circuits Rated Greater Than 600 Volts: Rigid metal conduit or IMC only.
- F. Conduit Installation: Unless indicated otherwise, conceal conduit within finished walls (existing or proposed), above ceilings, below floors or within floor slabs. With written approval by the Owner's Designated Representative where conduit cannot physically be installed concealed, install decorative surface metal raceway as manufactured by Wiremold Series 2400, or approved equal.
 - 1. For new conduit runs in existing locations, Contractor to field verify all proposed locations prior to installation. Installation of conduit shall be located and installed:
 - a. So as to not interfere with existing utilization equipment.
 - b. Not in front of intake/exhaust fans and louvers.
 - c. Not in front of access panels.
 - d. Not in front of doors or windows.
 - e. In a location that does not allow maintenance and clearance to existing and proposed mechanical and electrical equipment
 - f. Not on floor or at a height above floor so as to be a tripping hazard,

- g. Not installed in dedicated space that would limit an overhead cranes or similar lifting device's ability to remove intended equipment below. This includes but is not limited to access hatches, crane trucks, crane hoists, movement along crane rails, jib crane full swinging arc/areas, etc.
- 2. Contractor to notify Owner and Owners Designated Representative of all potential conduit installation conflicts with existing equipment, HVAC, plumbing, building or structural systems prior to field construction of conduit systems.
- G. Keep conduit minimum 6 inches away from parallel runs of flues and steam or hot water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members where located above accessible ceilings and where conduit will be visible after completion of project.
 - 1. Conduit Through Floor Slabs: Where conduits rise through floor slabs, curved portion of bends shall not be visible above finish slab.
 - 2. Conduit Support: Support conduit by pipe straps, wall brackets, hangers, or ceiling trapeze. Fasten by wood screws to wood; by toggle bolts on hollow masonry units; by concrete inserts or expansion bolts on concrete or brick; and by machine screws, welded threaded studs, or spring-tension clamps on steel work. Threaded C-clamps may be used on rigid steel conduit only. Do not weld conduits or pipe straps to steel structures. Load applied to fasteners shall not exceed one-fourth proof test load. Fasteners attached to concrete ceiling shall be vibration- resistant and shock-resistant. Holes cut to depth of more than 1-1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete joints shall not cut main reinforcing bars. Fill unused holes. In partitions of light steel construction, use sheet metal screws. In suspended-ceiling construction, run conduit above ceiling. Do not support conduit by ceiling support system. Spring-steel fasteners may be used for lighting branch circuit conduit supports in suspended ceilings in dry locations. Support exposed risers in wire shafts of multi-story buildings by U-clamp hangers at each floor level and at 10-foot maximum intervals. Where conduit crosses building expansion joints, provide suitable watertight expansion fitting that maintains conduit electrical continuity by bonding jumpers or other means. Support raceways within three (3) feet of each outlet box, junction box, cabinet or enclosure.
 - 3. Directional Changes in Conduit Runs: Make changes in direction of runs with symmetrical bends or cast-metal fittings. Make field-made bends and offsets with hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits. Prevent plaster, dirt, or trash from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of obstructions.

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- 4. Pull Wire: Install pull wires in empty conduits in which wire is to be installed by others. Pull wire shall be plastic having minimum 200-pound tensile strength. Leave minimum 12 inches of slack at each end of pull wire.
- 5. Telephone and Signal System Conduits: Install in accordance with specified requirements for conduit and with additional requirement that no length of run shall exceed 150 feet for trade sizes 2 inches and smaller and shall not contain more than two 90-degree bends or equivalent. Provide pull or junction boxes where necessary to comply with these requirements. Inside radii of bends in conduits 1-inch trade size and larger shall be minimum five times nominal diameter. Terminate conduit in terminal cabinet with two locknuts and plastic bushing.
- 6. Conduit Installed in Concrete Floor Slabs: Locate so as not to adversely affect structural strength of slabs. Install conduit within middle 1/3 of concrete slab. Space conduits horizontally minimum three diameters, except at cabinet locations. Curved portions of bends shall not be visible above finish slab. Increase slab thickness as necessary to provide minimum 1-inch cover over conduit. Where embedded conduits cross expansion joints, provide suitable watertight expansion fittings and bonding jumpers. Conduit larger than 1-inch trade size shall be parallel with or at right angles to main reinforcement; when at right angles to reinforcement, conduit shall be close to one of supports of slab. Where nonmetallic conduit is used, raceway must be converted to rigid steel or steel IMC before rising above floor, unless specifically indicated otherwise.
- 7. Locknuts and Bushings: Fasten conduits to sheet metal boxes and cabinets with two locknuts where required by NFPA 70, where insulated bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, use minimum single locknut and bushing. Locknuts shall have sharp edges for digging into wall of metal enclosures. Install bushings on ends of conduits, and provide insulating type where required by NFPA 70.
- 8. Stub-ups: Provide conduits stubbed up through concrete floor for connection to free-standing equipment with adjustable top or coupling threaded inside for plugs, set flush with finished floor. Extend conductors to equipment in rigid steel conduit, except that flexible metal conduit may be used 6 inches above floor. Where no equipment connections are made, install screwdriver-operated threaded flush plugs in conduit end.
- 9. Flexible Connections: Provide flexible connections of short length, 6-foot maximum, for recessed and semi-recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for motors. Provide liquid-tight flexible conduit in wet locations. Provide separate ground conductor across flexible connections.

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- 10. Arrange conduit to maintain headroom and present neat appearance.
- 11. Cut conduit square using saw or pipe cutter; deburr cut ends. For field cut threaded conduits, provide field applied anti-corrosion material to the threads in accordance with the manufacturer's instructions and per the NEC. Product shall be Thomas & Betts KOPR-Shield or approved equal.
- 12. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- 13. Install no more than equivalent of three 90 degree bends between boxes.
- 14. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- 15. Provide suitable fittings to accommodate expansion and deflection where conduit crosses expansion joints.
- 16. Use Suitable caps to protect installed conduit against entrance of dirt and moisture.
- 17. Ground and bond conduit under as per NEC 250.

3.02 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods specified in other sections.
- B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation. Coordinate installation with representative of roofing material manufacturer to maintain any roof warranty.

END OF SECTION

4.23 CONDUIT 409.005.001 26 05 34-9

SECTION 26 05 35

OUTLET, JUNCTION AND PULL BOXES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Outlet, Junction and Pull Boxes, as shown on the Plans, as specified, and/or directed.
- B. Plans (drawings) are diagrammatic and show only approximate locations of equipment, fixtures, devices, etc. Plans may not show exact quantity and locations of Junction and Pull Boxes required for a complete installation. Exact locations and routing shall be determined in the field and shall suit the job conditions. Quantities and locations of Outlet, Junction, and Pull Boxes shall be provided to suit the installed arrangement and meet all NEC and local code requirements.

1.02 REFERENCES

- A. NEMA
- B. UL. (Specifically UL 514A)
- C. NFPA 70

1.03 SUBMITTALS

- A. Product Data: Catalog sheets, specifications and installation instructions.
 - 1. For fire rated construction, prove that materials and installation methods proposed for use are in accordance with the listing requirements of the classified construction.
- B. Shop Drawings: Plans, elevations, sections, and details for all custom enclosures and cabinets

1.04 GENERAL REQUIREMENTS

A. Section 26 05 01, "Electrical General Requirements", applies to this Section, with the additions and modifications specified herein.

PART 2 - PRODUCTS

2.01 GALVANIZED STEEL OUTLET BOXES

A. Standard galvanized steel boxes and device covers by Appleton Electric Co., Cooper/Crouse-Hinds, Hubbell, or approved equal.

2.02 GALVANIZED STEEL JUNCTION AND PULL BOXES

A. Code gage, galvanized steel screw cover boxes by Hoffman Enclosures Inc., Hubbell Wiegmann, or approved equal

2.03 THREADED TYPE BOXES

- A. Outlet Boxes: For Dry, Damp Locations: Zinc electroplate malleable iron or cast iron alloy boxes by Appleton Electric Co., Cooper/Crouse-Hinds Co., or approved equal with zinc electroplate steel covers to suit application. For classified spaces, provide outlet boxes rated for Class I, Div. 1, group D hazardous areas as manufactured by Crouse-Hinds, Appleton or approved equal.
- B. For Wet Locations: Malleable iron or cast iron alloy boxes with hot dipped galvanized or other specified corrosion resistant finish as produced by Cooper/Crouse-Hinds (hot dipped galvanized or Corro-free epoxy powder coat), or OZ/Gedney Co. (hot dipped galvanized), with stainless steel cover screws, and malleable iron covers gasketed to suit application.

C. Junction and Pull Boxes:

- 1. For Dry, Damp Locations: Zinc electroplate cast iron boxes by Appleton Electric Co., Cooper/Crouse-Hinds, or approved equal with zinc electroplate steel or cast iron cover.
- 2. For Wet Locations: Cast iron boxes by Cooper/Crouse-Hinds' (hot dipped galvanized or Corro-free epoxy powder coat), or OZ/Gedney Co. (hot dipped galvanized), or approved equal, with stainless steel cover screws and cast iron cover gasketed to suit application.
- 3. For classified spaces, provide junction and pull boxes rated for Class I, Div. 1, group D hazardous areas as manufactured by Crouse-Hinds, Appleton or approved equal.
- D. Conduit Bodies, Threaded (Provided with a Volume Marking):
 - 1. For Dry, Damp Location: Zinc electroplate malleable iron or cast iron alloy bodies with zinc electroplate steel covers; Appleton Electric Co.'s Unilets, Cooper/Crouse-Hinds' Condulets, or approved equal.
 - 2. For Wet Locations: Malleable iron or cast iron alloy bodies with hot dipped galvanized or other specified corrosion resistant finish; Cooper/Crouse-Hinds' Condulets (hot dipped galvanized or Corro-free epoxy power coat), or OZ/Gedney Co.'s Conduit Bodies (hot dipped galvanized) or approved equal, with stainless steel cover screws and malleable iron covers gasketed to suit application.

3. For classified spaces, provide outlet conduit bodies rated for Class I, Div. 1, group D hazardous areas as manufactured by Crouse-Hinds, Appleton, or approved equal.

2.04 SPECIFIC PURPOSE OUTLET BOXES

A. As fabricated by manufacturers for mounting their equipment.

PART 3 - EXECUTION

3.01 PREPARATION

A. Before proceeding with the installation of junction and pull boxes, check the locations with the Director's Representative and have same approved.

3.02 INSTALLATION

- A. Mounting Position of Wall Outlets For Wiring Devices: Unless otherwise indicated, install boxes so that the long axis of each wiring device will be vertical.
- B. Height of Wall Outlets: Unless otherwise indicated, locate outlet boxes with their center lines at the following elevations above finished floor:

Switches	4'-0"
Single & Duplex Receptacles	1'-6"
Special Purpose Receptacles	4'-0"
Telephone/Data Outlets	1'-6"
Telephone Outlets (Wall Phones)	4'-0"
Above-Counter Devices	8" Above Counter
Fire Alarm Manual Station	4'-0"
Fire Alarm Notification Device	7'-0"

- C. Wall Outlet Location: Locations shown on drawings are approximate only. Locate wall outlet boxes as near to position indicated as possible, but so as to avoid conflicts with other trades (architectural, mechanical, plumbing, structural, etc.).
- D. Where devices of different mounting heights are shown on drawings at same location, align outlet boxes along a common vertical line.
- E. Outlet boxes in a common wall serving separate rooms shall not be installed back-to-back.
- F. Outlet boxes shall be sized to accommodate the device that is to be installed.
- G. Provide box extensions and/or trim rings as required to accommodate construction of wall/ceiling in which boxes are recessed.

- H. Supplementary Junction and Pull Boxes: In addition to junction and pull boxes indicated on the drawings and required by NFPA 70, provide supplementary junction and pull boxes as follows:
 - 1. When required to facilitate installation of wiring.
 - 2. At every third 90 degree turn in conjunction with raceway sizes over 1 inch.
 - 3. At intervals not exceeding 100 feet in conjunction with raceway sizes over 1 inch.
- I. All Junction and Pull Boxes shall have a screw-on cover plate. Cover plate shall match box material and construction.
- J. Junction and Pull Boxes shall be installed in locations that are readily accessible, and shall not be blocked by equipment, piping, ducts, structural supports, etc.

3.03 OUTLET, JUNCTION, AND PULL BOX SCHEDULE

- A. Boxes For Concealed Conduit System:
 - 1. Non-Fire Rated Construction:
 - a. Depth: To suit job conditions and comply with NFPA 70 Article 370.
 - b. For Lighting Fixtures: Use galvanized steel outlet boxes designed for the purpose.
 - 1) For Fixtures Weighing 50 lbs. or Less: Box marked "FOR FIXTURE SUPPORT".
 - 2) For Fixtures More Than 50 lbs: Box listed and marked with the weight of the fixture to be supported (or support fixture independent of the box).
 - c. For Ceiling Suspended Fans:
 - 1) For Fans Weighing 35 lbs or Less: Marked "Acceptable for Fan Support."
 - 2) For Fans Weighing More Than 35 lbs, up to 70 lbs: Marked "Acceptable for Fan Support up to 70 lbs (or support fan independent of the box)."
 - d. For Junction and Pull Boxes: Use galvanized steel boxes with flush covers.
 - e. For Switches, Receptacles, Etc:
 - 1) Plaster or Cast-In-Place Concrete Walls: Use 4 inch or 4-11/16 inch galvanized steel boxes with device covers.
 - 2) Walls Other Than Plaster or Cast-In-Place Concrete: Use type of galvanized steel box which will allow wall plate to cover the opening made for the installation of the box.

- B. Boxes For Exposed Conduit System:
 - 1. Dry and Damp Locations: Use zinc electroplate or hot dipped galvanized threaded type malleable iron or cast iron alloy outlet, junction, and pull boxes or conduit bodies provided with a volume marking in conjunction with ferrous raceways unless otherwise specified or indicated on the drawings.
 - a. Galvanized steel boxes may be used in conjunction with conduit sizes over 1 inch in non-hazardous dry and damp locations.
 - b. Galvanized steel boxes may be used in conjunction with electrical metallic tubing where it is allowed (specified) to be installed exposed as branch circuit conduits at elevations over 10'-0" above finished floor.
 - 2. Wet Locations: Use threaded type malleable iron or cast iron alloy outlet junction, and pull boxes or conduit bodies (provided with a volume marking) with hot dipped galvanized or other specified corrosion resistant coating in conjunction with ferrous raceways unless otherwise specified or indicated on the drawings.
 - a. Use corrosion resistant boxes in conjunction with plastic coated rigid ferrous metal conduit.
- C. Specific Purpose Outlet Boxes: Use to mount equipment when available and suitable for job conditions. Unless otherwise specified, use threaded type boxes with finish as specified for exposed conduit system, steel (painted) for surface metal raceway system and galvanized steel for recessed installations.

3.04 LABELING

- A. Identify junction and pull boxes for system served (i.e. power, lighting, fire alarm, telephone, data, public address, nurse call, etc.), using stencil lettering on box cover.
- B. Identify panelboard and circuit number of all conductors contained within junction and pull boxes, using stencil lettering on box cover.
- C. Identify junction and pull boxes for systems over 600V as follows: "DANGER HIGH VOLTAGE KEEP OUT." Label shall be white stencil lettering, minimum 1" text height, on box cover.

END OF SECTION

SECTION 26 05 43

UNDERGROUND ELECTRICAL WORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Underground Electrical Work, as shown on the Plans, as specified, and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. Federal Specification (Fed. Spec.):
 - a. RR-F-621C Frame, Covers, Gratings, Steps, Sump and Catch Basin, Manhole
 - 2. American Association of State Highway and Transportation Officials (AASHTO) Publications:
 - a. HB-12 Highway Bridges, Including Interim Specifications
 - b. M 198 Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets
 - 3. American Concrete Institute (ACI) Publications:
 - a. 315 Details and Detailing of Concrete Reinforcement
 - b. 318 Building Code Requirements for Reinforced Concrete
 - 4. American National Standards Institute (ANSI) Publication:
 - 5. C2 National Electrical Safety Code (NESC)
 - 6. American Society for Testing and Materials (ASTM) Publications:
 - a. B1 Hard-Drawn Copper Wire
 - b. B8 Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
 - c. C32 Sewer and Manhole Brick (Made from Clay or Shale)
 - d. C260 Air-Entraining Admixtures for Concrete
 - e. C309 Liquid Membrane-Forming Compounds for Curing Concrete
 - f. D698 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-in. (305-mm) Drop
 - g. D1556 Density of Soil in Place by the Sand-Cone Method
 - h. D1557 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in. (457-mm) Drop

- i. D1682 Breaking Load and Elongation of Textile Fabrics
- 7. Association of Edison Illuminating Companies (AEIC) Publications:
 - a. Impregnated-Paper-Insulated Lead Covered Cable, Solid Type (10th Edition)
- 8. National Electrical Manufacturer's Association (NEMA) Publications:
 - a. RN 1 Polyvinyl-Chloride Externally Coated Galvanized Rigid Steel Conduit and Electrical Metallic Tubing
 - b. TC 2 Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
 - c. TC 3 PVC Fittings for Use With Rigid PVC Conduit and Tubing
 - d. TC 6 PVC and ABS Plastic Utilities Duct for Underground Installation
 - e. TC 9 Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation
 - f. WC 7 Cross-Linked-Thermosetting- Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (ICEA S-66-524)
 - g. WC 8 Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (ICEA S-68-516)
- 9. National Fire Protection Association (NFPA) Publication:
 - a. 70 National Electrical Code (NEC)
- 10. U.S. Department of Agriculture, Rural Electrification Administration (REA) Bulletins:
 - a. 344-2 List of Materials Acceptable for Use on Telephone Systems of REA Borrowers
 - b. 345-6 Splicing Plastic-Insulated Cables (PC-2)
 - c. 345-14 Direct Burial Telephone Cable (Air Core) (PE-23)
 - d. 345-26 Buried Plant Housings (PE-35)
 - e. 345-67 Filled Telephone Cables (PE-39)
- 11. Underwriters Laboratories Inc. (UL) Publications:
 - a. 6 Rigid Metal Conduit
 - b. 467 Grounding and Bonding Equipment
 - c. 510 Insulating Tape
 - d. 514A Metallic Outlet Boxes
 - e. 514B Fittings for Conduit and Outlet Boxes
 - f. 854 Service-Entrance Cables
 - g. 1242-83 Intermediate Metal Conduit

1.03 GENERAL REQUIREMENTS

- A. The following Sections apply to this Section with additions and modifications specified herein:
 - 1. Section 26 05 01, "Electrical General Requirements"
 - 2. Section 26 05 19, "Wiring/Cable, 600Volts and Under".
 - 3. Section 26 05 26, "Grounding".

- 4. Section 26 05 34, "Conduit".
- 5. Section 27 13 43, "Communications Cabling Standards".

B. Laboratory Tests:

1. Determine soil-density relationships for compaction of backfill material in accordance with ASTM D1557, Method D.

1.04 SUBMITTALS

- A. Shop Drawings including Manufacturer's Data:
 - 1. Conduit spacers for encased concrete duct bank buried detectable warning tape
 - 2. Bedding material
 - 3. Backfill material
 - 4. Concrete
 - 5. Rebar and reinforcing materials
 - 6. Splice box
 - 7. Insulating tape
 - 8. Manhole frame and cover handhole frame and cover
 - 9. Sealing material for precast manhole and handhole joints
 - 10. Telephone pedestals
 - 11. Precast manholes and handholes: Calculations and shop drawings for precast manholes and handholes shall bear the seal of a registered professional engineer.
 - a. Material description (i.e., fc and fy)
 - b. Manufacturer's printed assembly and installation instructions
 - c. Design calculations
 - d. Reinforcing shop drawings prepared in accordance with ACI 315
 - e. Plans and elevations showing opening and pulling-in iron locations and details
 - f. Pulling-in iron

B. Manufacturer's Instructions:

- 1. Manufacturer's directions for use of ground megger with proposed method indicated
- 2. Terminator manufacturer's installation instructions

- C. Certificates of Compliance:
 - 1. Material and Equipment: Provide manufacturer's statement certifying that the product supplied meets or exceeds contract requirements.
 - a. Precast hand hole and accessories
 - b. Hand hole frame and cover

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Provide materials and equipment listed by UL or approved by Factory Mutual (FM) System when such equipment is listed or approved.
- B. Conduit: Shall be per Section 26 05 34 "Conduit".
- C. Plastic Insulating Tape: UL 510.
- D. Wire and Cable Shall be per Section 26 05 19 "Wiring/Cable, 600Volts and Under" and Section 27 13 43 "Communications Cabling Standards"
 - 1. Connectors and Terminals: Shall be designed and approved for use with the associated conductor material, and shall provide a uniform compression over the entire contact surface. Solderless terminal lugs shall be used on stranded conductors. For connecting aluminum to copper, connectors shall be the circumferentially compressed, metallurgically bonded type.
- E. Grounding and Bonding Equipment: Per Section 26 05 26 "Grounding".
- F. Materials for Manholes and Hand Holes: Referred to throughout this Section as "structures" or "underground structure".
 - 1. Brick shall be sewer and manhole brick conforming to ASTM C32, Grade MS.
 - 2. Metal Frames and Covers: Provide cast iron frames and covers conforming to Fed. Spec. RR-F-621 except where rolled steel floor plate is indicated.
 - 3. Fiberglass Hand Holes: Shall be matched die molded of dark green fiberglass. When buried, the unit shall be capable of supporting an ultimate downward load of 6500 pounds distributed over a 6-inch by 6-inch area imposed anywhere on the cover surface (H10 loading per AASHTO HB-12). Unit shall have precut 6-inch by 6-inch cable entrance at the center bottom of each side. A fiberglass weatherproof cover with nonskid surface shall be provided for each hand hole. Covers shall be capable of being locked into position.

4. Polymer Concrete Hand Holes: Shall be matched die molded of dark green fiberglass. When buried, the unit shall be weight load rated as Tier T22: 22,000 pound design and 33,750 pound test (ANSI). Unit shall have precut 6-inch by 6-inch cable entrance at the center bottom of each side. A weatherproof cover with nonskid surface shall be provided for each hand hole. Covers shall be capable of being locked into position.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Underground installation shall conform to ANSI C2 and NFPA 70 except as otherwise specified or indicated.
- B. Contractor Damage: The Contractor shall promptly repair any indicated utility lines or systems damaged by Contractor operations. If the Contractor is advised in writing of the location of a non-indicated line or system, such notice shall provide that portion of the line or system with "indicated" status in conformance with the Contract Documents. The Contractor shall immediately notify the Engineer of any such damage to any underground line that is indicated on Contract Drawings, indicated by supplemental information from the Engineer or not indicated.
- C. Direct Burial System: Bury cables directly in earth, except under railroad tracks, paved areas, and roadways; install cables in conduit encased in concrete. Slope ducts to allow drainage. Trenches in which the cables are placed shall be excavated by hand or with mechanical trenching equipment. Provide a minimum cable cover of 24 inches below finished grade for power conductors operated at less than 600 volts. Trenches shall be not less than 6 inches wide, and shall be in straight lines between cable markers. Cable plows shall not be used. Bends in trenches shall have a radius of not less than 36 inches. Where two or more cables are laid parallel in the same trench, space cables laterally at least 3 inches apart. If rock is encountered, remove rock to a minimum depth of 3 inches below the cable and fill the space with sand or clean earth free from particles larger than 1/4 inch. Cables shall not be unreeled and pulled into the trench from one end. However, the cable may be unreeled on grade and lifted into position. Provide a plastic warning tape as specified herein.
 - 1. Cables crossing other cables or metal piping shall be separated from the other cables or pipe by not less than 3 inches of well-tamped earth.
 - 2. Cables shall be in one piece without splices between connections except where the distance exceeds the lengths in which the cable is furnished.
 - 3. Bends in cables shall be not less than those specified in NFPA 70 for the type of cable specified.
 - 4. Horizontal slack of approximately 3 feet shall be left in the ground on each end of cable runs, on each side of connection boxes, and at all points

- where connections are brought above ground. Where cable is brought aboveground, leave additional slack to make necessary connections. Splices in lead-sheathed or armored cables shall be enclosed in split-type cast-iron splice boxes; after completion of the connection, tightly clamp the box and fill with insulating filler compound.
- 5. Identification Slabs: Provide a slab at each change of direction of the cable, over the ends of ducts or conduits which are installed under paved areas and roadways, and over each splice. Identification slabs shall be concrete, approximately 20 inches square by 6 inches thick, and shall be set flat in the ground so that the top surface projects not less than 3/4 inch, nor more than 1-1/4 inches aboveground. The concrete shall have a minimum compressive strength of 3000 psi and shall have a smooth, troweled finish on exposed surface. Inscribe an identifying legend such as "cable", "duct", "splice", or other applicable designation on the top surface of slab before the concrete hardens. Inscribe circuit identification symbols on slabs as directed. The letters or figures shall be approximately 2 inches high, and the grooves shall be approximately 1/4 inch in width and depth. Install the slabs so that the side nearest the inscription on the top shall include an arrow indicating the side nearest the cable.
- D. Underground Duct Without Concrete Encasement: Direct buried ductbank systems. Shall be as shown on the Contract Documents.
 - 1. The top of the conduit shall be not less than 24 inches below grade, shall have a minimum slope of 3 inches in each 100 feet away from buildings and toward manholes and other necessary drainage points, and shall run in straight lines except where a change of direction is necessary. As each conduit run is completed, a testing mandrel not less than 12 inches long with a diameter 1/4 inch less than the inside diameter of the conduit shall be drawn through each conduit, after which a stiff-bristled brush shall be drawn through until the conduit is clear of earth, sand, or gravel particles. Conduit plugs shall then immediately be installed. Ensure a minimum 3-inch clearance from the conduit to each side of the trench. Grade the bottom of the trenches smooth; where rock, soft spots, or sharp-edged materials are encountered, excavate the bottom for an additional 3 inches; fill with sand or earth, free from particles that would be retained on a 1/4-inch sieve; and tamp level with the original bottom.
 - 2. Under roads, paved areas, and railroad tracks, install conduits in concrete encasement of rectangular cross-section providing a minimum of 3-inch concrete cover around ducts. The concrete encasement shall extend at least 8 feet beyond the edges of paved areas and roads, and 12 feet beyond the rails on each side of railroad tracks. Conduits to be installed under existing paved areas which are not to be disturbed, and under roads and railroad tracks, shall be zinc-coated, rigid steel, jacked into place.
 - 3. Separate multiple conduits with a minimum concrete thickness of 2 inches, except that light and power conduits shall be separated from control, signal, and telephone conduits by a minimum distance of 12

inches. Stagger the joints of the conduits by rows and layers to strengthen the conduit assembly. Provide plastic duct spacers that interlock vertically and horizontally. Spacer assembly shall consist of base spacers, intermediate spacers, and top spacers to provide a completely enclosed and locked-in conduit assembly. Install spacers per manufacturer's instructions, but provide a minimum of two spacer assemblies per 10 feet of conduit assembly.

- E. Underground Duct With Concrete Encasement: Encased only and reinforced concrete duct banks. Shall be constructed of individual conduits encased in concrete. Except where rigid galvanized steel conduit is indicated or specified, the conduit shall conform to NEMA TC 6, Type EB. The type of conduit used shall not be mixed in any one duct bank. Ducts shall be a minimum of 4 inches in diameter unless otherwise indicated. The concrete encasement surrounding the bank shall be rectangular in cross-section and shall provide at least 3 inches of concrete cover around ducts. Separate conduit by a minimum concrete thickness of 2 inches, except separate light and power conduits from control, signal, and telephone conduits by a minimum concrete thickness of 12 inches.
 - 1. The top of the concrete envelope shall be a minimum of 18 inches below grade, except under roads and pavement, concrete envelope shall be a minimum of 24 inches below grade.
 - 2. Duct banks shall have a continuous slope downward toward underground structures and away from buildings with a minimum pitch of 3 inches in 100 feet. Except at conduit risers, changes in direction of runs exceeding a total of 10 degrees, either vertical or horizontal, shall be accomplished by long sweep bends having a minimum radius of curvature of 25 feet; sweep bends may be composed of one or more curved or straight sections or combinations thereof. Manufactured bends shall have a minimum radius of 18 inches for use with conduits of less than 3 inches in diameter and a minimum radius of 36 inches for ducts of 3 inches in diameter and larger. Excavate trenches along straight lines from structure to structure before ducts are laid or structure constructed so the elevation can be adjusted, if necessary, to avoid unseen obstruction.
 - 3. Terminate conduits in end-bells where ducts enter underground structures. Stagger the joints of the conduits by rows and layers to strengthen the duct bank. Provide plastic duct spacers that interlock vertically and horizontally. Spacer assembly shall consist of base spacers, intermediate spacers, and top spacers to provide a completely enclosed and locked-in duct bank. Install spacers per manufacturer's instructions, but provide a minimum of two spacer assemblies per 10 feet of duct bank. Before pouring concrete, anchor duct bank assemblies to prevent the assemblies

- from floating during concrete pouring. Anchoring shall be done by driving reinforcing rods adjacent to every other duct spacer assembly and attaching the rod to the spacer assembly.
- 4. As each section of a duct bank is completed from structure to structure, a testing mandrel not less than 12 inches long with a diameter 1/4 inch less than the inside diameter of the conduit shall be drawn through each conduit, after which a stiff-bristled brush, having the diameter of the conduit shall be drawn through until the conduit is clear of earth, sand, and gravel particles. Conduit plugs shall then be immediately installed.
- 5. New conduit indicated as being unused or empty shall be provided with plugs on each end. Plugs shall contain a weep hole or screen to allow water drainage. Provide a plastic pull rope (minimum 200# rating) having 3 feet of slack at each end of unused or empty conduits.
- 6. Connections to Manholes/Handholes: Duct bank envelopes connecting to underground structures shall be flared to have an enlarged cross-section at the manhole entrance to provide additional shear strength. The dimensions of the flared cross-section shall be larger than the corresponding manhole opening dimensions by no less than 12 inches in each direction. The perimeter of the duct bank opening in the underground structure shall be flared toward the inside or keyed to provide for a positive interlock between the duct bank and the wall of the structure. Vibrators shall be used when this portion of the envelope is poured to assure a seal between the envelope and the wall of the structure.
 - a. For connection to precast concrete and cast-in-place concrete handholes/manholes: Provide concrete encasement for all conduit ductbank systems (direct buried conduit ductbank, concrete encased conduit ductbank, reinforced concrete encased ductbank) connections at handholes a minimum of 48" from manhole/handhole. Concrete shall be keyed into manhole/handhole.
- 7. Connections to Existing Hand Holes: For duct bank connections to existing structures, break the structure wall out to the dimensions required and preserve the steel in the structure wall. Cut the steel and extend it into the duct bank envelope. Chip the perimeter surface of the duct bank opening to form a key or flared surface, providing a positive connection with the duct bank envelope.
- 8. Connections to Concrete Pads: For duct bank connections to concrete pads, break an opening in the pad out to the dimensions required and preserve the steel in the pad. Cut the steel and extend it into the duct bank envelope. Chip out the opening in the pad to form a key for the duct bank envelope.
- 9. Connections to Existing Ducts: Where connections to existing duct banks are indicated, excavate the banks to the maximum depth necessary. The banks shall be cut off and loose concrete removed from the conduits

- before new concrete-encased ducts are installed. A reinforced concrete collar, poured monolithically with the new duct bank, shall be provided to take the shear at the joint of the duct banks. Remove existing cables which constitute interference with the work. Abandon in place the unused ducts and cables which do not interfere with the work.
- 10. Partially Completed Duct Banks: During construction wherever a construction joint is necessary in a duct bank, prevent debris such as mud, sand, and dirt from entering ducts by providing suitable conduit plugs. Fit concrete envelope of a partially completed duct bank with reinforcing steel extending a minimum of 2 feet back into the envelope and a minimum of 2 feet beyond the end of the envelope. Provide one No. 4 bar in each corner, 3 inches from the edge of the envelope. Secure corner bars with two No. 3 ties, spaced approximately 1 foot apart. Restrain reinforcing assembly from moving during concrete pouring.
- F. Concrete for Electrical Requirements: Concrete shall be 4,000 psi minimum ultimate 28-day compressive strength with 1-inch maximum aggregate conforming to the requirements of Section 03 30 00, "Cast-in-Place Concrete". Concrete for Electrical Requirements: Shall be composed of fine and coarse aggregate, Portland cement, and water proportioned and mixed to produce a plastic, workable mixture. Fine aggregate shall be of hard, dense, durable, clean, and uncoated sand. The coarse aggregate shall be 3/16 inch to 1 inch size. The fine and coarse aggregates shall not contain dirt, vegetable matter, soft fragments, or other deleterious substances. Water shall be fresh, clean, and free from salts, alkali, organic matter, and other impurities. Concrete shall be 4,000 psi minimum ultimate 28-day compressive strength. Slump shall not exceed 4 inches. Retempering of concrete will not be permitted. Exposed, unformed concrete surfaces shall be given a smooth, wood float finish. Concrete shall be cured for a period of not less than 7 days, and concrete made with high early strength Portland cement shall be repaired by patching honeycombed or otherwise defective areas with cement mortar as directed. Air entrain concrete exposed to weather using an air-entraining admixture conforming to ASTM C260. Air content shall be between 4 and 6 percent.
- G. Buried Utility Warning and Identification Tape: Provide detectable aluminum foil plastic-backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried cable and conduit. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 2 inches minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be CAUTION BURIED ELECTRIC CABLE BELOW or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material. Bury tape with the printed side up at a depth of 12 inches below the top surface of earth or the top surface of the subgrade under pavements.

- H. Reconditioning of Surfaces:
 - 1. Unpaved surfaces disturbed during the installation of duct or direct burial cable shall be restored to the original elevation and condition. Sod or topsoil shall be preserved carefully and replaced after the backfilling is completed. Replace damaged sod with sod of equal quality. Where the surface is disturbed in a newly seeded area, the disturbed surface shall be reseeded with the same quantity and formula of seed as that used in the original seeding.
 - 2. Paving Repairs: Where trenches, pits, or other excavations are made in existing roadways and other areas of pavement where surface treatment of any kind exists, such surface treatment or pavement shall be restored to the same thickness and in the same kind as previously existed, except as otherwise specified, and to match and tie into the adjacent and surrounding existing surfaces in a neat and acceptable manner.
- I. Cable Pulling: Test existing ducts with a mandrel and thoroughly swab out to remove foreign material before the pulling of cables. Cables shall be pulled down grade with the feed-in point at the manhole or buildings of the highest elevation. Flexible cable feeds shall be used to convey cables through the manhole opening and into the ducts. Cable lubricants shall be lubricants specifically recommended by the cable manufacturer. Cable-pulling tensions shall not exceed the maximum pulling tension recommended by the cable manufacturer. Do not exceed the specified cable bending radii when installing cable under any conditions, including turnups into switches, transformers, switchgear, switchboards, and other enclosures. Cable with tape shield shall have a bending radius not less than 12 times the overall diameter of the completed cable. Cable with wire shield shall have a bending radius not less than eight times the overall diameter of the completed cable. If basket-grip type cable-pulling devices are used to pull cable in place, cut off the section of cable under the grip before splicing and terminating.
 - 1. Installation of Cables in Manholes, Hand Holes, and Vaults: Route cables along walls providing the longest route and the maximum spare cable lengths. Form cables to closely parallel walls without interference to duct entrances. Support cables on brackets and cable insulators at a maximum of 4 feet. In existing manholes, hand holes, and vaults where new ducts are to be terminated, or where new cables are to be installed, the existing installation of cables, cable supports, and grounding shall be modified as required with cables arranged and supported as specified for new cables. Identify each cable by corrosion-resistant embossed metal tags attached in each underground structure in accordance with the cable schedule and as approved by the Engineer. Example: 600V cable, Circuit 4-Sub. NB to SP. Identify each phase of the 600V cable.

J. Hand Holes:

- 1. Workmanship: Underground structures shall be precast construction as specified herein. Horizontal concrete surfaces of floors shall have a smooth trowel finish. Locate duct entrances and windows in the center of end walls (shorter) and near the corners of sidewalls (longer) to facilitate cable racking and splicing. Covers for underground structures shall fit the frames without undue play. Steel and iron shall be formed to shape and size with sharp lines and angles. Castings shall be free from warp and blowholes that may impair strength or appearance. Exposed metal shall have a smooth finish and sharp lines and arises. Provide necessary lugs, rabbets, and brackets. Set pulling-in irons and other built-in items in place before depositing concrete. The words "electric" and "telephone" shall be cast in the top face of power and telephone manhole covers, respectively.
- 2. Precast Concrete Construction: Precast units shall be the product of a manufacturer regularly engaged in the manufacture of precast concrete products, including precast manholes and hand holes.
 - General: Precast concrete structures shall have the same accessories and facilities as required for poured-in-place structures. Likewise, precast structures shall have plan area and clear heights not less than those of poured-in-place structures. Concrete materials and methods of construction shall be the same as for poured-in-place concrete construction, as modified herein. Slope in floor may be omitted provided precast sections are poured in reinforced steel forms. Concrete for precast work shall have an ultimate 28-day compressive strength of not less than 4000 psi. Structures may be precast to the design and details indicated for poured-in-place construction, precast monolithically and placed as a unit, or structures may be assembled sections, designed and produced by the manufacturer in accordance with the requirements specified. Structures shall be identified with the manufacturer's name embedded in, or otherwise permanently attached to, an interior wall face.
 - b. Design for Precast Structures: ACI 318. In the absence of detailed on-site soil information, design for the following soil parameters/site conditions:

Angle of Internal Friction (0) = 30 degrees

Unit Weight of Soil () = 110 pcf

Coefficient of Lateral Earth Pressure (Ko) = 0.50

Ground Water Level = 3 feet below ground elevation

Vertical design loads shall include full dead, superimposed dead, and live loads including a 30 percent magnification factor for impact. Live loads shall consider all types and magnitudes of vehicular (automotive, industrial, or aircraft) traffic to be encountered. The minimum design vertical load shall be for H20 highway loading per AASHTO HB-12.

Horizontal design loads shall include full geostatic and hydrostatic pressures for the soil parameters, water table, and depth of installation to be encountered. Also, horizontal loads imposed by adjacent structure foundations, and horizontal load components of vertical design loads, including impact, shall be considered, along with a pulling-in iron design load of 6000 pounds.

Each structural component shall be designed for the load combination and positioning resulting in the maximum shear and moment for that particular component.

Design shall also consider the live loads induced in the handling, installation, and backfilling of the manholes. Provide lifting devices to ensure structural integrity during handling and installation.

Construction: Structure top, bottom, and walls shall be of a c. uniform thickness of not less than 6 inches. Thin-walled knock-out panels for designed or future duct bank entrances shall not be permitted. Quantity, size, and location of duct bank entrance windows shall be as directed, and cast completely open by the precaster. The size of the windows shall exceed the nominal duct bank envelope dimensions by at least 12 inches in each direction to preclude in-field window modifications made necessary by duct bank misalignment. However, the sides of precast windows shall be a minimum of 6 inches from the inside surface of adjacent walls, floors, or ceilings. Form the perimeter of precast window openings to have a keyed or inward flared surface to provide a positive interlock with the mating duct bank envelope. Provide welded wire fabric reinforcing through window openings for in-field cutting and flaring into duct bank envelopes. Provide additional reinforcing steel comprised of at least two No. 4 bars around window openings. The minimum concrete cover for reinforcing steel shall be 2 inches. Provide drain sumps for precast structures a minimum of 12 inches in diameter and 4 inches deep.

- d. Joints: Provide tongue-and-groove joints on mating edges of precast components. Shiplap joints shall not be allowed. Design joints to firmly interlock adjoining components and to provide waterproof junctions and adequate shear transfer. Seal joints watertight using preformed plastic strip conforming to AASHTO M 198, Type B. Install sealing material in strict accordance with the sealant manufacturer's printed instructions. Provide waterproofing at conduit/duct entrances into structures and, where access frame meets the top slab, provide continuous grout seal.
- 3. Metal Frames and Covers: Frames and covers of steel shall be welded by qualified welders in accordance with standard commercial practice. Steel covers shall be rolled-steel floor plate having an approved anti-slip surface. Hinges shall be of galvanized steel with bronze hinge pin, 5 by 5 inches by approximately 3/16 inch thick, without screw holes, and shall be for full surface application by fillet welding. Hinges shall have non-removable pins and five knuckles. The surfaces of plates under hinges shall be true after the removal, by grinding or other approved method, of raised lugs.
- 4. Precast Hand Holes Installation: Commercial precast assembly shall be set on 6 inches of level, 90 percent compacted granular fill, 3/4 inch to 1 inch size, extending minimally 12 inches beyond the manholehand hole on each side. Granular fill shall be compacted by a minimum of four passes with a plate type vibrator. Installation shall conform to the manufacturer's instructions.
- 5. Field Painting: Cast-iron frames, covers, and gratings not buried in masonry shall be cleaned of mortar, rust, grease, dirt, and other deleterious materials, and coated with bituminous paint. Steel frames not buried in masonry and steel covers shall be cleaned of mortar, dirt, and grease by an approved blasting process. Surfaces that cannot be cleaned satisfactorily by blasting shall be cleaned to bare metal by wire brushing or other mechanical means. Surfaces contaminated with rust, dirt, oil, grease, or other contaminants shall be washed with solvents until thoroughly cleaned. Immediately after cleaning, surfaces shall be coated with a pretreatment coating or a crystalline phosphate coating. As soon as practicable after the pretreatment coating has dried, treated surfaces shall be coated with zinc chromate primer and synthetic exterior gloss enamel. Pretreatment primer and paint shall be as specified for shop painting in Section 26 05 01, "Electrical General Requirements".
- 6. Removal of Ducts: Where duct banks are removed from existing underground structures, close the openings to waterproof the structure. Chip out the wall opening to provide a key for the new section of wall.

- K. Excavating, Backfilling, and Compacting: Excavate underground structures to depths indicated. If hard material is encountered, the provisions of the Contract respecting an adjustment for changed conditions shall apply, subject to the requirements of notification thereunder being given. Hard material shall be defined as solid rock; firmly cemented unstratified masses; conglomerate deposits possessing the characteristics of solid rock not ordinarily removed without systematic drilling and blasting; or any boulder, masonry, or concrete (except pavement) exceeding 1/2 cubic yard in volume.
 - 1. Excavated materials not required or suitable for backfill shall be wasted on the project site as directed. Provide sheeting and shoring as necessary for protection of work and safety of personnel. Remove water from excavation by pumping or other approved method.
 - 2. Backfilling around structures shall consist of earth, loam, sand-clay, or sand and gravel, free from large clods of earth or stones over 1 inch in size. Backfill materials shall be placed symmetrically on all sides in loose layers not more than 9 inches deep. Each layer shall be moistened, if necessary, and compacted with mechanical or hand tampers to 90 percent compaction.
 - 3. Backfilling Trenches: Place backfill in layers not more than 6 inches thick, and compact each layer. Backfilling shall progress as rapidly as the construction, testing, and acceptance of the work permits. Backfill shall be free from roots, wood scrap material, and other vegetable matter and refuse. Compaction of backfill shall be to 90 percent of ASTM D698 density. The first layer shall be earth or sand, free from particles that would be retained on a 1/4-inch sieve and extending not less than 3 inches above the top of the conduit or cables. The succeeding layers shall be excavated material having stones no larger than would pass through a 4-inch ring. The backfill may be moistened. The backfill shall be level with the adjacent surface, except that in sodded areas, leave a space equal to the thickness of the sod.
- L. Cable Terminating: Protect terminations of insulated power and lighting cables from accidental contact, deterioration of coverings, and moisture by the use of terminating devices and materials. Make terminations by using materials and methods indicated or specified herein or as designated by the written instruction of the cable manufacturer and termination kit manufacturer. Adequately support cables and cable terminations to avoid any excessive strain on the termination and the conductor connection.
- M. Splices for 600-Volt Class Cables: Splices in underground conduit systems shall be made only in accessible locations such as manholes and hand holes, using a compression connector on the conductor and by insulating and waterproofing by one of the following methods suitable for continuous submersion in water.

- 1. Cast-type splice insulation shall be provided by means of a molded casting process employing a thermosetting epoxy resin insulating material which shall be applied by a gravity-poured method or by a pressure-injected method. The component materials of the resin insulation shall be in a packaged form ready for convenient mixing without removing from the package. Do not allow the cables to be moved until after the splicing material has completely set.
- 2. Gravity-poured method shall employ materials and equipment contained in an approved commercial splicing kit which includes a mold suitable for the cables to be spliced. When the mold is in place around the joined conductors, prepare and pour the resin mix into the mold. Do not allow cables to be moved until after the splicing materials have completely set.
- N. Grounding: Shall be per Section 26 05 26, "Grounding".
- O. Special Conditions: During the construction of duct banks and underground structures located in access roads, streets and similar traffic areas, these area shall remain open to traffic. Plan and execute the work to meet this condition. At locations where duct banks cross railroad tracks and the work requires closing of the tracks, secure permission from the Engineer and Railroad Owner for each track closure.

3.02 FIELD TESTS

- A. As an exception to requirements that may be stated elsewhere in the Contract, notify the Engineer in writing at least 5 working days prior to each tests. Furnish labor, equipment, and incidentals required for testing, except that the Owner will provide electric power required for the tests. Correct defects in the work provided by the Contractor and repeat tests until the work is in compliance with contract requirements. Show by demonstration in service that circuits and devices are in good operating condition. Tests shall be such that each item of control equipment will function not less than five times.
- B. Compaction: Backfill shall be tested in accordance with ASTM D1556, one test per lift per 2000 square feet.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials, equipment and accessories for Panelboards, as shown on the Plans, as specified and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only and shall be the most current version.
 - 1. National Electrical Contractors Association (NECA) Publication:
 - 2. Standard of Installation
 - 3. National Electrical Manufacturers Association (NEMA) Publications:
 - a. AB1 Molded Case Circuit Breakers
 - b. PB 1 Panelboards
 - c. PB 1.1 Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less
 - 4. National Fire Protection Association (NFPA) Publication:
 - a. 70 National Electrical Code

1.03 SUBMITTALS

- A. Submittal Packages: Submit the shop drawings, product data, and the quality control submittals specified below at the same time as a package.
- B. Shop Drawings: Include the following for each panelboard.
 - 1. Cabinet and gutter size.
 - 2. Voltage and current rating.
 - 3. Panelboard short circuit rating. Indicate if rating is Fully Rated Equipment Rating, or where acceptable, UL listed Integrated Equipment Short Circuit Rating.
 - 4. Circuit Breaker Enumeration (Frame, Poles, KAIC.): Indicate if circuit breakers are suitable for the panelboards' Fully Rated Equipment Rating, or where acceptable, are series connected devices that have been test verified and listed with UL (include documentation proving the compatibility of the proposed circuit breaker combinations). Circuit

4.23 PANELBOARDS 409.005.001 26 24 16-1 breakers do not have to be listed as series connected devices when all of the circuit breaker interrupting ratings are equal to, or greater than, the short circuit rating of the panelboard.

5. Accessories.

C. Product Data:

- 1. Catalog sheets, specifications and installation instructions.
- 2. Bill of materials.
- D. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.
- E. Contract Closeout Submittals:
 - 1. Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to Owner.

PART 2 - PRODUCTS

2.01 PANELBOARDS

- A. As produced by Cutler-Hammer/Eaton Corp, General Electric Co., , or Square D Co., having:
 - 1. Flush or surface type cabinets as indicated on the Contract Drawings.
 - 2. Increased gutter space for gutter taps, sub-feed wiring, through-feed wiring, oversize lugs.
 - 3. UL label "SUITABLE FOR USE AS SERVICE EQUIPMENT" where used as service equipment.
 - a. Where indicated, equip panelboards used as service equipment with secondary surge arresters; GE's Tranquell Series, Joslyn's Mfr. Co.'s Surge Tec Series, Intermatic Incorp.'s AG2401 or AG6503, Square D Co.'s SDSA 1175 or SDSA 3650, to suit system primary (transformer size, available current) and secondary characteristics.
 - 4. Door and one piece trim. Door fastened to trim with butt or piano hinges. Trim fastened to cabinet with devices having provision for trim adjustment. Provide door-in-door trim.
 - 5. Door lock. 2 keys with each lock. All locks shall be keyed alike.
 - 6. Solid copper bus bars. Ampere rating of bus bars not less than frame size of main circuit breaker.
 - 7. Full capacity copper isolated neutral bus in panelboards where neutrals are required and the panel is not utilized as service equipment.
 - 8. Copper equipment grounding bus in panelboards where equipment grounding conductors are required.

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- 9. Sections designated "space" or "provision for future breaker" equipped to accept future circuit breakers.
- 10. Lock on devices for exit light, fire alarm, stair well circuits or as indicated on Contract Drawings.
- 11. Provisions for padlocking circuit breaker handle in OFF position where indicated.
- 12. Blank circuit directories in plastic pockets.
- 13. Short circuit rating not less than indicated on panelboard schedule. Furnish panelboards having Fully Rated Equipment Rating (the short circuit rating of the panelboard is equal to the lowest interrupting rating of any device installed in the panelboard).
- 14. Molded Case Circuit Breakers.
 - a. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Do not use tandem circuit breakers. Type HACR for air conditioning equipment circuits, Class A ground fault interrupter circuit breakers where scheduled. The fault interrupter shall detect and trip on current imbalance of 6 milliamperes or greater per requirements of UL 943 for Class A GFCI devices.
 - b. Components: See panelboard schedule for specific components required for each circuit breaker. In addition to the specific components, equip each circuit breaker with additional components as required to achieve a coordinated selective scheme between the main circuit breaker and the branch/feeder circuit breakers when indicated on the panelboard schedule that a coordinated selective scheme is required.
 - c. Single pole 15 amp and 20 amp circuit breakers marked SWD where used as switches.
 - d. Single pole and two pole 15, 20, and 30 amp circuit breakers rated for high intensity discharge lighting loads when applicable.
- 15. Size of circuit breakers and rating of main lugs shall be as indicated on Contract Drawings.
- 16. Enclosure: as scheduled on Contract Drawings.

2.02 NAMEPLATES

- A. General: Precision engrave letters and numbers with uniform margins, character size minimum 3/16 inch high.
 - 1. Phenolic: Two color laminated engravers stock, 1/16 inch minimum thickness, machine engraved to expose inner core color (white).
 - 2. Aluminum: Standard aluminum alloy plate stock, minimum .032 inches thick, engraved areas enamel filled or background enameled with natural aluminum engraved characters.
 - 3. Materials for Outdoor Applications: As recommended by nameplate manufacturer to suit environmental conditions.

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- 4. Provide the following information on the panelboard door:
 - a. Panel designation
 - b. "Fed from". Descriptive location and/or main feeder connection indication.
 - c. Volts
 - d. 1 or 3 Phase indication and wire indication
 - e. Bus Amperage
 - f. Feeder phase/wire color designations.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install panelboards in accordance with NEMA Publication No. PB1.1 "General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less".
- B. Flush Cabinets: Set flush cabinets so that edges will be flush with the finished wall line. Where space will not permit flush type cabinets to be set entirely in the wall, set cabinet as nearly flush as possible, and cover the protruding sides with the trim extending over the exposed sides of the cabinet and back to the finished wall line.
- C. Directory: Indicate on typewritten directory the equipment controlled by each circuit breaker, and size of feeder servicing panelboard. For power panelboards also include ATE rating and feeder size for each breaker.
- D. Identification:
 - 1. Install nameplates on front of each panelboard.
 - a. Identification of 120/208 Volt Circuit Conductors:
 - 1) 2 wire circuit white*, black.
 - 2) 3 wire circuit white*, black, red.
 - 3) 4 wire circuit white*, black, red, blue.
 - *White is used only as neutral. Where neutral is not required, black, red, or black, red, blue is used for phase to phase circuits.
 - b. Identification of 277/480 Volt Circuit Conductors:
 - 1) 2 wire circuit natural gray**, brown.
 - 2) 3 wire circuit natural gray**, brown, yellow.
 - 3) 4 wire circuit natural gray**, brown, yellow, orange.
 - **Natural gray is used only as neutral. Where neutral is not required, brown, yellow, or brown, yellow, orange is used for phase to phase circuits.

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- E. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.
- F. Provide filler plates for unused spaces in panelboards.
- G. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.
- H. Provide spare conduits out of each recessed panelboard to an accessible location above ceiling. Minimum spare conduits: 5 empty 1 inch. Identify each as SPARE.

3.02 FIELD QUALITY CONTROL

- A. System Acceptance Test:
 - 1. Preparation: Notify Owner/Engineer at least 3 working days prior to the test so arrangements can be made prior to the test to have a Facility Representative witness the test.
 - 2. Make the following tests:
 - a. Test circuit breakers that have ground fault protection.
 - b. Test programmable solid state trip devices in accordance with the manufacturer's recommendations.
 - c. Supply all equipment necessary for system adjustment and testing.
 - d. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION

4.23 PANELBOARDS 409.005.001 26 24 16-5

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Wiring Devices as shown on the Plans, as specified, and/or directed.

1.02 REFERENCES

- A. NEMA
- B. UL
- C. NFPA 70

1.03 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions.

1.04 RELATED SECTIONS

A. Section 26 05 01, "Electrical General Requirements", applies to this Section, with the additions and modifications specified herein.

PART 2 - PRODUCTS

2.01 SWITCHES

- A. Local Switches, Single Pole: 20A, 120/277 V ac; Bryant's 4901, Crouse-Hinds/AH's 1991, Hubbell's 1121/1221, Leviton's 1121/1221, Pass & Seymour's 20AC1.
- B. Local Switches, Double Pole: 20A, 120/277 V ac; Bryant's 4902, Crouse-Hinds/AH's 1992, Hubbell's 1222/1122, Leviton's 1222/1122, Pass & Seymour's 20AC2.
- C. Local Switches, Three-Way: 20A, 120/277 V ac; Bryant's 4903, Crouse-Hinds/AH's 1993, Hubbell's 1223/1123, Leviton's 1223-2/1123-2, Pass & Seymour's 20AC3.
- D. Local Switches, Four-Way: 20A, 120/277 V ac; Bryant's 4904, Crouse-Hinds/AH's 1994, Hubbell's 1224/1124, Leviton's 1224-2/1124-2, Pass & Seymour's 20AC4.

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E. Local Switches, Dimming: 20A, 120/277 V ac; Eaton's WBSD-010SLD, Leviton's 66EV-10W, Pass & Seymour's WS4FBL3PW.

2.02 RECEPTACLES

- A. Federal Spec./NEMA Grade Receptacles:
 - 1. Single receptacle, NEMA 5-20R (20A, 125 V, 2P, 3W); Bryant's 5361, Crouse-Hinds/AH's 5361, Hubbell's 5361, Leviton's 5361, or Pass & Seymour's 5361.
 - 2. Duplex receptacle, NEMA 5-20R (20A, 125 V, 2P, 3W); Bryant's 5362, Crouse-Hinds/AH's 5739-S, Hubbell's 5362, Leviton's 5362, Pass & Seymour's 5362, or Daniel Woodhead's 5362 DW.
- B. Ground Fault Interrupter Receptacles: Duplex receptacle rated 20A (NEMA 5-20R), circuit ampacity 20A; Bryant's GFR53FT, Crouse-Hind/AH's GF5342, Hubbell's GF 5352, Leviton's 6899, Pass & Seymour's 2091S,

2.03 WALL PLATES

- A. Stainless Steel Wall Plates: Type 302 stainless steel with satin finish. All areas except finished spaces or wet locations.
- B. Weatherproof/Wet Location Covers: UL 514D type "extra duty". Thomas & Betts Red Dot Code Keeper type 2CKU or equal.
- C. Finished areas: Polycarbonate. Color to match device color.

2.04 NAMEPLATES

- A. Phenolic Type: Standard phenolic nameplates with 3/16 inch minimum size lettering engraved thereon.
- B. Embossed Aluminum: Standard stamped or embossed aluminum tags, 3/16 inch minimum size lettering, as produced by Seton Name Plate Corp. or Tech Products Inc.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install wiring devices in outlet boxes.
- B. Local Switches:
 - 1. Install local switches rated 20A, 120/277 V ac for switches unless otherwise shown on the drawings or specified.
 - 2. Where more than one switch occurs at same location in a 120 volt system, arrange switches in gangs and cover with one face plate.

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3. Install single and double pole switches so that switch handle is up when switch is in the "On" position.

C. Receptacles:

- 1. Install Specification Grade receptacles, NEMA 5-20R, 20A, 125 V, 2P, 3W, for duplex receptacles and single receptacles unless otherwise shown on the drawings or specified.
- 2. Install receptacles with ground pole in the down positon.

D. Wall Plates:

- 1. Install wall plates on all wiring devices in dry locations, with finish to match hardware in each area.
- E. Weatherproof In-use Covers: Install weatherproof covers on wiring devices in damp and wet locations.
- F. Nameplates: Provide phenolic or embossed aluminum nameplate for each special purpose receptacle indicating phase, ampere and voltage rating of the circuit. Attach nameplate with rivets or tamperproof fasteners to wall plate or to wall above receptacle. Wall plates may be engraved with required data in lieu of separate nameplates.
- G. Labels: Provide electronically-generated, self-sticking label at each wiring device. Label shall indicate panel designation and circuit number associated with respective device. Label shall be attached to outside of wall plate.
- H. Where Contract Drawings call out a classified area all equipment/devices and wiring methods to be suitable for this area per NEC. Refer to Contract Drawings for classified area locations.

END OF SECTION

SECTION 26 28 16

SAFETY SWITCHES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Safety Switches as shown on the Plans, as specified, and/or directed.

1.02 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions.

PART 2 - PRODUCTS

2.01 SAFETY SWITCHES (SINGLE THROW)

- A. NEMA KS1, switches serving as motor-disconnect means shall be horsepower rated. Provide heavy-duty type switches where indicated, where switches are rated higher than 240 volts, and for double-throw switches.
- B. Fused Switches: Provide fused switch as required or indicated. Fused switches shall utilize Class R fuse holders and fuses unless otherwise indicated.
- C. Enclosure: Enclosure shall be NEMA rated for installation environment.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install switches so that the maximum height above the floor to the center of the operating handle does not exceed 6'-6".
- B. Identify each safety switch, indicating purpose or load served:
 - 1. NEMA 1 Enclosures: Rivet or bolt nameplate to the cover.
 - 2. NEMA 12 Enclosures: Rivet or bolt and gasket nameplate to the cover.
 - 3. NEMA 3R, 4, 4X Enclosures: Attach nameplate to the cover using adhesive specifically designed for the purpose, or mount nameplate on wall or other conspicuous location adjacent to switch. Do not penetrate enclosure with fasteners.

END OF SECTION

SECTION 26 51 01

INTERIOR LIGHTING

PART 1 - GENERAL

1.01 SCOPE

A. The work under this Interior Lighting includes interior luminaires and accessories, exit signs, and building-mounted exterior lighting.

1.02 RELATED WORK

A. Applicable provisions of Division 1 govern work under this Section.

1.03 REFERENCE STANDARDS

- A. RoHS Restriction of Hazardous Substances. Council of the European Union (EC) Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
- B. LM-79-08 (or latest) IES Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products.
- C. LM-80-08 (or latest) IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- D. TM-21-11 (or latest) IES Technical Memorandum on Projecting Long Term Lumen Maintenance of LED Light Sources.
- E. NEMA SSL 1-2010 (or latest) Electronic Drivers for LED Devices, Arrays, or Systems.

1.04 SUBMITTALS

- A. Include outline drawings, lamp and ballast data, support points, weights, accessory information and performance data for each luminaire type.
- B. For each luminaire type, submit luminaire information including catalog cuts with highlighted catalog numbers and required accessories:
 - 1. Luminaire:
 - a. Manufacturer and catalog number,
 - b. Type (identification) as indicated on the plans and schedule,
 - c. Delivered lumens.
 - d. Input watts,
 - e. Efficacy,
 - f. Color rendering index.

2. Driver:

- a. Manufacturer and catalog number,
- b. Type (Non-Dimming, Step-dimming, Continuous dimming, etc.),
- c. Power Factor, Crest Factor, THD, etc.

1.05 OPERATION AND MAINTENANCE DATA

A. All operations and maintenance data shall comply with the submission and content requirements specified under Section General Requirements.

1.06 EXTRA MATERIALS

- A. Provide three (3) percent of each lamp type, but not less than one (1) of each type.
- B. Provide one (1) of each type of LED module, light bar, or array (if applicable). If the LED's are integrated into the luminaire and are not separate components, provide one (1) of each of these types of luminaires.
- C. Provide one (1) LED driver or ballast of each type.

1.07 DEFINITIONS

- A. Driver: The power supply used to power LED luminaires, modules, or arrays.
- B. L70, L₇₀, or L₇₀%: The reported life of an LED component or system to reach 70% lumen maintenance, or 70% of the LED's original light output. This test is being developed by the IES and is currently described by TM-21-11.
- C. LEDs: Broadly defined as complete luminaire with light emitting diode (LED) packages, modules, light bars or arrays, complete with driver.
- D. LED luminaire failure: Negligible light output from more than 10 percent of the LED's constitutes luminaire failure.

PART 2 - PRODUCTS

2.01 INTERIOR LUMINAIRES AND ACCESSORIES

- A. See the Luminaire Schedule on the drawings for type of luminaires and catalog numbers. Catalog numbers are shown on the drawings for quality and performance requirements only. Luminaires manufactured by others are equally acceptable provided they meet or exceed the performance of the indicated luminaires, and meet the intent of the design.
- B. Luminaire shall be listed by a NRTL (Nationally Recognized Testing Laboratory: e.g., UL, ETL, etc.).

- C. Provide luminaires with quick-connect disconnecting means, similar to Thomas & Betts Sta-Kon.
- D. Fluorescent T8 lamps and ballasts shall be listed on CEE high-performance qualifying product list and approved by Focus–On–Energy.

2.02 GENERAL USE LAMPS

- A. General Use Incandescent Lamps and Incandescent Reflector Lamps are prohibited. Use LED retrofit lamps or LED luminaires in lieu of incandescent or halogen luminaires. LED retrofit lamps shall be:
 - 1. Rated for the voltage of the incandescent lamp/luminaire they are replacing.
 - 2. Dimmable where required as indicated on the Plans.
 - 3. Rated for the luminaire in which they are being installed. Verify whether the luminaire is enclosed and whether the LED retrofit lamp is rated for enclosed luminaires and the temperatures that will be encountered.
 - 4. LED lamps/luminaires shall provide delivered footcandles equal to or greater than the footcandles provided by an equivalent incandescent lamp/luminaire.
 - 5. LED retrofit lamps shall have an average rated life of 25,000 hours, minimum.
 - 6. Lamp color temperature shall be nearly equal to the incandescent lamp it is replacing.
- B. All lamps shall be new.

2.03 LED LUMINAIRES

- A. LED Luminaires shall meet all DesignLights Consortium® (DesignLights.org) Product Qualification Criteria. This does not require that the luminaire be listed on the DesignLights Consortium's® Qualified Products List, but they must meet the Product Qualification Criteria. The technical requirements that the luminaire shall meet for each Application Category are:
 - 1. Minimum Light Output.
 - 2. Zonal Lumen Requirements.
 - 3. Minimum Luminaire Efficacy.
 - 4. Minimum CRI.
 - 5. L70 Lumen Maintenance.
 - 6. Minimum Luminaire Warranty of 5 years (not pro-rated) to include LED driver and all LED components.
- B. Color Temperature of 3000K-4100K for interior luminaires as listed in the Luminaire Schedule on the Plans. The color temperature of exterior LED luminaires should not exceed 4100K (nominal).

- C. Color Consistency: LED manufacturer shall use a maximum 3-step MacAdam Ellipse binning process to achieve consistent luminaire-to-luminaire color for interior luminaires. Exterior luminaires shall use a maximum 5-step MacAdam Ellipse binning process.
- D. Glare Control: Exterior luminaires shall meet DesignLights Consortium's® criteria for Zonal Lumen Distribution requirements or Backlight-Uplight-Glare (BUG) standards for exterior luminaires.
- E. Luminaire shall be mercury-free, lead-free, and RoHS compliant.
- F. Luminaire shall comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.
- G. Light output of the LED system shall be measured using the absolute photometry method following IES LM-79 and IES LM-80 requirements and guidelines.
- H. Luminaire shall maintain 70% lumen output (L70) for a minimum of 50,000 hours.
- I. Lumen output shall not depreciate more than 20% after 10,000 hours of use.
- J. Luminaire and driver shall be furnished from a single manufacturer to ensure compatibility.
- K. Luminaire Color Rendering Index (CRI) shall be a minimum of 80 for interior luminaires, and a minimum of 70 for exterior luminaires.
- L. LED luminaire shall be thermally designed as to not exceed the maximum junction temperature of the LED for the ambient temperature of the location the luminaire is to be installed. Rated case temperature shall be suitable for operation in the ambient temperatures typically found for the intended installation. Exterior luminaires to operate in ambient temperatures of -40°F to 104°F (-40°C to 40°C).
- M. Luminaire shall operate normally for input voltage fluctuations of plus or minus 10 percent.
- N. Luminaire shall have a maximum Total Harmonic Distortion (THD) of ≤20% at full input power and across specified voltage range.
- O. All connections to luminaires shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.
- P. All luminaires shall be provided with knockouts for conduit connections.
- Q. The LED luminaire shall carry a limited 5-year warranty minimum for LED light engine(s)/board array, and driver(s).

- R. Provide all of the following data on submittals:
 - 1. Delivered lumens
 - 2. Input watts
 - 3. Efficacy
 - 4. Color rendering index.
- S. LED Luminaires used for Emergency Egress Lighting: The failure of one LED shall not affect the operation of the remaining LEDs.
- T. Emergency LED Luminaire Compatibility with Inverters shall be sine-wave type, or have written confirmation from the luminaire manufacturer that the luminaire will function with a square-wave inverter.

2.04 LED DRIVERS

A. General Drivers:

- 1. Provide driver type (non-dimmed, step-dimmed, continuous-dimming, etc.) as indicated on the luminaire schedule on the drawings.
- 2. Minimum Warranty of 5 years (not pro-rated) to include LED driver and all LED components.
- 3. Driver shall have a rated life of 50,000 hours, minimum.
- 4. Driver and LEDs shall be furnished from a single manufacturer to ensure compatibility.
- 5. Driver shall have a minimum power factor (pf) of 0.9 and a maximum crest factor (cf) of 1.5 at full input power and across specified voltage range.
- 6. Driver shall operate normally for input voltage fluctuations of plus or minus 10 percent.
- 7. Driver shall have a maximum Total Harmonic Distortion (THD) of $\leq 20\%$ at full input power and across specified voltage range.
- 8. Wiring connections to LED drivers shall utilize polarized quick-disconnects for field maintenance.
- 9. Fuse Protections: All luminaires shall have built-in fuse protection. All power supply outputs shall be either fuse protected or be Polymeric Positive Temperature Coefficient (PTC)-protected as per Class 2 UL listing.
- 10. Provide all of the following data on submittals:
 - a. Input watts
 - b. Power Factor (pf)
 - c. Crest Factor (cf) at full input power
 - d. Total Harmonic Distortion (THD).

B. Dimming Drivers:

1. LED driver shall be compatible with dimming controls where dimming is indicated on the Plans. Dimmable drivers shall use Dimming Constant Current (DCC), Constant Voltage, or Pulse Width Modulation (PWM) operation.

- 2. Step-Dimming Drivers: Easily switched from 0% to 50% to 100% output power. Both switch-leg inputs shall control 50% of the luminaire's light output equally.
- 3. Continuous Dimming Drivers: LED luminaires shall dim to (10%, 1%, or 0.1%) as specified in the Luminaire Schedule on the Plans without visible flicker or "popcorn effect". "Popcorn effect" is defined as the luminaire being on a pre-set dimmed level (less than 100%), and going to 100% prior to returning to the pre-set level when power is returned to the luminaire. Continuous Dimming Drivers shall use 0-10V control.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Verify ceiling types with Architectural plans or with existing ceilings. Verify specified luminaires are compatible with specified ceiling type(s) prior to ordering luminaires.
- B. Install in accordance with manufacturer's instructions.
- C. Install suspended luminaires using aircraft cable, or pendants supported from swivel hangers. Heavy-duty chain supports may be used where indicated on the luminaire schedule. Provide aircraft cable, pendants, or chain lengths required to suspend luminaire at indicated height. All aircraft cables or pendant supported luminaires shall have an independent support to structure at all cable or pendant support locations. When chain is used, tie-wrap the luminaire wiring method to the chain.
- D. Support luminaires larger than 2 x 4 foot (600 x 1200 mm) size independent of ceiling framing.
- E. Provide independent support for all luminaires over 50 lbs.
- F. Locate ceiling luminaires as indicated on reflected ceiling plan.
- G. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prohibit movement.
- H. The Contractor shall install luminaire supports as required. Luminaire installations with luminaires supported only by insecure boxes will be rejected. It shall be the Contractor's responsibility to support all luminaires adequately, providing extra steel work for the support of luminaires if required. Any components necessary for mounting luminaires shall be provided by the Contractor. No plastic, composition or wood type anchors shall be used.

- I. Exposed Grid Ceilings: Provide auxiliary members spanning ceiling Ts to support surface mounted luminaires. Fasten surface mounted luminaires to ceiling T using bolts, screws, rivets, or suitable clips.
- J. Install recessed luminaires to permit removal from below.
- K. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
- L. Install code required hardware to secure recessed grid-supported luminaires in place.
- M. Install wall mounted luminaires and exit signs at height as scheduled. Use pendants supported from swivel hangers in exposed ceiling/structure locations where necessary to mount exit signs at the specified height.
- N. Install accessories furnished with each luminaire.
- O. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- P. Bond luminaires and metal accessories to branch circuit equipment grounding conductor.
- Q. Install specified lamps in each luminaire and exit sign.
- R. HID High-Bay or Low-Bay Luminaires: Use power hook hangers rated 500 pounds (225 kg) minimum and provide safety chain between ballast and structure. Also provide safety chain between reflector and ballast.
- S. Dimmed luminaire circuits shall have separate neutrals.
- T. Dimmed LED luminaires shall have a positive OFF, which requires turning off the circuit to the luminaire so that the luminaires don't "glow" at the lowest dimmed setting. This shall be accomplished using a switch, relay, or some other means acceptable to DFD.
- U. All lamps shall be delivered to the job in sealed cartons and protected from dirt and dust during storage on the project. Lamps shall be taken directly from the cartons and installed in the luminaire with special care so that they do not become dusty and are not soiled in the operation.
- V. Lamps installed in luminaires using dimming ballasts shall be burned in at 100% rated output by the contractor for a minimum of 100 hours as recommended by the ballast manufacturer.
- W. All new lamps shall be operational at the Substantial Completion of the project.

3.02 ADJUSTING AND CLEANING

- A. Align luminaires and clean lenses and diffusers at completion of work. Clean paint splatters, dirt, and debris from installed luminaires.
- B. Aim and adjust luminaires as indicated on drawings or as directed by the A/E.
- C. Touch up luminaire finish at completion of work.

3.03 INTERFACE WITH OTHER PRODUCTS

- A. Interface with air handling accessories furnished and installed under Division 23.
- B. Provide controls as indicated on the plans. Refer to Section 26 27 26, "Wiring Devices". Controls shall be compatible with the luminaires/ballasts/drivers being installed.

3.04 ZERO-TO-10V DIMMING CONTROL WIRING INSTALLATION

- A. Zero-to-10V dimming control conductors are classified by the NEC as Class 2 conductors and shall be kept separate from line-voltage conductors per NEC 725.136(A). Matching the insulation rating of Conductors of Different Systems does not apply to Class 2 conductors per NEC 300.3(C)(1), Informational Note No.1.
- B. Wall box dimmers will typically have two conduits: One conduit for line-voltage power, and one conduit or conduit stub for the 0-10V control wiring.
- C. At each luminaire, separate openings (either manufactured knock-outs or punched openings) shall be used for the line-voltage power and the 0-10V wiring. The EC shall use a cable connector at the opening for the 0-10V wiring. Zero-to-10V conductors entering and within a luminaire enclosure shall maintain a minimum separation of 6 mm (0.25 in.) per NEC 725.136(D).
- D. Exposed 0-10V cables shall be installed in separate conduits from line-voltage conductors.
- E. The 0-10V cables may be routed in free air where concealed above accessible ceilings. Cables routed in free air shall observe the following installation requirements:
 - 1. The 0-10V cables may be tie-wrapped to the outside of the luminaire power raceway where allowed by NEC 300.11(B)(2). Tie-wraps shall be UL listed for UV resistance. Care should be taken in the use of cable ties to secure and anchor the cabling. Ties shall not be over tightened as to compress the cable jacket. No sharp burrs shall remain where excess length of the cable tie has been cut.

- 2. Cabling shall be neatly run at right angles and be kept clear of other trades work.
- 3. Cabling shall be secured within twelve (12) inches of direction change or termination.
- 4. Cabling shall be supported at a maximum of 5-foot intervals utilizing "J-Hook" or "Bridle Ring" supports anchored to ceiling concrete, piping supports or structural steel beams. If cable sag at mid-span exceeds 12-inches, another support shall be provided. Cable supports shall be installed to maintain cable bend to larger than the minimum bend radius.
- 5. Cabling shall not be attached to or supported by existing cabling, plumbing or steam piping, ductwork, suspended ceiling supports or electrical or communications conduit. Do not place cable directly on the ceiling grid or attach cable in any manner to the ceiling grid wires.
- 6. All cables shall be free of tension at both ends. Nylon strain relief connectors shall be provided at each device and junction box where cables enter. In cases where the cable must bear some stress, Kellum type grips may be used to spread the strain over a longer length of cable.
- 7. Cable manufacturer's minimum bend radius shall be observed in all instances.
- 8. Use suitable cable fittings and connectors.

3.05 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.06 LUMINAIRE CONNECTIONS

- A. Metal-Clad (MC) Cable Whips
 - 1. Metal-Clad (MC) type cable that combines power and Class 2 circuits into a single cable may be used for luminaire whips where 0-10V dimming control wiring is required. Whips may not exceed six (6) feet in length. Examples of such products are Encore Wire® MC-LEDTM or Southwire® MC-PCS DuoTM. Manufacturer's names and catalog numbers are used for quality and performance only. MC Cables manufactured by others shall be equally acceptable provided they meet or exceed in performance and quality as specified.
- B. Recessed, including Master-Satellite connections:
 - 1. Use a luminaire fixture whip from a J-box for recessed lay-in luminaires. Luminaire fixture whips shall be aluminum or steel AC Cable (Armored Cable) or Flexible Metal Conduit (FMC). Metal Clad (MC) cable that combines power and Class 2 circuits (for 0-10V dimming control) into a single cable may be used as a whip for luminaires that are dimmed.
 - 2. Cable/Conduit whips shall be 3/8" (10 mm) minimum diameter, six feet (1.8 m) maximum length.

- 3. Flexible whips or pre-wired systems between master and satellite luminaires may be supported by the ceiling grid wires.
- 4. The flexible connectors shall be steel, galvanized, clamp type with locknut, snap-in type with locknut, or snap-in connector type, including those used on the master-satellite units.
- C. Chain or Cable Hung (unfinished spaces):
 - 1. Use manufacturer's SO cord or a luminaire fixture whip from a J-box. Luminaire fixture whips shall be aluminum or steel AC Cable (Armored Cable) or Flexible Metal Conduit (FMC). Metal Clad (MC) cable that combines power and Class 2 circuits (for 0-10V dimming control) into a single cable may be used as a whip for luminaires that are dimmed.
 - 2. Conduit whips shall be 3/8" (10 mm) minimum diameter. Conduit whip or SO cord shall be cut to length (six feet (1.8 m) maximum) and shall allow movement of the chain/cable/luminaire, but shall not be long enough to "loop" and shall present a neat and workmanlike appearance.
 - 3. Luminaire field wired flexible cord installations shall be connected per NEC 410.62.
 - 4. The flexible connectors shall be steel, galvanized, clamp type with locknut, snap-in type with locknut, or snap-in connector type, including those used on the master-satellite units.
 - 5. Conduit whip slack shall be tie-wrapped to the chain supports. Tie-wraps shall be UL listed for UV resistance.
- D. Cable Hung (finished spaces):
 - 1. Use manufacturer's SO cord from luminaire to a J-box.
 - 2. SO cord shall be cut to length (six feet (1.8 m) maximum) and shall allow movement of the cable/luminaire, but shall not be long enough to "loop" and shall present a neat and workmanlike appearance.
 - 3. SO cord slack may be tie-wrapped to the cable supports. Tie-wraps shall be UL listed for UV resistance.
 - 4. Luminaire field wired flexible cord installations shall be connected per NEC 410.62.
- E. Surface Mounted (unfinished spaces): Provide direct conduit and box connection.
- F. Surface Mounted (finished spaces): Provide direct conduit and box connection. Use surface metal raceway where indicated on drawings. Conceal box and conduit where appropriate. Flexible metal conduit shall not be used where the conduit is exposed.

END OF SECTION

SECTION 27 13 43

COMMUNICATIONS CABLING AND EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Communications Cabling and Equipment Standards, as shown on the Plans, as specified and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. UCS Telephone and Data Wiring Specifications
 - 2. Building Industry Consulting Services International (BICSI) Telecommunications Distribution Methods Manual (TDMM)
 - 3. IEEE Standards
 - 4. ANSI/TIA/EIA Standards
 - a. ANSI/TIA/EIA 568-B.1-- Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements
 - b. ANSI/TIA/EIA -568-B.2 -- Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted Pair Cabling Component
 - c. ANSI/TIA/EIA 568-B.3 -- Optical Fiber Cabling Components Standard
 - d. ANSI/TIA/EIA 569A -- Commercial Building Standard for Telecommunications Pathways and Spaces
 - e. ANSI/TIA/EIA 606 (A) -- The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
 - f. ANSI/TIA/EIA 607 (A) -- Commercial Building Grounding and Bonding Requirements for Telecommunications
 - g. ANSI/TIA/EIA 526-7 -- Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
 - h. ANSI/TIA/EIA 526-14A -- Measurement of Optical Power Loss of Installed Multimode Fiber Cable Plant
 - i. ANSI/TIA/EIA 758(A) -- Customer-Owned Outside Plant Telecommunications Cabling Standard
 - 5. National Electric Safety Code (NESC)
 - 6. National Fire Protection Agency (NFPA)
 - 7. National Electrical Code (NEC)

8. Any Applicable State and Local Codes

1.03 BASIC INTENT

- A. Located throughout the building as shown on the drawings are locations where computers and other associated equipment are intended to be placed and connected to a network for the purposes of utilizing common resources.
- B. Telecommunications Rooms (IT Closets) for the data network are shown on the drawings.
- C. Patch panels and wall-mounted data racks are to be provided in the IT Closets (quantity as required for area served). Patch panels are to be used as termination points for the data cables.
- D. All network electronics, cross connections, programming, UPS equipment, etc. shall be provided by Owner.

1.04 SCOPE OF WORK

- A. Provide wall-mounted data racks and patch panels in each IT Closet. Provide quantity of patch panels as required to accommodate quantity of data cables in area served plus 30% spare capacity.
- B. Provide a Horizontal Cable System including:
 - 1. Copper Horizontal Cable
 - 2. Faceplates
 - 3. Modular Jacks
- C. Provide testing and identification of cable system.
- D. Provide interior telecommunication system pathways including raceways and J-Hook cable supports.

1.05 QUALITY ASSURANCE

- A. All methods of construction, details of workmanship that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner's Representative.
- B. Equipment and materials shall be of the quality and manufacturer listed in their respective sections of the specifications, or engineer approved equal. Equipment and materials submitted as an "equal" shall be of same or higher quality and equipment characteristics as basis of design.
- C. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.

- D. Installation shall be in accordance with NFPA-70 (National Electrical Code), EIA/TIA, IEEE, IEC, state codes, local codes, and requirements of authority having jurisdiction.
- E. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published ANSI, NEMAIEC, TIA/EIA and IEEE standards.
- F. Each item shall bear the UL Label.

1.06 SUBMITTALS

- A. Manufacturer's catalog sheets, specifications, and installation instructions for all components.
- B. Warranty information.
- C. Cut sheets on all cables.
- D. Provide layout drawings on scaled plans that show complete network system. Information shall include but not limited to: jack locations, jack addresses, equipment riser schematics, patch panel layouts, rack equipment layouts, etc.
 - Equipment riser schematic shall be a complete riser diagram detailing jack addresses, cable identifications, patch panel termination addresses, etc.

PART 2 - PRODUCTS

2.01 HORIZONTAL CABLE SYSTEM

A. General:

- 1. Desktop data wiring must comply with the Category 6 specification (TIA/EIA-568-B.2-1) end-to-end, and support GIGABIT Ethernet. The components of desktop wiring includes UTP cables, connectors, and patch panels. Wiring order for all data terminations is T568B.
- 2. Provide quantity of outlets as required by drawings. Provide one (1) continual Category 6, 4 pair, 24AWG copper data cable from each data outlet to punch down on back of patch panel in area IT Closet. Cable length from data outlet to patch panel shall not exceed 295 feet.
- 3. All wiring and cabling shall be installed in a neat professional manner and shall be in compliance with the National Electrical Code, State and local electrical building and fire codes. If cable trays are not used, J-Hook supports should be anchored every 10 feet via threaded rods or beam clamps. Penetration through fire walls must include the appropriate site sleeve and be fire stopped. Low voltage cables shall not be tie-wrapped or secured to other electrical mediums or conduit pipes. When wraps are needed, Velcro will be permitted.

- 4. The vendor must provide cable certification, which will certify Category 6 copper and fiber runs according to current TIA/EIA industry standards. Upon completion of all jobs, the vendor must provide the purchaser with three sets of documentation on certification results and AutoCAD files indicating cable location, labels and all connections. Vendor is to provide a 15-year manufacturer's product warranty and a 15-year performance warranty. All (Cabling) Certification and documentation are to be included in the cost of cabling.
- B. Category 6, 4-Pair Horizontal Cabling:
 - 1. Plenum rated (CMP).
 - 2. Blue Jacket Color.
- C. Modular Flush-Mount Faceplates:
 - 1. Single gang with 2 jack openings (holes).
 - 2. Designed for use with modular jacks specified.
 - 3. Slots to cover screws and to house labels and covers.
- D. Category 6, 8-Position, 8-Conductor RJ45 Jack
 - 1. Category & Performance Rating: Cat 6.
 - 2. White color.
 - 3. Suitable for installation on patch panels and faceplates.
 - 4. Ortronics OR-KS6A, or Engineer approved equal.

2.02 WALL-MOUNT EQUIPMENT (DATA) RACK

- A. 30 rack unit (RU), 12" depth, wall-mount server rack.
- B. Steel with black powder-coat finish.
- C. #12-24 threaded rails.
- D. Ortronics OR-WMRF-30-12, or Engineer approved equal.

2.03 PATCH PANEL

- A. 48 Port angled patch panel with labels.
- B. Performance Rating: Category 6, based on selection of panel jack.
- C. Steel with black powder-coat finish.
- D. Recessed panel design with lower mounted profile; directs cables more easily into vertical management.
- E. Patch Panel Mounting Screws #12-24 x 5/8" included.
- F. High Density Solution: Maximized rack space.

- G. Panel Jacks Support Snap-In Icons: Easy designation of ports.
- H. Front Designation Labeling Kits: Easily identify infrastructure and meet TIA/EIA-606-A standard.
- I. Include all hardware necessary for complete installation to data rack.
- J. Ortronics OR-SPA6U48, or Engineer approved equal.

2.04 PATCH PANEL JACKS

- A. Category 6 RJ45 jack shall be of same type and construction, and meet all requirements as listed in Horizontal Cable System.
- B. Shall match patch panel construction and installation requirements.
- C. Ortronics OR-KS6A, or Engineer approved equal.

2.05 RACK HORIZONTAL CABLE MANAGEMENT

- A. Provide one (1) 2 rack unit (RU) organizer for each patch panel provided.
- B. Steel with black powder-coat finish.
- C. Include all hardware necessary for complete installation to data rack.
- D. Ortronics OR-FCM-19-2SR, or Engineer approved equal.

2.06 LABELING

- A. All communication related spaces, equipment, rack, firestopping, ground bars, etc. shall be properly labeled per ANSI TIA/EIA-606-A Standard.
- B. Labels For Cable Marking: Vinyl substrate with a white printing area and a clear "tail" that self laminates the printed area when wrapped around the cable. If cable jacket is white, provide cable label with printing area that is any other color than white, preferably orange or yellow so that the labels are easily distinguishable.
- C. Pre-printed labels shall meet legibility, defacement, exposure, and adhesion requirements of UL969.
- D. Faceplate labels shall reference room number/name-jack number.
- E. All labels shall be machine printed. Handwritten labels are not allowed.
- F. Provide TIA/EIA-606-A labeling system for all horizontal cabling components.
- G. Each data port shall have an identical label to the corresponding port in the associated patch panel.

- H. Labels shall correspond to the actual installed room names/numbers upon completion of the project. Contractor shall not necessarily utilize room names/numbers indicated on the Contract Drawings.
- I. Cable labels that are cut off during the installation process shall be replaced with new labels after final dress and termination in such a position that permits the label to be easily read.
- J. Contractor shall record each data port label on all record drawings.

2.07 TESTING

- A. System supplier shall channel test end-to-end each connection using latest 350 MHZ 1000 Mbps IEEE testing procedure. (Tester must conform to the latest standards at the time of testing not time of bid). Provide a full test using Microtest Omni Scanner with latest software version, or approved equivalent.
- B. Replace any cables or connectors that do not test per standards referenced and stated herein.
- C. Submit test reports to Engineer. Include data directory table cross-referencing room numbers and cable numbers with test report. Post copies of directory at Data Closet room location.

PART 3 - EXECUTION

3.01 CABLE INSTALLATION

- A. Provide a minimum of one (1) UTP cable to each RJ45 jack from respective equipment as called for. Quantity of data jacks equals minimum quantity of UTP cables (typical).
- B. All wiring concealed in walls or soffits shall be installed in metal conduits.
- C. All cable above accessible ceilings shall be installed in cable tray or utilizing J-hook cable rings or bridle rings, supporting cable at 10 ft. O.C.
- D. Provide wire management and Velcro cable wraps every 6 inches throughout Data Closets. Provide Velcro cable wraps every 36 inches elsewhere.
- E. Verify all wiring requirements with the Manufacturer. If the manufacturer recommends larger wire sizes, they shall be provided. However smaller sizes or lower cable categories are not acceptable.

- F. All Contract Documents are schematic. The system supplier shall incorporate their wiring requirements on the systems drawings. The Contractor in conjunction with the system manufacturer shall be responsible for complete wiring requirements and conduit sizes.
- G. Install UTP cable in accordance with latest revision of TIA/EIA 568 standards.
- H. The Contractor shall be responsible for replacing all cables that do not pass required bandwidth and throughput tests.
- I. All raceways and closets shall be installed in accordance with latest revision of TIA/EIA-569.
- J. Cables shall be labeled in accordance with latest revision of TIA/EIA 606.
- K. All horizontal cables shall be terminated in patch panels at the data rack, and at the UTP jack at the telecommunications outlet.

3.02 TERMINATIONS

- A. All terminations shall be made by a manufacturer's authorized representative.
- B. Use termination kits for UTP that are approved by the manufacturer of the cable.

3.03 EQUIPMENT AND DEVICES

A. Install all devices where shown on drawings. Provide all necessary conduit, outlet boxes, junction boxes, supports, etc.

3.04 RACEWAYS

A. Minimum size raceway shall be 1 inch.

3.05 GROUNDING AND BONDING

- A. Bond all new metallic cable shields and metallic supporting structures in all equipment rooms and service entrances, including racks, frames, protectors, and cabinets to the telecommunications grounding busbar (TGB), according to the manufacturer's specifications.
- B. Mount new TGB's on plywood backboards as shown on drawings.
- C. Do not make connections between the telecommunications busbar system and building electrical grounds, or other types of connections, without Engineer approval.

- D. Bond metallic surfaces of telecommunications hardware with #6 AWG grounding wire as straight as possible to the ground source.
- E. All grounding conductors leaving the Data Closets shall be in a separate conduit from all communication cabling.
- F. All grounding items shall be installed in complete compliance with NEC and Specification Section 26 05 26 "Grounding".

3.06 HORIZONTAL CABLING INSTALLATION

- A. Install faceplates and copper jacks at each outlet location as indicated on the Contract Drawings.
- B. All faceplates shall have two cables and jacks, unless otherwise indicated on drawings or within this Specification.
- C. Faceplates shall be secured with mechanical fasteners. Adhesive fasteners shall not be allowed.
- D. Install copper horizontal cable from each outlet location indicated on the drawings to the Data Closet as indicated on the contract drawings.
- E. Ensure that maximum pulling tensions of the specified cables are not exceeded and cable bends maintain the proper radius during placement.
- F. All horizontal cabling terminating within a single faceplate must be routed and terminated in the same Data Closet.
- G. All cables in the ceiling space:
 - 1. Shall be supported in conduit, cable tray, or by J-hooks.
 - 2. Shall not be attached to the suspended ceiling structure or laid directly on the ceiling grid as a means of support.
- H. Maintain the following clearances from EMI Sources:
 - 1. Unshielded power lines or equipment less than or equal to 5 kVA near cable in open or non-metal pathway: 12".
 - 2. Unshielded power lines or equipment greater than 5 kVA near cable in open or non-metal pathway: 24".
 - 3. Unshielded power lines or equipment less than or equal to 5 kVA near cable in grounded metal pathway: 6".
 - 4. Unshielded power lines or equipment greater than 5 kVA near cable in grounded metal pathway: 12".
 - 5. Power lines enclosed in grounded metal conduit less than or equal to 5 kVA near cable in grounded metal pathway: 3".

- 6. Power lines enclosed in grounded metal conduit greater than 5 kVA near cable in grounded metal pathway: 6".
- 7. Fluorescent fixtures near cable in open or non-metal pathway: 12".
- 8. Fluorescent fixtures near cable in grounded metal conduit: 6".
- 9. Motors or transformers near cable in non-metal pathway: 48".
- 10. Motors or transformers near cable in grounded metal pathway: 36".
- I. Manage slack to avoid excess cable or kinking.

3.07 FLOOR AND WALL PENETRATIONS

- A. Provide all necessary floor, wall, and building penetrations.
- B. The Owner's designated representative shall approve the location of all required floor, wall, and building penetrations before the Contractor can begin this portion of the work.

3.08 FIRE-STOP

A. The Contractor shall furnish and install fire-stop material in all floor, wall, and building penetrations after all cabling has been installed, in accordance with the National Electric Code. All other codes shall be consulted, and the code(s) that place the most stringent conditions shall be satisfied.

3.09 SPLICES

A. All cabling shall be installed in one continuous run between termination locations. The use of junctions and splices will not be permitted.

END OF SECTION

SECTION 31 05 16

AGGREGATES FOR EARTHWORK

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes material requirements and gradations for all unbound aggregates, as called on the Plans.
- B. Aggregate mixes including in this specification include:
 - 1. Granular Fill.
 - 2. Pipe Bedding.
 - 3. Structural Fill.
 - 4. Drainage Fill.
 - 5. Select Granular Fill.
 - 6. Sand Fill.
- C. Related work specified elsewhere:
 - 1. Section 31 23 16.13, Trenching.
 - 2. Section 31 23 43, Excavating Backfilling and Compacting.

1.02 REFERENCES

- A. The following is a list of standards that may be referenced in this Section:
 - 1. American Association of State Highway Transportation Officials (AASHTO):
 - a. M147, Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses.
 - b. T180, Standard Specification for Moisture-Density Relations of Soils Using a 10-lb Rammer and a 18-in. Drop.
 - 2. ASTM International (ASTM):
 - a. C88, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
 - b. C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - c. D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).
 - d. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3).
 - e. D2487, Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - f. D4318, Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.03 SUBMITTALS

- A. Comply with Submittal Procedures.
- B. Materials Source: Name of imported materials suppliers.

1.04 QUALITY ASSURANCE

A. Furnish each aggregate material from single source throughout work.

PART 2 – PRODUCTS

2.01 GENERAL

- A. All granular materials shall be free from any organic or other deleterious materials.
- B. The quality of the gravel or stone particles shall be demonstrated per ASTM C88.
- C. The maximum weight loss at four (4) cycles shall be 20 percent.

2.02 MATERIALS

- A. Granular Fill: Conforming to New York State Department of Transportation Standard Specifications Item 304.12 Type 2 Subbase Course.
- B. Pipe Bedding:
 - 1. Shall consist of clean, sound, crushed stone and shall be free from coatings.
 - 2. Conform to NYSDOT 703-02 for coarse aggregate requirements.
 - 3. NYSDOT No 1 Stone Gradation (703-4):
 - a. Percent passing by weight per sieve size:
 - 1) 1 inch: 100.
 - 2) 1/2 inch: 90 to 100.
 - 3) 1/4 inches: 0 to 15.
 - 4) No. 200: 0 to 1.0.

C. Structural Fill:

- 1. Shall consist of crushed gravel or crushed stone.
- 2. The gravel or stone shall be well graded from fine to coarse.
- 3. The material should comply with NYSDOT Standard Specifications, Item No. 304.12 Type 2 Subbase or Item No. 304.14 Type 4 Subbase, with the condition that if a gravel and sand product is used (vs. a crusher run

stone), the gravel should be a crushed gravel material, with at least 50% of the particles greater than ½ inch, having a minimum of one crushed face.

a. Percent passing by weight per sieve size:

Item 304.12 – Type 2

- 1) 2 inch: 100
- 2) ½ inch: 25 to 60
- 3) No. 40: 5 to 40
- 4) No. 200: 0 to 10

Item 304.12 – Type 4

- 1) 2 inch: 100
- 2) ½ inch: 30 to 65
- 3) No. 40: 5 to 40
- 4) No. 200: 0 to 10

D. Drainage Fill:

- 1. Natural stone pea gravel, washed, free of clay, shale, organic matter; graded according to ASTM C136; to following limits:
 - a. Minimum Size: 1/8 inch.
 - b. Maximum Size: 3/8 inch.
- E. Select Granular Fill: Conforming to New York State Department of Transportation Standard Specifications Item 733-11.
- F. Sand Fill:
 - 1. Clean, granular sand, free from organic matter and frozen material.
 - 2. Maximum particle size:
 - a. 4-inch diameter pipe and smaller: 1/2-inch.
 - b. 6-inch to 8-inch diameter pipe: 3/4-inch.
 - c. 10-inch to 15-inch diameter pipe: 1-inch.
 - d. 16-inch diameter and larger: 1-1/2-inch.
 - 3. Conforming to New York State Department of Transportation Standard Specifications Item 733-15.

2.02 SOURCE QUALITY CONTROL

- A. Coarse Aggregate Material, Testing and Analysis: Perform sieve analysis, plasticity index, and soundness tests in accordance with ASTM C136, ASTM D4318.
- B. When tests indicate materials do not meet specified requirements, change material and retest at the Contractor's expense.

PART 3 – EXECUTION

3.01 HAULING MATERIAL

- A. When it is necessary to haul material over the streets or pavements, the Contractor shall provide suitable tight vehicles so as to prevent deposits on the streets or pavements.
- B. In all cases where any materials are dropped from the vehicles, the Contractor shall clean up the same at least daily or as often as directed and keep the crosswalks, streets and pavements clean and free from dirt, mud, stone and other hauled material.

3.02 STOCKPILING

- A. Stockpile materials on Site at locations designated on the drawings, the SWPPP, or as otherwise approved by the Engineer.
- B. Stockpile in sufficient quantities to meet project schedule and requirements.
- C. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.
- D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.
- E. Stockpile unsuitable materials on impervious material and cover to prevent erosion and leaching, until disposed of.

3.03 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition.
- B. Grade site surface to prevent free standing surface water.
- C. When borrow area is indicated, leave area in clean and neat condition.
- D. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 31 05 19.24

GEOTEXTILES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials, and equipment for the supply and installation of Geotextile as shown on the Plans, as specified, and/or directed.

1.02 REFERENCES

- A. Latest version of Geosynthetics Research Institute (GRI) testing methods:
 - 1. Geosynthetic Research Institute, GT12(a) "Test Methods and Properties for Nonwoven Geotextiles Used as Protection (or Cushioning) Materials (ASTM)."
 - 2. Geosynthetic Research Institute, GT13(a) "Test Methods and Properties for Geotextiles Used as Separation Between Subgrade Soil and Aggregate (ASTM)."

1.03 SUBMITTALS

- A. Prior to the installation or delivery of a geotextile, the Contractor shall submit to the Engineer, from the geosynthetic manufacturer, a list of guaranteed "minimum average roll values" (MARV) for the geotextile. The Contractor shall provide, from the manufacturer, a written certification stating that the geosynthetic material meets or exceeds the guaranteed properties submitted.
- B. In addition to submitting guaranteed physical properties, the Contractor shall submit to the Engineer, from the manufacturer, documentation demonstrating the chemical compatibility of the geosynthetic material with leachate generated from mixed municipal solid waste. Such documentation shall include chemical compatibility testing results, if requested by the Engineer.
- C. Prior to delivery of the geotextile, the Contractor shall submit a sample of the material and installation warranty to be provided as described in Article 3.02.
- D. The Contractor shall submit to the Engineer, from the manufacturer, documentation certifying that all geotextiles provided by the Contractor have been inspected for needles and sheet defects, such that no needles or defects are present in rolls shipped to the site. Documentation must be provided by the manufacturer certifying that each roll of geotextile has been inspected for the presence of broken needles using an in-line metal detector.

5.23 GEOTEXTILES 409.005.001 31.05.19.24-1

1.04 DELIVERY, STORAGE, AND HANDLING

A. All geotextiles will be inspected on delivery, and materials that do not comply with the Specification will be rejected. The Contractor shall furnish all labor required to handle the geotextiles during inspection and shall remove the rejected material from the site. Stockpiling of geosynthetics, specifically allowable height and surfaces, shall be in accordance with the manufacturer's recommendations.

1.05 CONFORMANCE TESTING

- A. Conformance samples shall be taken at the manufacturing facility unless otherwise approved by the Engineer. All conformance test results shall be submitted a minimum of seven days prior to installation. No materials shall be installed until acceptable test results are approved by the Engineer.
- B. At a minimum, the following tests will be performed on Type 1, Type 2, and Type 4 geotextiles:
 - 1. mass per unit area ASTM D5261
 - 2. grab strength ASTM D4632
 - 3. CBR Puncture Resistance ASTM D6241
 - 4. trapezoidal tear strength ASTM D4533
- C. Samples will be taken by cutting along the width and 5 feet from the end of a rolled or folded geotextile material. The sampling frequency for the geotextile will be one sample per every 100,000 square feet of respective material delivered and shall be distributed across the rolls allocated to the project. The samples shall be evenly distributed throughout the rolls delivered to the site.
- D. Any samples which fail the conformance testing will require the failed material to be removed from the site. The failing material shall be isolated by taking samples from rolls prior to and after the failing roll.
- E. For each lot number of geotextile (Type 1, Type 2 and Type 4) that arrives at the site, a sample shall be taken by the Contractor and provided to the Owner for archiving. This sample shall be 3 feet long by the width of the roll. The Contractor shall clearly package the samples and label the specific roll information and project as directed by the Engineer.
- F. Conformance testing for Type 3 Geotextile is not required.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Geotextile: Type 1, Type 2 and Type 4 geotextile shall be nonwoven, needle-punched, polymeric geotextile. Type 3 geotextile shall be woven geotextile. The fibrous structure of the geotextile must be able to withstand handling, placement and long-term loads associated with the installation.
 - 2. All geotextile shall be protected from ultraviolet light, precipitation, mud, dirt, excessive dust, puncture, cutting and/or other damaging condition prior to and during delivery. All geotextile shall be capable of withstanding 30 days of sunlight without measurable deterioration.
 - 3. Fabrics shall be similar materials except for the weight and the associated physical properties. Type 1 will be nominal eight oz./square yard or heavier and Type 2 will be a nominal sixteen oz./square yard or heavier fabric. The Type 4 geotextile will be nominal twenty-four oz./square yard or heavier. An equivalent substitution may be made subject to the approval of the Engineer. Geotextile Specifications are given in Article 2.02.
 - 4. One type of woven geotextile will be supplied by the Contractor for use in roadway construction. Type 3 geotextile shall be Mirafi 600X, or an approved equal.
 - 5. All geotextiles shall be delivered on site shall be tagged and display the following information.
 - a. Manufacturer's name
 - b. Product identification
 - c. Lot number
 - d. Roll number and dimensions

2.02 MANUFACTURER'S QUALITY CONTROL DATA

A. Geotextile Specifications:

1. The table below lists the MARV specification values for the geotextiles to be used for the project. In addition, the typical average specification values, as indicated, have been listed. Final approval of the geotextile properties shall be made by the Engineer based upon Contractor's submittals.

5.23 GEOTEXTILES 409.005.001 31.05.19.24-3

Geotextiles

Specification Limits:

Property	Type 1	Type 2	Type 3	Type 4	Test Method
*Mass per Unit Area (oz/yd²)	8.0	16.0	N/A	24.0	ASTM D5261
**Apparent Opening Size (US Sieve)	70-100	80-100	40	100	CW-02215 or ASTM D4751
*Grab Strength (lbs)	205	370	315	450	ASTM D4632
*Grab Elongation (%)	50	50	15	50	ASTM D4632
*CBR Puncture Resistance (lbs)	535	900	900	1100	ASTM D6241
*Trapezoidal Tear Strength (lbs)	85	145	120	200	ASTM D4533
*Permittivity (sec ⁻¹)	1.35	0.6	0.05	0.4	ASTM D4491
***Ultraviolet Stability (% Str. Ret. @ 500 hrs)	70	70	70	70	ASTM D7238

^{*}MARV Values Taken Along Weakest Principal Direction.

N/A = Not Applicable

PART 3 - EXECUTION

3.01 INSTALLATION

A. The following procedures and requirements will be followed during the installation of geotextile.

B. Placement

- 1. The placement of the geotextile shall not be conducted during weather conditions that would compromise the installation of the material or underlying materials. The geotextile will be kept dry during storage and up to the time of deployment. During windy conditions, all geotextiles will be secured with sandbags or an equivalent approved anchoring system. Removal of the sandbags or equal will only occur upon placement of an overlying soil layer.
- 2. Tools appropriate for cutting geotextile as approved by the Engineer shall be used to cut and size the geotextile materials. Extreme care will be taken while cutting in-place geotextiles.
- 3. During the placement of geotextiles, all dirt, dust, sand or mud shall be kept off to prevent clogging. If excessive contaminant materials are present on the geotextile, it shall be cleaned or replaced as directed by the Engineer.

^{**}Typical Average Values

^{***}Evaluation to be on 2.0 inch strip tensile specimens after 500 hours exposure

- 4. No equipment used will damage the geotextiles by handling, trafficking or other means. Equipment, including ATVs, will not be allowed to travel directly on the geotextiles during the installation of overlying soils or geosynthetic layers, unless otherwise approved by the Engineer. Any damage to the material from the equipment shall be repaired by the Contractor at no additional cost to the Owner.
- 5. The Contractor shall perform field needle detection with a magnetic locator for all Type 4 geotextile rolls installed. Each roll shall also be visually inspected for sheet defects prior to primary collection layer placement.

C. Seaming or Joining

- Geotextiles shall be seamed using either an eighteen inch overlap, by sewing or by fusion welding. No open flame leistering will be permitted. The specific conditions requiring a sewn/welded seam or simply an overlap are as follows:
 - a. Type 1, Type 2, and Type 3 geotextile shall be sewn or overlapped according to the criteria below. Type 4 geotextile shall be fusion welded with an appropriate welding machine, sewn or overlapped.
 - b. In all cases, seams on side slopes will be parallel to the line of slope. No horizontal seams will be allowed on side slopes, except for patching.
 - c. Geotextiles placed on the subgrade, or between two soil layers at less than 10 percent slope may utilize an 18-inch overlap seam.
 - d. Where the slope is greater than 10 percent, and/or directly above a geomembrane, these seams shall be sewn or fusion welded.
- 2. Sewing will be done using a polymeric thread with chemical compatibility resistance equal to or exceeding the geotextile being sewn. Thread and the sewing device shall be approved by the Engineer prior to its use in the field
- 3. Repair of tears or holes in the geotextile will require the following procedures:
 - a. On slopes: A patch made from the same geotextile will be double seamed into place; with each seam 1/4-inch to 3/4-inch apart and no closer than 1-inch from any edge. Should any tear exceed 10% of the width of the roll, that roll will be removed from the slope and replaced.
 - b. Flat slopes: A patch made from the same geotextile will be spotseamed in place with a minimum of 24-inch overlap in all directions or sewn in-place as allowed on sloping areas.

3.02 POST-CONSTRUCTION

- A. Upon completion of the installation, the Contractor shall submit to the Engineer:
 - 1. All quality control documentation.
 - 2. The warranty obtained from the Manufacturer/Fabricator.

3.03 WARRANTY

A. The Contractor shall obtain and submit to the Engineer from the manufacturer and installer separate written warranties for the geotextiles. The warranty shall guarantee that the material and workmanship shall remain free from defects for a minimum of one (1) year from the date of substantial completion of the project. The Engineer will review the warranty for completeness prior to the Owner accepting its provisions.

END OF SECTION

GEOTEXTILES 5.23 31 05 19.24-6 409.005.001

SECTION 31 11 00

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Under this Section, the Contractor shall prepare and clear from the site of the work, by removal or destruction, as may be required, the following:
 - 1. Debris
 - 2. Brush
 - 3. Logs
 - 4. Trees
 - 5. Stumps
 - 6. Snow and Ice
 - 7. Windblown Litter, Refuse and Rubbish
- B. The work also includes:
 - 1. Removal and replacement, as required, or supporting of all telephone and power posts, fence poles and lines within the work area.
 - 2. Any work to be performed specifically to be paid for under the Clearing Item as stated in the Information For Bidders and/or the Additional Instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. The Contractor shall furnish and install materials and equipment required.

PART 3 - EXECUTION

3.01 REMOVAL

- A. The Contractor shall furnish all labor, material and equipment necessary to properly construct all items under this Section in an acceptable manner.
 - 1. No burning or burying of brush, logs, trees, stumps or other debris will be allowed on the site.
 - 2. All timber must be salvaged and turned over to the Owner, if requested.
 - 3. The Contractor shall remove all brush, slash and toppings, and dispose of with stumps at a location offsite or at an on-site location approved by the Owner.

END OF SECTION

SECTION 31 23 43

EXCAVATING, BACKFILLING AND COMPACTING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Excavating, Backfilling and Compacting, as shown on the Plans, specified, and/or directed.
- B. Excavation, in open cut, includes the loosening, removing, transporting, storage and disposal of all materials necessary to be removed for the construction and completion of all work under the Contract. Excavations shall be made to the widths and depths shown on the Plans, specified or directed.
- C. The Contractor shall be responsible for maintaining the stability of any excavations and for any damage or injury to any persons property or structures as a result.
- D. Where rock is encountered, the excavations shall be done in accordance with the applicable provisions hereof.

1.02 REFERENCES:

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. American Society for Testing and Materials (ASTM) Publications. Reference to standard Specifications is intended to specify minimum standards for quality of materials and performance of workmanship, and for standard test methods.

1.03 DEFINITIONS

- A. The term "excavation" and the term "trenching" where used, shall be deemed and understood to cover the following described work, and the price bid for any and all items including "excavation", or "trenching" shall be deemed to include and cover all of the several following detailed operations:
 - 1. The loosening, removing, transporting, storage and rehandling of all materials;

- 2. The refilling of trenches, excavations and pits, and the furnishing and placing of material over trenches, excavations and pits to the original surface of the ground or to other grades as may be shown or directed;
- 3. The compacting of all materials used in filling or refilling by rolling, ramming, watering, puddling, etc., as may be required;
- 4. The removing and disposing of all surplus materials from all excavations in the manner specified;
- 5. The maintenance, accommodation and protection of travel;
- 6. The dressing, topsoiling, sodding and/or seeding of all unpaved areas disturbed by the Contractor within and outside the limits of the Contract as may be necessary to leave the surface in as good condition as it was previous to the commencement of the work.
- B. "Earth" includes all materials, such as sand, gravel, clay loam, pavements, ashes, cinders, muck, roots, or pieces of timber, soft or disintegrated rock, not requiring barring or wedging from their original beds, and specifically excludes all ledge or bed rock, and individual boulders or masonry larger than one-half cubic yard in volume.
- C. "Backfill" includes selected materials for the backfilling or refilling of all excavations and trenches up to the original surface of the ground or to other grades as may be shown or directed.
- D. "Spoil" includes surplus excavated materials not required or not suitable for backfills or embankments.
- E. "Embankments" include fills constructed of selected materials above the original surface of the ground.
- F. "Rock" includes ledge or bedrock requiring barring or wedging from their original beds and individual boulders or masonry larger than one-half cubic yard in volume.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. Where used for general site fill or suitable backfill, soil material shall be free of debris, roots, wood, scrap material, vegetative matter, refuse, soft unsound particles, frozen, deleterious, or objectionable materials.

2.02 GRANULAR FILL

A. NYSDOT Standard Specification Item 304.12 Type 2 subbase.

2.03 GRANULAR FILTER MATERIAL:

A. NYSDOT 2008 Standard Specifications, Section 605-2.02 for Underdrain Filter Type I. Applies to drainage stone around perimeter foundation drain.

PART 3 - EXECUTION

3.01 ROCK EXCAVATION

A. Rock excavation shall include the loosening, removing, transporting, storing and disposal of all materials requiring barring or wedging for removal from their original beds. Blasting will not be permitted. All pieces of ledge or bed rock and boulders or masonry larger than one-half (1/2) cubic yard in volume are included under rock excavation. Rock excavations shall be made to the widths and depths shown on the Plans or as directed by the Engineer. For concrete structures, rock shall be excavated only to the bottom of the structure unless otherwise shown or noted on drawings. All excavated rock which cannot be handled and compacted as earth shall not be mixed with other backfill or embankment materials except as specified herein or as directed.

3.02 EXCAVATION FOR FOUNDATIONS

- A. Excavation shall be of sufficient size, and only of sufficient size, to give suitable room for the proper construction of structures and appurtenances, including allowances for sheeting, dewatering, and other similar work necessary for completion of the Contract.
- B. Subgrade for all footings and foundations shall be undisturbed original earth or granular fill, thoroughly compacted where noted on drawings. Keep all excavations free from water. Excavate soil disturbed or weakened by Contractor's operations and soils softened or made unsuitable for subsequent construction due to exposure to weather.
- C. Excavation inside of structure or within 24 inches of the structure shall be performed by hand tools only. No excavation equipment/machines are permitted within 24 inches of the structure without written authorization form the Directors Representative.

3.03 BACKFILLING

A. Backfill around structures shall be deposited in horizontal layers not more than eight (8) inches in thickness and shall be thoroughly compacted. Compaction shall be by a vibrating tamper or other approved method and shall be to a minimum dry density of ninety-five (95) percent of the maximum dry weight density in pounds per cubic foot as determined by the Modified Proctor Compaction Test (ASTM D1557).

B. Backfilling shall be done immediately after work has been inspected and approved. No frozen material shall be used, nor shall backfilling be placed on or against frozen earth, debris or other deleterious matter not conducive to proper compaction.

3.04 TRENCHING

A. Width and Depth of Trenches: The trenches in which pipelines are to be constructed, shall be excavated in all cases in such manner and to such depths and widths as will give suitable room for the pipelines which the trenches are to contain.

3.05 EARTH SUBGRADE PREPARATION FOR PIPES:

- A. Unless otherwise permitted by the Engineer, the trench shall have a flat or sloped bottom conforming to the grade to which the pipe is to be laid.
- B. Pipe subgrade preparation shall be performed immediately prior to installing the pipe in the trench. The trench bottom shall be accurately graded.
- C. Any additional material added during clean-up operations, or at any other time to prevent or remove a hazard, shall be placed in horizontal layers not more than eight (8) inches in thickness, with each layer adequately compacted by mechanical means, by the Contractor at his own expense.

3.06 REMOVAL OF WATER

- A. The Contractor shall at all times during construction provide and maintain proper and satisfactory means and devices for the removal of all water entering the excavations, and shall remove all such water as fast as it may collect, in such manner as shall not interfere with the prosecution of the work or the proper placing of pipe, masonry, concrete, structures, or other work.
- B. Unless otherwise specified, all excavations which extend down to below the groundwater elevation at the sites of structures shall be dewatered by lowering and maintaining the groundwater beneath such excavations at an elevation not less than that specified herein at all times when work thereon is in progress, during subgrade preparation and the placing of the structures or pipe thereon.
- C. Suitable stand-by pumping equipment shall be provided to insure the maintenance of the specified lowering of the water table.
- D. Water pumped or drained from excavations, or any sewers, drains, or water courses encountered in the work, shall be disposed of in a suitable and environmental manner without injury to adjacent property, the work under construction, or to pavements, roads, and drives. No water shall be discharged to sanitary sewers. Sanitary sewage shall be pumped to sanitary sewers or shall be disposed of by an approved method.

E. Any damage caused by improper handling of water shall be repaired by the Contractor at his own expense.

3.07 STORAGE OF MATERIAL

A. Topsoil suitable for final grading shall be removed and stored on the Site separately from other excavated material, and shall be replaced in position upon completion of the work.

3.08 ADDITIONAL EXCAVATION

A. In case the materials encountered at the locations and grades shown on the Plans or specified are not suitable, or in case it is found desirable or necessary to excavate additional materials to secure good support for the structure or pipeline, the excavation shall be carried to such additional limits as the Engineer may direct. The Contractor shall refill such additional excavated space with either granular fill, Class "D" or "E" concrete or other material, as the Engineer may direct. Additional excavation, backfill material, concrete or other materials so ordered, will be paid for under the appropriate items of the Contract.

3.09 UNAUTHORIZED EXCAVATION

- A. Whenever excavations are carried beyond or below the lines and grades shown on the Plans, or as given or directed by the Engineer, all such excavated space shall be refilled with granular fill, concrete or other materials as directed by the Engineer. All refilling of unauthorized excavations shall be at the Contractor's own expense.
- B. All material which slides, falls or caves into the established limits of excavations due to any cause whatsoever shall be removed and disposed of at the Contractor's own expense, and no extra compensation will be paid the Contractor for any materials ordered for refilling the void areas left by the slide, fall or cave-in.

3.10 DISPOSAL AND GRADING OF MATERIALS

- A. All spoil shall be transported and placed on the Site of the work at the locations and to the elevations and grades shown on the Plans, or as directed by the Architect/Engineer.
- B. The surface of all spoil placed on the Site shall be graded and dressed, and no unsightly mounds or heaps shall be left on completion of the work.
- C. Subsurface soil excavated for construction of interior building foundations shall be utilized to reestablish finished grade below the structure or removed as required or directed by Architect/Engineer

END OF SECTION

SECTION 31 25 00

EROSION AND SEDIMENT CONTROL

PART 1 – GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Aggregates for Earthwork: Section 31 05 16.
- B. Excavation Backfilling and Compacting: Section 31 23 43.
- C. Topsoil Placement and Grading: Section 32 91 19.13.
- D. Seeding: Section 32 92 19.

1.02 REFERENCES

- A. Erosion and Sediment Control Guidelines: Conform to the latest edition of "NEW YORK STANDARDS and SPECIFICATIONS for EROSION and SEDIMENT CONTROL" by NYS Department of Environmental Conservation DOW (i.e., Bluebook). Refer to these guidelines for construction and maintenance of all items (Temporary and Permanent Structural, Vegetative and Biotechnical) included in the Storm Water Pollution and Prevention Plan (SWPPP).
- B. Stormwater Management: Conform to the latest edition of "NEW YORK STATE STORMWATER MANAGEMENT DESIGN MANUAL" prepared by Center for Watershed Protection for NYS Department of Environmental Conservation.

1.03 RESPONSIBILITY

- A. Provide any temporary sediment and erosion control measures that may be required within limits of the work, including any staging areas, throughout construction in conformance with the plan, and as directed by the Engineer. Place the permanent control practices required before the removal of the temporary storm water diversion and control items.
- B. During construction conduct operations in such a manner as to prevent or reduce to a minimum any damage to any water body from pollution by debris, sediment, chemical or other foreign material, or from the manipulation of equipment and/or materials in or near a stream or ditch flowing directly to a stream. Any water which has been used for wash purposes or other similar operations which become polluted with sewage, silt, cement, concentrated chlorine, oil, fuels, lubricants, bitumens, or other impurities shall not be discharged into any water body.

C. In the event of conflict between these Specifications and the regulation of other Federal, State, or local jurisdictions, the more restrictive regulations shall apply.

1.04 DESCRIPTION

- A. The work shall consist of furnishing, installing, inspecting, maintaining, and removing soil and erosion control measures as shown on the Contract Documents or as ordered by the Engineer during the life of the Contract to provide erosion and sediment control.
- B. Temporary structural measures provide erosion control protection to a critical area for an interim period. A critical area is any disturbed, denuded slope subject to erosion. These are used during construction to prevent offsite sedimentation. Temporary structural measures shall include check dams, construction road stabilization, stabilized construction entrance, dust control, earth dike, level spreader, perimeter dike/swale, pipe slope drain, portable sediment tank, rock dam, sediment basin, sediment traps, silt fence, storm drain inlet protection, straw/hay bale dike, access waterway crossing, storm drain diversion, temporary swale, turbidity curtain, water bars or other erosion control devices or methods as required.
- C. Permanent structural measures also control protection to a critical area. They are used to convey runoff to a safe outlet. They remain in place and continue to function after completion of construction. Permanent structural measures shall include debris basins, diversion, grade stabilization structure, land grading, lined waterway (rock), paved channel, paved flume, retaining wall, riprap, rock outlets, and stream bank protection or other erosion control devices or methods as required.
- D. Vegetative measures shall include brush matting, dune stabilization, grassed waterway, vegetating waterway, mulching, protecting vegetation, seeding, sod, straw/hay bale dike, stream bank protection, temporary swale, topsoil, and vegetating waterways.
- E. Biotechnical measures shall include wattling (live fascines, brush matting, brush layering, live cribwall, and branchpacking) vegetated rock gabions, live staking, tree revetment, and fiber rolls.
- F. Weekly inspections will be completed by the Engineer (if required). Comply with and correct all deficiencies found as a result of these inspections. At the end of the construction season when soil disturbance activities will be finalized or suspended until the following spring, the frequency of the inspections may be reduced. If soil disturbance is completely suspended and the site is properly stabilized, a minimum of monthly inspections must be maintained. The

stabilization activities must be completed before snow cover or frozen ground. If vegetation is required, seeding, planting and/or sodding must be scheduled to avoid die-off from fall frosts and allow for proper germination/establishment. Weekly inspections must resume no later than March 15th.

1.05 DEFINITIONS - TEMPORARY STRUCTURAL MEASURES

- A. Check Dam: Small barrier or dam constructed of stone, bagged sand or gravel to reduce velocity of flow.
- B. Construction Road Stabilization: Stabilization of construction roads to control erosion.
- C. Stabilized Construction Entrance: A stabilized pad of aggregate underlain with geo-textile where traffic enters a construction site to reduce or eliminate tracking of sediment to public roads.
- D. Dust Control: Prevent surface and air movement of dust from disturbed soil surfaces.
- E. Earth Dike: A temporary berm or ridge of compacted soil, located to channel water to a sediment trapping device.
- F. Level Spreader: A non-erosive outlet for concentrated runoff to disperse flow uniformly across a slope.
- G. Perimeter Dike/Swale: A temporary ridge of soil excavated from an adjoining swale located along the perimeter of the site or disturbed area to prevent runoff from entering a disturbed area and preventing sediment laden runoff from leaving a construction site.
- H. Pipe Slope Drain: A structure placed from the top of a slope to the bottom of a slope to convey runoff without causing erosion.
- I. Portable Sediment Tank: A compartmented tank to which sediment laden water is pumped to retain sediment before pumping the water to adjoining drainage ways.
- J. Rock Dam: A rock embankment located to capture sediment.
- K. Sediment Basin: A barrier constructed across a drainage way to intercept and trap sediment.
- L. Sediment Traps: A control device formed by excavation to retain sediment at a storm inlet or other points of collection.
- M. Silt Fence: A barrier of geo-textile fabric installed on contours across the slope to intercept runoff by reducing velocity. Replace after 1 year.

- N. Storm Drain Inlet Protection: A semi-permeable barrier installed around storm inlets to prevent sediment from entering a storm drainage system.
- O. Straw/Hay Bale Dike: Intercept sediment laden runoff by reducing velocity. Replace after 3 months.
- P. Access Waterway Crossing: A structure placed across a waterway to provide circulation for construction purposes.
- Q. Storm drain Diversion: The redirection of a storm drain line or outfall channel for discharge into a sediment trapping device.
- R. Temporary Swale: A temporary excavated drainage swale.
- S. Turbidity Curtain: A flexible, impenetrable barrier used to trap sediment when construction occurs within water bodies or along a shoreline.
- T. Water Bars: A ridge or channel constructed diagonally across a sloping road or right-of-way.
- U. Filter Bags: A dewatering bag that removes and filters sand, silt and fines out of water.

1.06 DEFINITIONS - PERMANENT STRUCTURAL MEASURES

- A. Diversion: A parabolic or trapezoidal swale with a supporting ridge on the lower side constructed across a slope to intercept and convey runoff to stable outlets at non-erosive velocities.
- B. Debris Basin: A barrier or dam constructed across a waterway to form a basin for catching and storing sediment or debris that gives protection downstream.
- C. Grade Stabilization Structure: A structure to stabilize the grade by providing channel linings that can withstand high velocities.
- D. Lined Waterway (rock): A waterway lined with stone to dispose of high velocity runoff.
- E. Paved Channel (concrete): A waterway lined with concrete to dispose of high velocity runoff.
- F. Paved Flume: A concrete lined channel to convey water down a steep slope.
- G. Retaining Wall: A structural wall constructed to prevent soil movement down steep slopes.

- H. Riprap: A layer of stone designed to protect slopes that are subject to erosion.
- I. Rock Outlets: Rock placed at the outlet end of culverts, conduits or channels.
- J. Rock Outlets: Rock placed at the outlet end of culverts, conduits or channels.
- K. Stream Bank Protection: Stabilization of eroding stream banks through use of riprap, gabions or pre-cast concrete units.

1.07 DEFINITIONS - VEGETATIVE MATERIALS MEASURES

- A. Brush Matting: Hardwood brush layered along a stream bank with a grid of stakes and wire. This acts as a mulch for seedlings established in the bank.
- B. Dune Stabilization:
- C. Grassed or Vegetating Waterway: A parabolic or trapezoidal channel below adjacent ground level stabilized by vegetation to convey water without causing erosion.
- D. Mulches: Hay, straw, wood cellulose, fiber mats, flexible growth medium and other materials approved by the Engineer.
- E. Protecting Vegetation: Protecting trees, shrubs, ground cover and other vegetation from damage.
- F. Temporary Seeding: Erosion control protection to a critical area for an interim period. A critical area is any disturbed, denuded slope subject to erosion.
- G. Permanent Seeding: Grasses established and combined with shrubs to provide perennial vegetative cover on disturbed, denuded, slopes subject to erosion.
- H. Sod: Used where a quick vegetative cover is required.
- I. Straw/Hay Bale Dike: Intercept sediment laden runoff by reducing velocity. Replace after 3 months.
- J. Stream Bank Protection: Stabilization of eroding stream banks through use of vegetation.
- K. Temporary Swale: A temporary excavated drainage swale.
- L. Topsoil: Placed before permanent seeding or sod is installed.

1.08 DEFINITIONS - BIOTECHNICAL MATERIALS MEASURES

- A. Vegetative Rock Gabions: A combination of vegetation and rock gabions for slope stabilization. Live branch cuttings are layered through the gabion protruding beyond the face of the gabion.
- B. Live Fascines: Bundles of branches staked into shallow trenches which are then filled with soil. They are oriented along a contour and placed in multiple rows.
- C. Brush Matting: Hardwood brush layered along a stream bank with a grid of stakes and wire. This acts as a mulch for seedlings established in the bank.
- D. Live Staking: Large stakes sharpened at the bottom end and forced vertically into the ground.
- E. Brush Layering: Stabilize slope areas above the flow line of stream banks. Long branches are placed with cut ends into a terraced slope.
- F. Live Crib Wall: A combination of vegetation and structural elements used along streams where flowing water is a hazard. Layers of logs are alternated with long branches protruding out between them.
- G. Tree Revetment: Used for bank stabilization by placing tree trunks and branches overlapped and anchored to absorb energy, reduce velocity and capture sediment.
- H. Branch Packing: Alternates live branch cuttings and tamped backfill to repair small localized holes in slopes. Used for areas less than 4' deep and 6' wide.
- I. Fiber Roll: A coconut fiber, straw, or excelsior woven roll encased in a netting of jute, nylon, or burlap to dissipate water energy and provide a medium for introduction of herbaceous vegetation. Anchor into a bank and provide suitable backfill behind the roll where vegetation can be planted.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Plant Materials for biotechnical slope protection (if required): Locate stands of specified species and obtain approval to harvest material from these stands or obtain from managed production beds that are maintained for commercial distribution. Install all plant materials within 8 hours of cutting or provide proper storage.
 - 1. Shrub willows: "Streamco" purpleosier willow, and "Bankers" dwarf willow.
 - 2. Redosier Dogwood
- B. Seeding: Permanent see Section 32 92 19.

2.02 COMPANIES-TEMPORARY STRUCTURAL

- A. Mirafi, 365 South Holland Drive, Pendergrass, Ga, 30567, (888) 795-0808, www.mirafi.com.
- B. North American Green, 14649 Highway 41 North, Evansville, IN 47725, (800) 772-2040, www.nagreen.com.
- C. Siltdam, Inc., P.O. Box 960, Brockton MA, 02303, (800) 699-2374, www. spilldam. com.
- D. Nedia Enterprises, Inc., 22187 Vantage Pointe Place, Ashburn, VA 20148, (888) 725-6999, www.nedia.com.
- E. Belton Industries, 5600 Oakbrook Parkway, Norcross GA, 30093, (800) 225-4099, www.beltonindustries.com.
- F. KriStar, 1219 Briggs Ave., Santa Rosa, CA 95401, (800) 579-8819, www.kristar.com.
- G. Rolanka International, Inc., 155 Andrew Drive, Stockbridge, GA 30281, (800) 760-3215, www.rolanka.com.
- H. Apex Resources Inc., 12910 Shelbyville Road, Louisville, KY 40243 (888) 677-2739, www.apexr.com.
- I. MonoSol, LLC, 707 E. 80th PL., Merrillville, IN 46410 (800) 237-9552, www.terraloc.com.
- J. Brockton Equipment Inc., P.O. Box 960, Brockton, MA 02303 (800) 699-2374, www. spilldam. com.
- K. Aer-Flo Inc., 4455 18th St. East, Bradenton, FL 34203 (800) 823-7356, www. aerflo. com.
- L. Contech Construction Products Inc., 9025 Centre Point Drive, Suite 400, West Chester, Ohio 45069, (800) 338-1122, www.contech-cpi.com.

2.03 COMPANIES-PERMANENT STRUCTURAL

A. Contech Construction Products Inc., 9025 Centre Point Drive, Suite 400, West Chester, Ohio 45069, (800) 338-1122, www.contech-cpi.com.

2.04 COMPANIES-VEGETATIVE

A. Nedia Enterprises, Inc., 22187 Vantage Pointe Place, Ashburn, VA 20148, (888) 725-6999, www.nedia.com.

B. Agrecol Corporation, 2918 Agriculture Drive, Madison, Wi, 53718, (608) 226-2544, www.agrecol.com.

2.05 COMPANIES-BIOTECHNICAL

- A. Rolanka International Inc., 155 Andrew Drive, Stockbridge GA 30281, (800) 760-3215, www.rolanka.com.
- B. Nedia Enterprises, Inc., www.nedia.com.
- C. Kristar (800) 579-8819.

PART 3 - EXECUTION

3.01 WORK AREAS

- A. The Engineer has the authority to limit the surface area of erodible earth exposed by earthwork operations and to direct the Contractor to provide immediate temporary or permanent erosion measures to minimize damage to property and contamination of watercourses and water impoundments. Under no circumstances will the area of erodible earth material exposed at one time exceed 50,000 sq. ft. The Engineer may increase or decrease this area of erodible earth material exposed at one time as determined by his analysis of project, weather and other conditions. The Engineer may limit the area of clearing and grubbing and earthwork operations in progress commensurate with the Contractor's demonstrated capability in protecting erodible earth surfaces with temporary, permanent, vegetative or biotechnical erosion control measures.
- B. Schedule the work so as to minimize the time that earth areas will be exposed to erosive conditions. Provide temporary structural measures immediately to prevent any soil erosion.
- C. Provide temporary seeding on disturbed earth or soil stockpiles exposed for more than 7 days or for any temporary shutdown of construction. In spring, summer or early fall apply rye grass at a rate of 1 lb/ 1000 sq. ft. In late fall or early spring, apply certified Aroostook Rye at a rate of 2.5 lbs./ 1000 sq. ft. Apply hay or straw at a rate of 2 bales/1000 sq. ft. or wood fiber hydromulch at the manufacturer's recommended rate. Hay or straw shall be anchored.
- D. Coordinate the use of permanent controls or finish materials shown with the temporary erosion measures.
- E. All erosion and sediment control devices must be maintained in working order until the site is stabilized. All preventative and remedial maintenance work, including clean out, repair, replacement, regrading, reseeding, or re-mulching, must be performed immediately.

F. After final stabilization has been achieved temporary sediment and erosion controls must be removed. Areas disturbed during removal must be stabilized immediately.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes all material and performance requirements for asphalt paving materials as called on the Plans, including:
 - 1. Asphalt paving base course.
 - 2. Binder course.
 - 3. Top course or surface course.
 - 4. Tack coats.
- B. See Section 32 11 23, Aggregate for Earthwork for aggregate base course requirements.

1.02 REFERENCE STANDARDS

- A. The following is a list of standards which may be referenced in this Section:
 - American Association of State Highway and Transportation Officials (AASHTO):
 - a. M17, Standard Specification for Mineral Filler for Bituminous Paving Mixtures.
 - b. M81, Standard Specification for Cut-Back Asphalt (Rapid Curing Type).
 - c. M82, Standard Specification for Cut-Back Asphalt (Medium Curing Type).
 - d. M140, Standard Specification for Emulsified Asphalt.
 - e. M208, Standard Specification for Cationic Emulsified Asphalt.
 - f. T166, Standard Method of Test for Bulk Specific Gravity of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens.
 - g. T176, Standard Method of Test for Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test.
 - h. T230, Standard Method of Test for Determining Degree of Pavement Compaction of Bituminous Aggregate Mixtures.
 - i. T245, Standard Method of Test for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.
 - j. T246, Standard Method of Test for Resistance of Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus.
 - k. T247, Standard Method of Test for Preparation of Test Specimens of Bituminous Mixtures by Means of California Kneading Compactor.

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- 1. T283, Standard Method of Test for Resistance of Compacted Bituminous Mixture to Moisture-Induced Damage.
- m. T304, Standard Method of Test for Uncompacted Void Content of Fine Aggregate (Method A).
- 2. Asphalt Institute (AI):
 - a. Manual Series No. 2 (SP-2), Mix Design Methods for Asphalt Concrete.
 - b. Superpave Series No. 2 (SP-2), Superpave Mix Design.
- 3. ASTM International (ASTM):
 - a. D4318, Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - b. D4791, Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
 - c. D5281, Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate.
 - d. E329, Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
- 4. State of New York Department of Transportation, Standard Specifications.

1.03 DEFINITIONS

- A. Combined aggregate: All mineral constituents of asphalt concrete mix, including mineral filler and separately sized aggregates.
- B. RAP: Reclaimed asphalt pavement.
- C. Standard Specifications: State of New York Department of Transportation (NYSDOT) Standard Specifications.

1.04 DESIGN REQUIREMENTS

- A. Prepare asphalt mix design in accordance the Standard Specifications.
- B. All thicknesses of pavement courses described herein or shown on the Drawings represent compacted thicknesses.

1.05 SUBMITTALS

- A. Comply with Section 01 33 00, Submittal Procedures.
- B. Informational submittals:
 - 1. Test report for asphalt concrete:
 - a. Submit a minimum 10 days prior to start of production.
 - b. Show appropriate test method(s) for each material and the test results.

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- 2. Manufacturer's Certificate of Compliance for the following materials:
 - a. Aggregate: gradation, source test results as defined in Section 703 of the NYSDOT Standard Specifications.
 - b. Asphalt for binder: Type, grade, and viscosity-temperature curve.
 - c. Tack coat: Type and grade of asphalt.
 - d. Additives.
 - e. Mix: Conforms to job-mix formula.
- 3. Statement of qualification for independent testing laboratory.
- 4. Test results:
 - a. Mix design.
 - b. Asphalt concrete core.
 - c. Gradation and asphalt content of uncompacted mix.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with the Standard Specifications as amended and/or supplement herein.

B. Qualifications:

- 1. Independent Testing Laboratory: In accordance with ASTM E329.
- 2. Asphalt concrete mix formula shall be prepared by approved, certified independent laboratory under the supervision of a certified asphalt technician.

C. Compaction Control Strip:

- 1. General:
 - a. Construct to approximately 4,300 square feet in area and at a location that will become a portion of the completed paved area.
 - b. Thickness: Typical thickness to be paved on the Project.
- 2. Rollers used for compaction:
 - a. Steel wheel rollers: Minimum static weight of 10 tons.
 - b. Pneumatic rollers: Capable of exerting pressure of 80 psi on bituminous surface.
 - c. Vibratory rollers: Minimum static weight of 6 tons, capable of applying a 10-ton impact force equipped with amplitude and frequency control specifically designed for compaction of bituminous mixtures.

3. Compaction:

- a. Compact bituminous mat using standard rolling patter that covers the entire control strip. Request that the Engineer performs a final density test.
- b. Continue rolling until no further compaction can be obtained as determined by field density testing.
- c. Temperature and condition of bituminous mat shall be considered workable when further compaction can no longer be obtained.

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- 4. Target Density Determination:
 - a. Select test point near center of normal roller pass, but no closer than 2 feet from the edge of mat and 50 feet from each end of the control strip. Mat thickness at this point shall be at least the depth of the finished pavement.
 - b. This shall be the point at which no further densification can be obtained.
- 5. Establish a new target density if changes are made in the mix design, nominal depth of mat being placed, aggregate source, or material properties.

1.07 AMBIENT CONDITIONS

A. Weather and seasonal limitations shall comply with the Standard Specifications. NYSDOT Standard Specifications Section 402-3.01.

PART 2 - PRODUCTS

2.01 MATERIALS – NEW YORK STATE

- A. Mixtures: Designed in accordance with NYSDOT standards:
 - 1. Top Course: 9.5 mm Superpave F2 Top Course HMA.
 - 2. Binder Course: 19.0 mm F9 Binder Course HMA.
 - 3. Base Course: 37.5 mm F9 Base Course HMA.
 - 4. Subbase Course: Item 304.12, Subbase Course, Type 2

B. Tack Coat:

- 1. Shall be applied between all lifts of HMA courses and where new asphalt meets existing asphalt or concrete.
- 2. Comply with the requirements of NYSDOT Section 702 Bituminous Materials

2.02 ASPHALT CONCRETE MIX – NEW YORK STATE

A. General:

- 1. Mix formula shall not be modified except with written approval of the Engineer.
- 2. Source changes:
 - a. Should material source(s) change, establish new asphalt concrete mix formula before new material(s) is used.
 - b. Perform check tests of properties of plant-mix bituminous materials on first day of production and as requested by the Engineer to confirm that properties are in compliance with design criteria.
 - c. Make adjustments in gradation or asphalt content as necessary to meet design criteria.

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C. Composition:

- 1. Hot-mix asphalt plant of aggregate, mineral filler if required, and paving grade asphalt cement.
- 2. The several aggregate fractions shall be sized, uniformly graded, and combined in such proportions that resulting mixture meets grading requirements of the mix.

D. Aggregate:

- 1. General: as specified in Section 703 of the Standard Specifications.
- 2. RAP will not be acceptable.
- E. Mineral Filler: In accordance with Section 703-08 of the Standard Specifications.
- F. Asphalt Cement: Paving grades 18-60, as specified in Section 702 of the Standard Specifications.

PART 3 - EXECUTION

3.01 GENERAL

- A. Traffic control:
 - 1. Comply with Section 01 50 00, Temporary Facilities and Controls.
 - 2. Minimize inconvenience to traffic, but keep vehicles off freshly-treated or paved surfaces to avoid pickup and tracking of asphalt.
- B. Driveways: Repave driveways from which pavement was removed. Leave driveways in as good or better condition than before start of construction.

3.02 LINE AND GRADE

- A. Provide and maintain intermediate control of line and grade, independent of underlying base, to meet finish surface grades and minimum thickness.
- B. Shoulders: Construct to line, grade, and cross-section shown.

3.03 APPLICATION EQUIPMENT

A. In accordance with the Standard Specifications.

3.04 PREPARATION

A. Prepare subgrade and subbase in accordance with the Standard Specifications and as supplemented herein.

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B. Existing Roadways:

- 1. Modify profile by grinding, milling, or overlay methods as approved, to provide meet lines and surfaces and to produce smooth riding connection to existing facilities.
- 2. Remove existing material to a minimum depth of 1 inch.
- 3. Paint edges to meet line with tack coat prior to placing new pavement.
- C. Thoroughly coat edges of contact surfaces (curbs, manhole frames) with emulsified asphalt or asphalt cement prior to laying new pavement. Prevent staining of adjacent surfaces.

3.05 PAVEMENT APPLICATION

A. General: Place asphalt concrete mixture on approved, prepared subbase or base as applicable in accordance with the Standard Specifications and as shown on the Drawings.

B. Tack Coat:

- 1. Prepare material, as specified in the Standard Specifications prior to application.
- 2. Apply uniformly to clean, dry surfaces avoiding overlapping of applications.
- 3. Do not apply more tack coat than necessary for the day's paving operation.
- 4. Touch up missed or lightly-coated surfaces and remove excess material.
- 5. Application rate: Minimum 0.05 to 0.15 gallons per square yard of asphalt (residual if diluted emulsified asphalt) of surface area or as specified in the Standard Specifications, whichever is greater.

C. Pavement Mix:

- 1. Prior to paving:
 - a. Sweep primed surface free of dirt, dust, or other foreign material.
 - b. Patch holes in tack-coated surface with asphalt concrete pavement mix.
 - c. Blot excess tack material with sand.
- 2. Total compacted thickness: As shown on the Drawings.
- 3. Apply such that meet lines are straight and edges are vertical.
- 4. Collect and dispose of segregated aggregate from raking process. Do not scatter material over finished surface.
- 5. Joints:
 - a. Offset edge of each layer a minimum of 6 inches so joints are not directly over the underlying layer.
 - b. Offset longitudinal joints in roadway pavements so longitudinal joints in wearing layer coincide with pavement centerlines and lane divider lines.
 - c. Form transverse joints by cutting back on the previous day's run to expose full vertical depth of layer.

- 6. Succeeding Lifts: Apply tack coat to pavement surface between each lift.
- 7. After placement of pavement, seal meet line by painting a minimum of 6 inches on each side of the joint with cut-back or emulsified asphalt. Cover immediately with sand.

D. Compaction:

- 1. Comply with the requirements of the Standard Specifications.
- 2. Joint compaction shall follow the requirements the Standard Specifications.
- E. Tolerances: Tolerances shall comply with the Standard Specifications.

F. Seal Coat:

- 1. General: Apply seal coat of paving grade or emulsified asphalt to finished surface at longitudinal and transverse joints, joints at abutting pavements, areas where asphalt concrete was placed by hand, patched surfaces, and other areas as directed by the Engineer.
- 2. Preparation:
 - a. Surfaces that are to be sealed shall be maintained free of holes, dry, and clean of dust and loose material.
 - b. Seal in dry weather and when temperature is above 35 degrees F.
- 3. Application:
 - a. Fill cracks over 1/16-inch in width with asphalt-sand slurry or approved crack sealer prior to sealing.
 - b. When sealing patched surfaces and joints with existing pavements, extend a minimum of 6 inches beyond edges of patches.

3.06 PAVEMENT OVERLAY

A. Preparation:

1. Pavement overlay preparation shall comply with the Standard Specifications.

B. Application:

1. Pavement overlay application shall comply with the Standard Specifications.

3.07 PATCHING

A. Preparation:

- 1. Remove damaged, broken, or unsound asphalt concrete adjacent to patches.
- 2. Trim straight lines exposing smooth, sound, vertical edges.
- 3. Prepare patch subgrade as specified in the Standard Specifications.

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B. Application:

- 1. Patch thickness: 3 inches or thickness of adjacent asphalt concrete, whichever is greater.
- 2. Place asphalt concrete mix across full width of patch in layers of equal thickness.
- 3. Spread and grade asphalt concrete with hand tools or mechanical spreader, depending on size of area to be patched.
- C. Compaction: Follow compaction requirements specified in the Standard Specifications.
- D. Tolerances: Comply with the Standard Specifications.

3.08 FIELD QUALITY CONTROL

- A. General: Provide the services of an approved certified independent testing laboratory to conduct tests.
- B. Field Density Tests:
 - 1. Perform tests from cores or sawn samples in accordance with AASHTO T230 and AASHTO T166.
 - 2. Measure with properly operating and calibrated nuclear density gauge in accordance with ASTM D2950.
 - 3. Maximum Density: In accordance with ASTM D2041, using sample of mix taken prior to compaction from the same location as density test sample.
- C. Testing Frequency:
 - 1. Quality control test:
 - a. Asphalt content, aggregate gradation: once per every 500 tons of mix or once every 4 hours, whichever is greater.
 - b. Mix design properties, measured maximum (Rice's) specific gravity: Once every 1,000 tons or once every 8 hours, whichever is greater.
 - 2. Density tests: Once every 500 tons of mix or once every 4 hours, whichever is greater.

END OF SECTION

SECTION 32 13 13

CONCRETE PAVING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes performance and material requirements for reinforced and unreinforced concrete paving for:
 - 1. Roadways.
 - 2. Parking areas.
 - 3. Driveway aprons.
 - 4. Sidewalks.
 - 5. Slip-formed curbs and gutters.
- B. Related Work specified elsewhere:
 - 1. Section 07 92 00, Joint Sealants.
 - 2. Section 31 05 16, Aggregates for Earthwork
 - 3. Section 32 17 23, Pavement Markings.
 - 4. Section 33 49 13, Manholes, Manhole Frames & Covers

C. Definitions:

1. Standard Specifications: State of New York Department of Transportation (NYSDOT) Standard Specifications.

1.02 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. M6, Standard Specification for Fine Aggregate for Portland Cement Concrete.
 - 2. M80, Standard Specification for Coast Aggregate for Portland Cement.
 - 3. M153, Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
 - 4. M157, Standard Specifications for Ready-Mix Concrete.
 - 5. M213, Standard Specification for Preformed Expansion Joint.
 - 6. M227, Standard Specification for Steel Bars, Carbon, Merchant Quality, Mechanical Properties.
 - 7. M324, Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
- B. American Concrete Institute (ACI):
 - 1. 301, Specifications for Structural Concrete.
 - 2. 305R, Hot Weather Concreting.
 - 3. 306R, Cold Weather Concreting.
 - 4. 304, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 - 5. 308, Standard Practice for Curing Concrete.

- 6. 318/318R, Building Code Requirements for Structural Concrete and Commentary.
- 7. 325.9R, Guide for Construction of Concrete Pavements and Concrete Bases.

C. ASTM International (ASTM):

- 1. A184, Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
- 2. A185, Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
- 3. A497, Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
- 4. A615, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- 5. A706, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
- 6. A767, Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
- 7. A775, Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
- 8. A884, Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
- 9. A934, Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
- 10. C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- 11. C33, Standard Specification for Concrete Aggregates.
- 12. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- 13. C42, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
- 14. C88, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
- 15. C94, Standard Specification for Ready-Mixed Concrete.
- 16. C143, Standard Test Method for Slump of Hydraulic Cement Concrete.
- 17. C150, Standard Specification for Portland Cement.
- 18. C172, Standard Practice for Sampling Freshly Mixed Concrete.
- 19. C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
- 20. C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- 21. C260, Standard Specification for Air-Entraining Admixtures for Concrete.
- 22. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- 23. C494, Standard Specification for Chemical Admixtures for Concrete.
- 24. C595, Standard Specification for Blended Hydraulic Cements.
- 25. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.

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- 26. C803, Test Method for Penetration Resistance of Hardened Concrete.
- 27. C805, Test Method for Rebound Number of Hardened Concrete.
- 28. C979, Standard Specification for Pigments for Integrally Colored Concrete.
- 29. C989, Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
- 30. C1017, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
- 31. C1064, Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
- 32. C1116, Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
- 33. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
- 34. C1330, Specification for Cylindrical Seal Backing for Use with Cold Liquid Applied Sealants.
- 35. C1371, Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
- 36. C1549, Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
- 37. D920, Standard Specification for Elastomeric Joint Sealants.
- 38. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- 39. D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- 40. D1752, Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- 41. D2628, Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete.
- 42. D2828, Specification for Non-Bituminous Inserts for Contraction Joints in Portland Cement Concrete Airfield Pavement, Sawable Type.
- 43. D3406, Specification for Joint Sealant, Hot-Applied, Elastomeric, Jet Fuel Resistant Type for Portland Cement Concrete Pavements.
- 44. D3569, Specification for Joint Sealant, Hot-Applied, Elastomeric-Type, for Portland Cement Concrete Pavements.
- 45. D3581, Specification for Joint Sealant, Hot-Applied, Jet-Fuel-Resistant-Type, for Portland Cement and Tar-Concrete Pavements.
- 46. D5249, Specification for Backer Material for Use With Cold- and Hot-Applied Joint Sealants in Portland Cement Concrete and Asphalt Joints.
- 47. D5893, Specification for Cold-Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.
- 48. D6690, Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

- 49. E329, Specification for Agencies Engaged in Testing and Inspection of Materials Used in Construction.
- 50. E408, Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
- 51. E903, Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.
- 52. E1918, Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
- 53. E1980, Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
- D. National Ready Mixed Concrete Association (NRMCA).

1.03 SUBMITTALS

- A. Comply with General Conditions
- B. Action submittals:
 - 1. Product Data: admixtures.
 - 2. Design Data:
 - a. Concrete mix design signed by concrete mix designer.
 - b. Minimum information:
 - 1) Name of ready-mix plant.
 - 2) Project.
 - 3) Engineer.
 - 4) Contractor.
 - 5) Mix design number.
 - 6) Specified concrete strength.
 - 7) Water-cement-fly ash ratio.
 - 8) Maximum aggregate size.
 - 9) Cement content.
 - 10) Fly ash content.
 - 11) Water content.
 - 12) Type, name, and amount of admixtures.
 - 13) Unit weight.
 - 14) Slump.
 - 15) Ingredient proportions corrected for average moisture content for particular times of year.
 - 3. Joint Drawings: Identify location and spacing of each type of joint.
 - 4. Gradation for coarse and fine aggregates, and combined gradation. List percent passing for each sieve size.
 - 5. Detailed plan for cold weather placements, including curing and protection.
 - 6. Detailed plans for hot weather placements, including curing and protection.

C. Informational Submittals:

- 1. Manufacturer's Certificate of Compliance:
 - a. Portland cement.
 - b. Admixtures.
 - c. Fly ash.
 - d. Aggregates.
- 2. Statements of Qualifications:
 - a. Mix designer.
 - b. Batch plant.
 - c. Testing laboratory.
- 3. Test Reports:
 - a. Admixtures: Chemical ingredients and percentage of chloride in each admixture and fly ash.
 - b. Fly ash: Source test analysis and amount used in accordance with ASTM C94, Section 16.
 - c. Mix design: for each trial, signed by qualified mix designer.
 - d. Laboratory mixes: cylinder test results.
- 4. Concrete Delivery Tickets:
 - a. For each batch of concrete before unloading at the Site.
 - b. Minimum delivery ticket information:
 - 1) Name of ready-mix plant.
 - 2) Serial number of ticket.
 - 3) Date and truck number.
 - 4) Name of Contractor.
 - 5) Job name and location.
 - 6) Mix design number.
 - 7) Quantity of concrete delivered.
 - 8) Type and quantity of admixtures.
 - 9) Quantity of water added at batch plant.
 - 10) Time of loading, arriving at the Site, and unloading.
 - 11) Volume of water added by receiver of concrete at their initials.
 - c. Record of drum revolution counter, type, and brand.

1.04 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Mix Designer: Licensed professional engineer registered in New York State or a certified concrete mix designer approved by NYSDOT.
 - 2. Testing and Inspection Agency: Comply with ASTM E329.
 - 3. Batch plant: Currently certified by the National Ready Mixed Concrete Association.
- B. Pre-Paving Conference:
 - 1. Hold among the Contractor, Subcontractor involved in concrete paving and the Engineer.

- 2. Hold conference at least 14 days prior to the start of concrete paving operations.
- 3. Conference cannot be held until the Engineer has received concrete mix design and admixture submittals.
- 4. Items to be discussed:
 - a. Mix design.
 - b. Method of placement.
 - c. Curing.
 - d. Finishing schedule.
 - e. Traffic control.
 - f. Protection of Work.
- C. Hot Weather Concreting: Conform to ACI 305R.
- D. Cold Weather Concreting: Conform to ACI 306R.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Transport ready-mix concrete in accordance with ASTM C94.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

- A. Concrete mix design:
 - 1. The requirements of the following sections of the NYSDOT Standard Specifications shall apply unless otherwise indicated on the Drawings:
 - a. Portland cement: 701-01.
 - b. Coarse aggregate: 703-02.
 - c. Concrete sand: 703-07.
 - d. Admixtures: 711-08.
 - e. Water: 712-01.
 - 2. Compressive strength: 4,000 psi at 28 days.
 - 3. Air entrainment: 5% to 7%.
 - 4. Maximum water-cement ratio: 0.44.
 - 5. Maximum slump: 4 inches.

2.02 ANCILLARY MATERIALS

- A. Tie bars: Grade 40 deformed steel bars, conforming to Section 03 21 00, Reinforcing Steel.
- B. Dowels: Conform to the requirements of AASHTO M227, Grade 70.

C. Joint Filler:

- 1. Contraction joints shall be placed between expansion joints at equal intervals not exceeding six (6) feet.
- 2. These joints shall be formed either by use of steel division plates, 1/8-inch thick, or by approved methods of cutting a groove in the surface of the finished concrete.
- 3. Expansion joints shall be pre-molded strips of asphaltic felt of the required thickness, as wide as the thickness of the walk, and laid in one piece as long as the full length of the slab.

D. Joint Sealant:

- 1. Shall be a one-component, non-priming, urethane, self-leveling (pour grade) sealant.
- 2. Joint sealant material shall fully comply with Federal Specification TT-S-00230C, Type 1, Class A, and ASTM C920, Type S, Grade P, Class 25, Use T, M.

E. Backer Rod:

- 1. Backer material conforming to ASTM D5249.
- 2. Cylindrical sealant backing conforming to ASTM C1330.
- F. Curing Compound: Per NYSDOT Standard Specifications, Section 701.
- G. Curing Membranes:
 - 1. White, polyethylene sheet.
 - 2. Waterproof paper.
 - 3. Cotton or jute mats.
- H. Evaporation Retardant: Confilm, as manufactured by Master Builders Company, or approved equal.

2.03 EQUIPMENT

- A. Ready-mixed concrete batch plants: Certified by NYSDOT.
- B. Batch plants:
 - 1. Conform to requirements of Section 701 of the NYSDOT Standard Specifications.
 - 2. Bins shall have adequate separate compartments for fine aggregate, each separate size of coarse aggregate and cement.
 - 3. Bins and compartments shall be tight and ample to prevent spilling from one bin to another.
 - 4. Separate compartments, including weighing hoppers, shall discharge freely and efficiently.
 - 5. Scales for weighing aggregates and cement may be either beam type or springless dial type.

- 6. Scales shall be accurate within 0.5 percent under operating conditions throughout the range of use and, tested and adjusted as often as the Engineer may deem necessary to assure their continued accuracy.
- 7. Equipment for dispensing water and admixtures shall provide a separate feed, accurate quantity measurement, and shall inject water and admixture at a time in the mixing process to ensure thorough and complete mixing throughout the batch.
- 8. Automatically controlled batchers shall have automatically interlocked mechanisms providing the following:
 - a. Positive weighing and discharge of cement and of each separate size aggregate.
 - b. Interlocking between weighing hoppers to prevent part of batch from being discharged until each separate hopper has been filled with correct proportion.
 - c. Simultaneous discharge of hoppers.
 - d. Lockable compartment containing time setting controls.
- 9. Equip mixers with a timing device that will not permit batch to be discharged until specified mixing time has elapsed.
- 10. The means of storing, measuring and introducing water into the mixer shall provide positive control and accurate measurement.

C. Ready-mixed Concrete Trucks:

- 1. As specified in Section 701 of the NSDOT Standard Specifications.
- 2. Agitator mixer type.
- 3. Equipped with operable electrically-actuated drum revolution counter.
- 4. Use of non-agitator equipment is will not be permitted.
- 5. Each mixer shall carry a clearly visible manufacturer's plate showing capacity of mixer and other pertinent operating rates and limits.
- 6. Provisions shall be made at the mixer for controlled addition of airentraining admixtures or other special components of the mix.
- 7. Mixing speed: 70 to 100 revolutions at a mixing speed recommended by the truck mixer manufacturer.

D. Hauling Equipment:

- 1. As specified in Section 701 of the NYSDOT Standard Specifications.
- 2. Upon delivery of each batch of concrete to the Site, submit a trip ticket to the Engineer.

E. Paving Equipment:

- 1. Slipform paver:
 - a. Place concrete paving with two separate machines, a spreader and a slipform paver. Machines, when operating in tandem shall spread, consolidate, screed, and float finish freshly placed concrete paving in one pass with a minimum of hand-finishing.

- b. Each machine shall be fully self-propelled and equipped with electronic controls to control line and grade from both sides.
- c. Spreader shall be able to deliver mix without segregation or displacing reinforcing steel.
- d. Able to vibrate concrete paving for full width and depth and be equipped with vibrating tubes or arms to work in concrete paving.
- e. Sliding forms shall be held together rigidly to prevent them from spreading.
- f. Form shall be long enough so concrete slump will not exceed 1/4-inch.
- g. Supports of paver and other equipment which ride on previouslyplaced pavement shall be equipped to prevent marring, edge breaking, or chipping of previously placed pavement.
- 2. Bridge deck finisher/paver: A bridge or similar finishing/paving machine utilizing previously constructed and cured curb and gutter as side forms and support for machine rails may be used with prior approval of the Engineer.

F. Concrete Saws:

- 1. Provide power-driven concrete saws for sawing joints or finishing concrete, adequate in number of units and power to complete sawing at required rate.
- 2. Saws and related equipment shall be of proven adequacy and design to perform efficiently and shall be subject to immediate replacement, if specified results are not obtained.
- 3. Standby saw shall be available at the Site.
- G. Smoothness Testing Equipment: Supply two 12-foot straight edges for determining smoothness.

PART 3 - EXECUTION

3.01 WEATHER LIMITATIONS

- A. Concrete shall not be placed:
 - 1. Until the air temperature in the shade is 40 degrees F and rising and is forecast to remain above 40 degrees F.
 - 2. On frozen ground.
 - 3. During periods of rain or snow.
- B. Concrete placement shall not continue when air temperature drops below 40 degrees F.
- C. Protect concrete pavement from inclement weather for 7 days after it has been placed, when rain is imminent, and when air temperature drops or is forecast to drop below 40 degrees F.

3.02 PREPARATION

- A. Prepare base as specified in Section 304 of the NYSDOT Standard Specifications.
- B. Dampen base thoroughly prior to concrete placement; standing water will not be permitted.
- C. Complete formwork prior to concrete placement. Area in which concrete is to be placed shall be smooth and free of ruts, projections, debris, spilled concrete, mud, sloughed soil, standing water, organic and other objectionable materials.
- D. Construction joints: Inspect prior to concrete placement.
- E. Prior to placing paving equipment in position, full width and length of the area on which the tracks of the paving equipment is to operate shall be brought to density and surface tolerances required.
- F. Protect existing exposed surfaces such as grates, catch basins, air valves, manholes, and clean-out lids from splattered and spilled concrete during concrete placement by use of durable waterproof paper.
- G. Furnish operable backup vibrator on Site prior to concrete placement.

3.03 SLIP-FORM PAVING

- A. Deliver from hauling vehicle to paving machine hopper.
- B. Contractor's equipment hauling Portland cement concrete or reinforcement will not be permitted on prepared subgrade, but will be allowed on the base, with turns or other maneuvering kept to a minimum. Damage to subgrade or base shall be corrected to the satisfaction of the Engineer.

C. Machine Placement:

- 1. Place in final position uniformly in one layer, so a minimum of finishing will be necessary to provide a dense, homogenous pavement conforming to true grade and cross-section.
- 2. Spreader shall receive Portland cement concrete mixture in its hopper and uniformly spread and strike it off at proper thickness for full width of area being paved.
- 3. Paver shall vibrate, consolidate, and finish slab to proper grade and cross-section.

D. Paver:

- 1. Paver shall be operated with as continuous forward movement as possible.
- 2. Coordinate mixing, delivering, and spreading Portland cement concrete to provide uniform progress.
- 3. Stopping and starting paver shall be held to a minimum.

- 4. If for any reason it is necessary to stop forward motion of the paver, vibratory and tamping elements shall also be stopped immediately.
- 5. No external force shall be applied to the paver, except with approval of the Engineer.
- E. While placing Portland cement concrete, make provisions for construction joints, placing dowels, tie bars, and other devices, as called on the Drawings, and as specified herein.
- F. Portland cement concrete shall be rejected if it:
 - 1. Is not in place within 1 hour after being mixed.
 - 2. Has begun to take an initial set prior to placement.
 - 3. Has been re-tempered with water.
- G. If necessary, supplemental hand spreading and distributing shall be with shovels. Rakes will not be permitted.
- H. Portland cement concrete shall not be fouled with foreign matter.
- I. Use vibrators to consolidate Portland cement concrete pavement at least 6 feet each side of construction joints and expansion joints.

J. Defects:

- 1. Fill areas of minor honeycomb or other minor defect in composition of Portland cement concrete along exposed edges of Portland cement concrete with a stiff mortar of cement and fine aggregate.
- 2. Apply to moistened Portland cement concrete to satisfaction to Engineer.
- 3. Areas showing serious defects of concrete composition shall be removed and replaced with pavement of specified quality for full width of strip between longitudinal joints or edges and for a length of not less than between the nearest transverse joint.

3.04 JOINTS

A. General:

- 1. Referred to as contraction or construction, either of which may be transverse or longitudinal, as called on the Drawings or as approved by the Engineer.
- 2. Joints, backer material, joint filler, and joint sealants shall extend to pavement edges or to each other, and shall be constructed perpendicular to the pavement surface.
- 3. Joints shall not vary from specified or indicated line by more than 1/4 inch.
- 4. Joint drawings: Contractor's joint layout submittal shall consider joint placement in curb and gutter, at catch basins, and position of manholes and other large structures, as well as other limitations as specified herein.

5. Place manholes and other similar large structures in line of joint, or if impractical, isolate structure from pavement with pre-molded joint filler, 1/2-inch wide, conforming to AASHTO M213 and ASTM D1751.

B. Contraction Joints:

- 1. Sawed type with poured filler:
 - a. Sawing shall be to a depth as shown on the Drawings with a maximum width of 1/4 inch and a minimum width of 1/8 inch, in straight lines as shown or as approved by the Engineer.
 - b. Perform saw cuts as soon as concrete pavement has set enough to permit sawing without tearing or raveling, before uncontrolled cracking results, and within 24 hours of placing Portland cement concrete.
 - c. Saw by be single or tandem, as the Contractor may elect, and shall be controlled by a guide to a true line.
 - d. Clean joints thoroughly of foreign matter before pouring approved rubber asphalt filler.
 - e. Tops of joint filler shall be true to pavement cross-section within 1/8 inch and shall be protected from damage by concrete paving operations.
 - f. Areas containing uncontrolled cracks shall be removed and replaced.
 - g. Restore curing agents broken or damaged by sawing operations.
- 2. Space longitudinal joints as shown on the Drawings at the interface between lanes, normally at intervals between 12 and 16 feet.
- 3. Transverse joints shall be as shown on the Drawings or as approved by the Engineer, with intervals of 12 to 16 feet.

C. Construction Joints:

- 1. Construct when there is an interruption of longer than 45 minutes in Portland cement concrete placing operations or where specified.
- 2. Place parallel with intended contraction joint.
- 3. Tool both free edges of joints with 1/8 inch radius rounder to remove laitance and mortar resulting from finishing operations and to provide clean, rounded edge.
- 4. Tooling shall not form ridges on surface of concrete.
- 5. New concrete pavement placed contiguous to joint shall conform to proportions and consistency of previously placed concrete.
- 6. Transverse construction joint:
 - a. Doweled type by using #8 x 3'-0" long dowels at 12-inch centers coated with plastic, grease, heavy oil or other approved material that will neither bond with nor be harmful to operation at a depth of 1/2 the pavement thickness parallel to the centerline.

- b. If sufficient Portland cement concrete has not been mixed at the time of interruption to place a construction joint at least 3 feet from a planned contraction joint, remove excess Portland cement concrete back to a position to satisfactorily meet these criteria and to satisfaction of the Engineer.
- c. Fill joint which has opened to a width of 1/8 inch or greater during construction or maintenance periods with poured filler.
- d. Do not construct within 3 feet of a transverse contraction joint.
- 7. Longitudinal Construction Joint:
 - a. Tied type using #5 x 3'-0" deformed tie bars at 12-inch centers.
 - b. Tie bars:
 - 1) Not required at construction joints between concrete pavement and gutter, except where shown on the Drawings and specified herein.
 - 2) Placement:
 - a) Plastic concrete: Insert before vibrating and finishing concrete pavement.
 - b) Hardened concrete:
 - i) Drill hole, insert, and grout tie bars intoplace.
 - ii) Drill holes large and deep enough to allow tie bars to be inserted with grout.
 - iii) Perform any time after concrete pavement has attained enough strength to resist damage caused by drilling.
 - iv) Tie bars shall be grouted a maximum of 3 hours prior to placement of adjacent concrete payement.
 - 3) Replace loose tie bars by drilling and grouting as specified herein.

D. Scored Joints:

- 1. Configuration: 1/4-inch wide by 1/4-inch deep at locations indicated on the Drawings, formed by tooling concrete while it is still fresh.
- 2. Do not fill or seal.
- 3. Layout of joints shall be straight and true and shall not vary from indicated line by more than 1/4 inch.

3.05 SURFACE FINISHING

- A. Use temporary screeds. Wet screeding and jitterbugging shall not be permitted.
- B. Pavements shall have a surface tolerance of 1/4 inch in 10 feet, in accordance with ACI 325.9R.
- C. Salting, spreading of cement, or cement-sand mixtures to speed up hardening shall not be permitted.

- D. Exposed pavement edges shall be edged to a 1/2-inch radius and construction joints shall be edged to 1/8inch radius after finishing. Edging shall not form ridges on pavement surface.
- E. Pavement shall be treated and protected by use of evaporation retardant applied in accordance with manufacturer's written instructions.
- F. Flat surfaces shall be treated immediately after screeding and floating or if time period greater than 15 minutes occurs between finishing operations.
- G. Pavements shall be screeded, floated, and given a broomed, skid-resistant finish.

3.06 CURING OF CONCRETE PAVEMENT

- A. Immediately after final floating, surface finishing, and edging has been completed, and while Portland cement concrete surface is still moist, cover and cure entire expose surface for at least 72 hours in accordance with one of the following provisions:
 - 1. Liquid Membrane-Forming Compounds:
 - a. Apply compound uniformly to Portland cement concrete by pressure-spray methods at a rate which will form an impervious membrane, by at least at a rate of 1 gallon per 150 square feet.
 - 2. Other Membranes:
 - a. Apply to damp Portland cement concrete as soon as it can be placed without marring surface.
 - b. Place in tact with surface, extend beyond sides or edges of slabs or forms, and fasten down to hold it in position as a waterproof and moisture-proof covering.
 - c. Laps shall be sufficient to maintain tightness equivalent to sheeting.
 - d. Transverse laps for waterproof shall be at least 18 inches, and longitudinal seams shall be cemented.
 - e. Cotton or jute mats shall be saturated with water prior to placing and kept fully wetted during the curing period.
- B. Timing and Application:
 - 1. Concrete shall be cured by use of curing compound, for a minimum of 7 days after concrete placement, in accordance with ACI 308.
 - 2. Curing compounds shall be applied in accordance with the manufacturer's written instructions.
 - 3. Exposed surfaces shall be sprayed with curing compound immediately after free surface water has disappeared from finished surface.
- C. Concrete temperature shall be maintained in accordance with ACI 306R.
- D. Curing compounds shall not come into contact with hardened concrete that is to be concreted against.

3.07 FIELD QUALITY CONTROL

- A. Retain independent testing or inspection agency to perform inspection, sampling, and testing.
- B. Concrete Sampling:
 - 1. In accordance with ASTM C172.
 - 2. Take sample not less than every 5,000 square feet or fraction thereof of concrete placed each day.
- C. Perform the following tests on each sampling:
 - 1. Slump: ASTM C143.
 - 2. Air content: ASTM C231.
 - 3. Compressive strength: ASTM C39.
 - 4. Flexural strength: ASTM C78.
- D. Strength Tests:
 - 1. Make and cure cylinders and beams in accordance with ASTM C31.
 - 2. Cylinders:
 - a. Make four, standard 6-inch diameter by 12-inches high.
 - b. Cure on in field and three in laboratory.
 - 3. Beams:
 - a. Make three standard 6 inches by 6 inches by 21 inches.
 - b. Cure in the field.
 - 4. Compressive:
 - a. Test one field-cured cylinder at 7 days and two laboratory-cured cylinders at 28 days.
 - b. Test last cylinder at 56 days, if 28-day cylinder is below specified strength.
 - 5. Flexural: Test one beam at 7 days and two beams at 28 days.
- E. Acceptance of concrete shall be in accordance with ACI 318/318R.
- F. Concrete with compressive strength less than specified, as evidenced by cylinder tested at 56 days, shall be additionally tested as follows:
 - 1. Less than 500 psi low in compression or less than 75 psi low in flexure:
 - a. Penetration Resistance Test: Per ASTM C803.
 - b. Rebound Hammer Test: Per ASTM C805.
 - c. Perform tests within 24 hours of non-conforming strength tests.
 - 2. More than 500 psi low in compression or more than 75 psi low in flexure:
 - a. Concrete coring: Take three standard cores from the concrete representing original specimens.
 - b. Take and prepare cores in accordance with ASTM C42.
 - c. Test cores in accordance with ASTM C39.
 - d. Take cores within 24 hours of non-conforming strength test.

3.08 CLEANING

- A. Clean concrete splatter from exposed surfaces.
- B. Thoroughly broom and wash concrete surfaces before opening to traffic.

3.09 PROTECTION OF CONCRETE

- A. Do not operate construction equipment or allow traffic on newly placed concrete pavement until the following requirements are met:
 - 1. Joints have been filled as specified herein.
 - 2. Concrete has attained a compressive strength of at least 4,000 psi.
- B. Protect new concrete from construction operations, mechanical disturbances, water flow, and soiling until open for traffic.
- C. Erect and maintain suitable barriers to protect concrete from traffic or other detrimental trespass until pavement is opened to traffic.
- D. Maintain watchmen after normal working hours for at least a 24-hour period to ensure barriers are not removed or destroyed, and that trespass and vandalism upon pavements do not occur.
- E. Wherever it is necessary that traffic, including Contractor's vehicles and equipment, be carried from one side of pavement to the other, construct suitable bridges over pavement, and maintain them in good condition as long as they may be required.
- F. Leaving gaps in pavement to facilitate movement of traffic will not be allowed, unless prior written permission is received from the Engineer.
- G. Protect new concrete from dirt, asphalt, and other deleterious substances that may be tracked onto new pavement from construction activities.
- H. Pavement damaged by traffic or damaged from any other cause, prior to acceptance, shall be repaired or replaced to conform to the requirements herein.

END OF SECTION

SECTION 32 14 00

UNIT PAVING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Concrete Pavers
 - 2. Joint Sand
 - 3. Setting Bed Sand
 - 4. Base Aggregate
 - 5. Subbase Aggregate
 - 6. Edge restraints

1.02 REFERENCES

- A. American Society for Testing and Materials
 - 1. C 33, Standard Specification for Concrete Aggregates.
 - 2. C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - 3. C 140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
 - 4. C 144 Standard Specifications for Aggregate for Masonry Mortar.
 - 5. D448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
 - 6. C 936, Standard Specification for Solid Concrete Interlocking Paving Units.
 - 7. C 979, Standard Specification for Pigments for Integrally Colored Concrete.
 - 8. D 698 Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 5.5 lb (24.4 N) Rammer and 12 in. (305 mm) drop.
 - 9. D 1557 Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 10-lb (44.5 N) Rammer and 18 in. (457 mm) drop.
 - 10. C1645 Standard Test Method for Freeze-thaw and De-icing Salt Durability of Solid Concrete Interlocking Paving Units
 - 11. D 2940 Graded Aggregate Material for Bases or Subbases for Highways or Airports.

1.03 SUBMITTALS

A. In accordance with General Conditions of the Contract and Division 1 Submittal Procedures Section

B. Product Data: For materials other than water and aggregates.

C. Samples

- 1. Full-size units of each type of paver indicated
- 2. Exposed edge restraints.

D. Bedding material, Open-graded Base and Sub Base material

- 1. Submit sieve analysis results in accordance with ASTM C136 for jointing, bedding, base and sub-base material.
- 2. Provide supplier name, source and types of material used for jointing, bedding, base and sub base.

E. Paving Installer

1. Job references from projects similar in size and design to this project. Provide Owner/General Contractor names, postal address, phone, fax and email address.

1.04 QUALITY ASSURANCE

- A. Mock-Ups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic efforts and set quality standards for materials and execution.
 - 12. Install a 10 ft by 10 ft area of pavers on a prepared substrate including detail to illustrate component application including pattern and edge details.
 - 13. When required, provide a separate mock-up for each paver type and bonding pattern.
 - 14. Use mock-up to determine pre-compaction setting bed level, joint sizes, lines, laying patterns and product color.
 - 15. Do not start work until mock-up has been approved by Engineer/Landscape Architect.
 - 16. Approved mock-up is the standard by which appearance, workmanship, substrate preparation and material application will be judged.
 - 17. Approved field sample may be retained as part of finished work. Remove mock-up and dispose of materials when directed by Landscape Architect.

B. Pre-Installation Meetings

1. Conduct pre-installation meeting one week prior to commencing work of this section to verify project requirements, substrate condition and coordination with other trades, installation instructions and warranty requirements.

1.05 DELIVERY, STORAGE AND HANDLING

A. Procurement

1. Allow adequate time for the production and delivery of specified paver. Consult local distributor for lead-time and delivery options.

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B. Delivery

1. Deliver materials in manufacturer's original, unopened, undamaged packaging with identification labels intact. Unload pavers with proper equipment so no damage occurs to pavers.

C. Storage

- 1. Store materials so they are protected from contamination by foreign substances and excessive moisture.
- 2. Store pavers to prevent damage and staining.

1.06 PROJECT CONDITIONS

- A. Environmental Requirements
 - 1. Do not install in rain or snow.
 - 2. Do not install frozen bedding material.

1.07 MAINTENANCE

- A. Extra Materials
 - 1. Furnish one hundred additional pavers to owner for future maintenance and repair.
 - 2. Pavers shall be from the same production run as the installed materials.

PART 2 - PRODUCTS

2.01 CONCRETE PAVERS

- A. Concrete Pavers: Solid interlocking paving units complying with ASTM C 936 and resistant to freezing and thawing when tested according to ASTM C 67, made from normal-weight aggregates.
 - 1. Manufactures: 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. Unilock
 - b. Belgard Hardscapes, Inc.
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide Unilock; Brussels Block or comparable product by one of the following:
 - a. Belgard Hardscapes, Inc.
 - b. An approved equal.
 - 3. Thickness: 2.75 inches
 - 4. Face Size and Shape: 7 x 4.125 inches rectangle
 - 5. Face Size and Shape: 8.25 x 6.75 inches rectangle
 - 6. Face and Size and Shape 13.75 x 8.25 inches rectangle

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- 7. Laying Pattern: Brussels Block Z Half Stone (13%), Standard (20%) and XL (67%)
- 8. Color: As selected by Architect from manufacturer's full range.

2.02 AGGREGATE SETTING-BED MATERIALS

- A. Graded Aggregate for Base: Sound, crushed stone or gravel complying with ASTM D 2940, base material and requirements in Section 31 20 00 "Earth Moving" for base course.
- B. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33 for fine aggregate.
- C. Sand for Joints: Fine, sharp, washed, natural sand or crushed stone with 100 percent passing No. 16 sieve and no more than 10 percent passing No. 200 sieve.
 - 1. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
 - 2. Permittivity: 0.5 per second, minimum; ASTM D 4491.
- D. Herbicide: Commercial chemical for weed control, registered with the EPA. Provide in granular, liquid, or wettable powder form.

2.03 ACCESSORIES

- A. Aluminum Edge Restraints: Manufacturer's standard straight, 1/8-inch- thick by 4-inch- high extruded-aluminum edging with loops pressed from face to receive stakes at 12 inches o.c., and aluminum stakes 12 inches long for each loop.
 - 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. Brickstop Corporation.
 - b. Cury-Rite, Inc.
 - c. Permaloc Corporation.
 - d. Sure-loc Edging Corporation.
- B. Joint Sand: Provide natural Joint Sand as follows:
 - 1. Washed, clean, non-plastic, free from deleterious or foreign matter, symmetrically shaped, natural or manufactured from crushed rock.
 - 2. Do not use limestone screenings, stone dust, or sand for the Joint Sand material that does not conform to conform to the grading requirements of ASTM C 33.
 - 3. Utilize sands that are as hard as practically available where concrete pavers are subject to vehicular traffic.
 - 4. Gradation as shown in Table 1 below:

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Joint Sand Gradation Requirements for Joint Sand

ASTM C 144		
Sieve Size	Natural Sand	Manufactured Sand
	Percent Passing	Percent Passing
No. 4 (4.75 mm)	100	100
No. 8 (2.36 mm)	95 to 100	95 to 100
No. 16 (1.18 mm)	70 to 100	70 to 100
No. 30 (0.600 mm)	40 to 75	40 to 75
No. 50 (0.300 mm)	10 to 30	20 to 40
No. 100 (0.150 mm)	2 to 15	10 to 25
No. 200 (0.075)	0 to 1	0 to 10

- C. Provide Geotextile material conforming to the following performance characteristics, measured per the text methods referenced:
 - 1. 4 oz., nonwoven needle punched geotextile composed of 100% polypropylene staple fibers that are inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.
 - 2. Grab Tensile Strength: ASTM D 4632: 115 lbs.
 - 3. Grab Tensile Elongation: ASTM D 4632: 50%.
 - 4. Trapezoidal Tear: ASTM D4533: 50 lbs.
 - 5. Puncture: ASTM D4833: 65 lbs.
 - 6. Apparent Opening Size: ASTM D 4751: 0.212 mm, 70 U.S. Sieve.
 - 7. Permittivity: ASTM D 4491: 2.0 sec -18.
 - 8. Flow Rate: ASTM D 4491: 140 gal/min/s.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
- B. Cut unit pavers with motor-driven masonry saw equipment to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible.
 - 1. For concrete pavers, a block splitter may be used.
- C. Tolerances: Do not exceed 1/16-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 24 inches and 1/4 inch in 10 feet from level, or indicated slope, for finished surface of paving.
- D. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.

3.02 AGGREGATE SETTING-BED APPLICATIONS

- A. Compact soil subgrade uniformly to at least 95 percent of ASTM D 1557 laboratory density.
- B. Place aggregate base, compact by tamping with plate vibrator, and screed to depth indicated.
- C. Place drainage geotextile over compacted base course, overlapping ends and edges at least 12 inches.
- D. Place leveling course and screed to a thickness of 1 to 1-1/2 inches, taking care that moisture content remains constant and density is loose and uniform until pavers are set and compacted.
- E. Treat leveling course with herbicide to inhibit growth of grass and weeds.
- F. Set pavers with a minimum joint width of 1/16 inch and a maximum of 1/8 inch, being careful not to disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars. Use string lines to keep straight lines. Fill gaps between units that exceed 3/8 inch with pieces cut to fit from full-size unit pavers.
- G. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf compaction force at 80 to 90 Hz.
- H. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.

3.03 PROTECTION

A. After work in this section is complete, General Contractor shall protect work from damage due to subsequent construction activity on site.

END OF SECTION

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SECTION 32 17 13

PRECAST CONCRETE PARKING BUMPERS

PART 1 – GENERAL

1.1 SUBMITTALS

- A. Product Data: Catalog cuts, specifications, and installation instructions for precast bumpers.
- B. Quality Control Submittals:
 - 1. Test Reports: Random freeze thaw tests shall be conducted by the manufacturer. Test specimens shall retain 60 percent of its initial modulus of elasticity after 300 cycles. Furnish test results to the Director upon request.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Precast Concrete: Normal weight, 5000 psi, air entrained concrete. Air content shall be 6 percent by volume within an allowable tolerance of plus or minus 1.5 percent.
- B. Bar Reinforcement: ASTM A 615, Grade 40, deformed.
- C. Setting Pins: 3/4 x 18 inches galvanized steel.

2.2 FABRICATION

A. Parking bumpers shall be cast at the manufacturer's plant, not at the job site. Castings shall have plane smooth surfaces, true to line and face, free from defects and sharp arises. Overall dimensions for castings shall not vary more than 1/16 inch from those indicated.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Center each unit between parking bay lines.
- B. Anchor each parking bumper with two setting pins driven through precast or drilled holes into the subgrade or pavement below.

C. Reset existing parking bumpers approved for reuse by the Director's Representative.

3.2 FIELD QUALITY CONTROL

A. The Director may conduct additional tests. Replace units taken for testing, not to exceed 10 linear feet for each 1,000 feet or fraction thereof delivered to the project.

END OF SECTION

SECTION 32 17 21

PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Traffic lines and markings.
 - 2. Legends.
 - 3. Paint.
 - 4. Glass beads.

B. Definitions:

1. Standard Specifications: State of New York, Department of Transportation (NYSDOT) Standard Specifications.

1.02 REFERENCE STANDARDS

- A. The following is a list of standards which may be referenced in this Section:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. M237, Standard Specification for Epoxy Resin Adhesives for Bonding Traffic Markers to Hardened Portland Cement and Asphalt Concrete.
 - b. M247, Standard Specification for Glass Beads Used in Traffic Paint
 - c. M248, Standard Specification for Ready-Mixed White and Yellow Traffic Paints.
 - d. M249, Standard Specification for White and Yellow Reflective Thermoplastic Striping Material (Solid Form).
 - 2. ASTM International (ASTM):
 - a. D4280, Standard Specification for Extended Life, Nonplowable, Prismatic, Raised Retroflective Pavement Markers.
 - 3. Federal Specifications (FS):
 - a. A-A-2886A, Paint, Traffic, Solvent-Based.
 - b. TT-B-1325C, Beads (Glass Spheres); Retroflective.

1.03 SUBMITTALS

- A. Action submittals:
 - 1. Product Data for each product or material incorporated into the Work:
 - a. Paint
 - b. Thermoplastic material.
 - c. Reflective markers

- d. Epoxies, resins, and primers.
- e. Glass beads: proposed gradation.
- 2. Manufacturer Instructions:
 - a. Application temperatures, eradication requirements, application rate, line thickness, type of glass beads, and bead embedment and application rate.
 - b. Installation requirements, including storage and handling procedures.
- 3. Qualifications Statements:
 - a. Qualifications for manufacturer and applicator.
 - b. Manufacturer's approval of applicator.

1.04 QUALITY ASSURANCE

- A. The pavement marking Manufacturer shall have been in the active manufacture of specified products for at least three years.
- B. Applicator:
 - 1. The Applicator shall be an individual or firm specializing in the proper installation of the pavement marking specified herein.
 - 2. The Applicator shall have a minimum of three years of experience in applying the pavement markings specified and shall be certified and approved by the Manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Comply with Section 01 60 00, Common Product Requirements.
- B. Storage:
 - 1. Store in accordance with the Manufacturer's instructions.
 - 2. Paint:
 - a. Invert containers several days prior to use if paint has been stored more than two months.
 - b. Minimize exposure to air when transferring paint.
 - c. Seal drums and tanks when not in use.
 - 3. Protection:
 - a. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - b. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.01 GENERAL

A. All products shall be in accordance with Section 640 and Section 727 of the NYSDOT Standard Specifications.

2.02 PAINT

- A. Color: white, yellow, or blue.
- B. Traffic paint shall comply with Section 640-2 and Section 727-03 of the NYSDOT Standard Specifications.
- C. Paint shall be homogeneous, easily stirred to smooth consistency, with no hard settlement or other objectionable characteristics during a storage period of 6 months.

2.03 THERMOPLASTIC MARKING

- A. Color: white, yellow, or blue.
- B. Thermoplastic markings shall be in accordance with Section 737-01 of the NYSDOT Standard Specifications.

2.04 GLASS BEADS

A. Glass beads shall comply with Section 727-05 of the NYSDOT Standard Specifications.

PART 3 - EXECUTION

3.01 GENERAL

A. Surface Preparation, Application, and Protection: Comply with Section 635, Section 640, and Section 687 of the NYSDOT Standard Specifications.

3.02 APPLICATION

- A. Do not apply materials if surface and ambient temperatures are outside temperature ranges required by pavement marking Manufacturer.
- B. Do not apply exterior coatings during rain or snow if relative humidity is outside range required by Manufacturer, or if moisture content of surfaces exceeds that required by Manufacturer.
- C. Minimum Conditions: Do not apply paint if temperatures are expected to fall below 55 degrees F within 24 hours after application.
- D. Thermoplastic Compound: Do not apply unless pavement surface temperature is minimum 55 degrees F and rising.
- E. Maximum VOCs: Do not exceed limit required by State or Environmental Protection Agency.

3.03 FIELD QUALITY CONTROL

- A. Inspect for incorrect location, insufficient thickness, line width, coverage, retention, uncured or discolored material, and insufficient bonding.
- B. Acceptance:
 - 1. Repair lines and markings which, after application and curing, do not meet following criteria:
 - a. Incorrect location.
 - b. Insufficient thickness, width, coverage, or retention.
 - c. Uncured or discolored material.
 - d. Insufficient bonding.

3.04 CLEANING

A. Collect and lawfully dispose of residues from painting operations.

3.05 PROTECTION

- A. Protect painted pavement markings from vehicular and pedestrian traffic until paint is dry and track free.
- B. Follow Manufacturer instructions or use minimum of 30 minutes of dry time.

END OF SECTION

SECTION 32 31 13

CHAIN LINK FENCES AND GATES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes all performance and material requirements for temporary construction and permanent chain-link fences and gates as shown on the Plans.
- B. Scope of the work includes:
 - 1. Fence framework, fabric, and accessories.
 - 2. Excavation for post bases.
 - 3. Concrete foundation for posts.
 - 4. Manual gates and related hardware.
- C. Related work specified elsewhere:
 - 1. Section 31 11 00, Clearing and Grubbing

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. ASTM International (ASTM):
 - a. A121, Standard Specification for Metallic-Coated Carbon Steel Barbed Wire.
 - b. A123. Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - c. ASTM A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - d. A392, Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
 - e. A491, Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric.
 - f. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - g. A817, Standard Specification for Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcelled Tension Wire.
 - h. A824, Specification for Metallic-Coated Steel Marcelled Tension Wire for use with Chain Link Fence.

- i. A1011, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- j. B429, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
- k. C94, Standard Specification for Ready-Mixed Concrete.
- 1. F552, Standard Terminology relating to Chain Link Fencing.
- m. F567, Standard Practice for Installation of Chain-Link Fence.
- n. F626, Standard Specification for Fence Fittings.
- o. F668, Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric.
- p. F900, Standard Specification for Industrial and Commercial Swing Gates.
- q. F934, Standard Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials.
- r. F1043, Standard Specification for Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework.
- s. F1083, Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
- t. F1183, Standard Specification for Aluminum Alloy Chain Link Fence Fabric.
- u. F1184, Standard Specification for Industrial and Commercial Horizontal Slide Gates.
- v. F1345, Standard Specification for Zinc 5% Aluminum Mischmetal Alloy-Coated Steel Chain-Link Fence Fabric.
- w. F1664, Standard Specification for Poly(Vinyl Chloride)(PVC) and Other Conforming Organic Polymer-Coated Steel Tension Wire Used with Chain-Link Fence.
- x. F1665, Standard Specification for Poly(Vinyl Chloride)(PVC) and
- aa. ASTM F2781, Standard Practice for Testing Forced Entry, Ballastic, and Low-Impact Resistance of Security Fence Systems.
- 2. Chain Link Fence Manufacturers Institute (CLFMI):
 - a. SFR 2445. Security Fence Recommendations.
 - b. CLF TPO211, Tested and Proven Performance of Security Grade Chain Link Fence Systems.
 - c. WLG2445, Chain Link Fence Wind Load Guide for the Selection of Line Post and Line Post Spacing.
- 3. Institute of Electrical and Electronic Engineers (IEEE), Inc.: C2, National Electric Safety Code.
- 4. National Electrical Manufacturers Association (NEMA): 250, Enclosures for Electrical Equipment (1,000 volts maximum).
- 5. State of New York Department of Transportation (NYSDOT), Standard Specifications.

- 6. Underwriters' Laboratories, Inc. (UL):
 - a. 325, Door, Drapery, Gate, Louver and Window Operators.
 - b. 467, Standard for Safety Grounding and Bonding Equipment.

1.03 SUBMITTALS

- A. Comply with Section General Conditions
- B. Action submittals:
 - 1. Shop drawings:
 - a. Indicate site plan layout of fence locations with dimensions, locations of gates and opening sizes, cleared area, elevation of fence and gates, and details of attachments and footings.
 - b. Product data: Submit data on fabric, posts, accessories, fittings and hardware to demonstrate material compliance with this section.
 - 2. Certifications:
 - a. Manufacturer's material certifications, certifying compliance with this specification and referenced ASTM specifications.
- C. Informational submittals:
 - 1. Manufacturer's installation instructions:
 - a. Submit installation requirements, post foundation and anchor bolt template.
 - b. Manufacturer's Certificate of Conformance: Certify that materials and coatings furnished have been tested and conform to the referenced ASTM Specification.
- D. Closeout submittals:
 - 1. Comply with General Conditions Closeout Procedures.
 - 2. Accurately record actual locations of property perimeter posts relative to property lines and easements.
 - 3. Operation and Maintenance Data: Comply with General Conditions Operation and Maintenance Data.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum of five (5) years of experience.
- B. Fence Contractor: Company with demonstrated successful experience installing similar projects and products in accordance with ASTM F567 and have at least five (5) years of experience.
- C. Tolerances: Current published edition of ASTM specifications tolerances shall apply. ASTM specification tolerances supersede any conflicting tolerance.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with General Conditions
- B. Deliver fence fabric and accessories in packed cartons or firmly tied rolls.
- C. Identify each package with manufacturer's name.
- D. Store fence fabric and accessories in secure and dry place. Store materials off the ground to provide protection against oxidation caused by ground contact.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Materials and components: Conform to CLFMI Product Manual.
- B. All carbon steel materials, components, and accessories shall be hot-dip galvanized after fabrication.

2.02 CHAIN LINK FABRIC

- A. Steel chain link fabric:
 - 1. 2-inch mesh, 9- gauge galvanized steel wire weave. Specified gauge shall be the gauge thickness of the steel wire, exclusive of coatings.
 - 2. Height: as shown on the Drawings.
 - 3. Top selvage: knuckled.
 - 4. Bottom selvage: knuckled.
 - 5. Material:
 - a. Fabric shall be a zinc-coated steel wire fabric, hot dip galvanized in accordance with ASTM A392, with a Class 2b polymer coating in accordance with ASTM F668..
 - b. Minimum zinc coating: 2 oz / sq ft.
 - 1. Coating shall be fused and adhered to the steel fabric.
 - 2. Color: Black, as selected by Owner from manufacturers full range of color options.
- B. Provide Top Lock Privacy Slates for Chain Link Fence, Color to selected by Owner from manufacturers full range of color options, see plans for locations.

2.03 STEEL FENCE FRAMEWORK

- A. Round steel pipe and rail:
 - 1. Conform to ASTM F1043, Group IA Heavy Industrial Fence Framework, Schedule 40 galvanized pipe, per ASTM F1083.
 - 2. Yield strength: 30 ksi.
 - 3. Exterior hot-dip zinc coating minimum average: 2.0 oz / sq ft.
 - 4. Line Posts: 2-inch Schedule 40 steel pipe, per ANSI B36.10.
 - 5. End, corner, pull posts: 2-3/8 inch Schedule 80 steel pipe, per ANSI B36.10.
 - 6. Top, brace, bottom and intermediate rails: 1-1/4-inch Schedule 40 steel pipe, per ANSI B36.10.
- B. All posts shall be equipped with pressed steel combination tops. Tops shall be provided with a hole to permit through passage of the top rail.
- C. Gate Frame:
 - 1. 1-7/8 inch diameter for welded or fittings and truss rod fabrication.
 - 2. When fittings are used, 3/8-inch minimum diameter truss rods shall be provided to prevent sag or twist.
- E. Tension Wire: 7 gauge galvanized coil spring wire.
- F. Tension Bars:
 - 1. Tension bars shall be minimum 3/16-inch by 3/4-inch flat steel plates and no more than 2 inches shorter than the fabric height.
 - 2. Bars shall be hot-dip galvanized.
- G. Tension Bands: Tension bands shall be formed from No. 12 gauge flat or beveled steel and attached with 3/8-inch diameter carriage bolts hot-dip galvanized.
- H. Tie Wire: Aluminum alloy steel wire.
- I. All framework components shall be polymer-coated to match chain line fabric

2.07 FITTINGS

- A. Tension and brace bands:
 - 1. Galvanized pressed steel conforming to ASTM F626, minimum steel thickness of 12 gauge, minimum width 3/4-inch and minimum zinc coating of .2 oz / sq ft.
 - 2. Supply bands with 3/8-inch galvanized steel carriage bolts.
- B. Terminal post caps, line post loop tops, rail and brace ends Boulevard clamps, and rail sleeves: Conforming to ASTM F626, pressed steel galvanized after fabrication having a minimum zinc coating of 1.2 oz/sq ft.

C. Truss rod assembly: Conforming to ASTM F626, 3/8-inch diameter steel truss rod with a pressed steel tightener, minimum zinc coating of 1.2 oz/sq ft, assembly capable of withstanding a tension of 2,000 lbs.

D. Tension bars:

- 1. Conforming to ASTM F626.
- 2. Galvanized steel one-piece length 2 inches less than the fabric height.
- 3. Minimum zinc coating: 1.2 oz/sq ft.
- 4. Bars for 2-inch mesh shall have a minimum cross-section of 3/16 inch by 3/4 inches.
- E. All fittings shall be polymer-coated to match chain line fabric

2.08 TIE WIRE AND HOG RINGS

A. General:

- 1. Conforming to ASTM F626.
- 2. Minimum wire thickness: 9 gauge galvanized steel.
- 3. Minimum zinc coating: 1.2 oz/sq. ft.

2.09 SWING GATES

A. Size and configuration: as shown on the Drawings.

B. General:

- 1. Galvanized steel welded fabrication conforming to ASTM F900.
- 2. Gate frame members shall be minimum 2-inch Schedule 40 steel pipe.
- 3. Frame members shall be spaced no greater than 8 feet apart vertically and horizontally.
- 4. Welded joints shall be protected by applying zinc-rich pain in accordance with ASTM A780.
- 5. Positive locking gate latch shall be fabricated of 5/16-inch thick by 1-3/4 inch pressed steel, galvanized after fabrication.
- 6. Steel post and frame hinges shall be galvanized malleable iron or heavy gauge pressed steel.
- 7. Match gate fabric to that of the fence system.
- 8. Gate post size: 2-inch Schedule 80 galvanized steel pipe posts.
- 9. Polymer-coated to match chain link fabric.
- 10. Provide Gate Fulcrum Latch with Strike Strap and heavy duty swing gate hinges for double swing gates.

2.11 FENCE GROUNDING

A. Conductors:

1. Bare, solid wire for No. 6 AWG and smaller, stranded wire for No 4 AWG and larger.

- 2. Material, above and below ground: copper.
- 3. Bonding jumpers: braided copper tape, 1-inch wide, woven No. 30 AWG bare copper wire, terminated with copper ferrules.
- B. Connectors and Grounding Rods: Comply with UL 467.
 - 1. Connectors for below-grade use: exothermic welded type.
 - 2. Grounding rods: Copper-clad steel.

2.12 CONCRETE

- A. Concrete for foundations shall conform to the following:
 - 1. Minimum 28-day compressive strength: 3,000 psi.
 - 2. Portland cement: Type I, in accordance with ASTM C150.
 - 3. Course and fine aggregates: Comply with ASTM C33.
 - 4. Air entrainment: 4% to 7%, by admixture only.
 - 5. Maximum slump: 4 inches.
 - 6. Maximum water-cement ratio: 0.46.
 - 7. Ready mix concrete from an established company may be acceptable if it conforms to ASTM C94 and this Specification.

PART 3 – EXECUTION

3.01 CLEARING FENCE LINE

- A. Comply with Section 31 11 00 Clearing and Grubbing
- B. Layout:
 - 1. Provide all surveying control for establishing fence lines.
 - 2. Clear and grub fence lines to sufficient width to install chain link fences, as shown on the Plans.
- C. Drainage crossings: Where the chain link fence must cross drainage ditches or swales, the main fence shall be carried across a ditch or swale with additional fence fabric added below.

3.02 FRAMEWORK ERECTION

- A. Posts:
 - 1. Set posts plumb in concrete footings in accordance with ASTM F567.
 - 2. Minimum footing depth: 3'-0", plus an additional 3 inches for each foot of fence height over 4 feet.
 - 3. Minimum footing diameter shall be at 12 inches.
 - 4. Top of post concrete footing shall be at grade, crowned to shed water away from the post.
 - 5. Install line posts at intervals not exceeding 10 feet on-center.

B. Top Rail:

- 1. Install 21-foot lengths of rail continuous through the line post or barb arm loop top.
- 2. Splice rail using top rail sleeves, minimum 6 inches long.
- 3. Secure rail to terminal post with a brace band and rail end.
- 4. Field-cut bottom rail or intermediate rail and secure to line posts using boulevard bands or ends and brace bands.

C. Terminal Posts:

- 1. End, corner, pull, and gate posts shall be braced and trussed for fence 5 feet and taller, and for fences 5 feet in height not having a top rail.
- 2. The horizontal brace and diagonal truss rod shall be installed in accordance with ASTM F567.

D. Tension Wire:

- 1. Install 4 inches up from the bottom of the fabric.
- 2. Fences without a top rail shall have a tension wire installed 4 inches down from the top of the fabric.
- 3. Tension wire shall be stretched taut, independently and prior to the fabric, between the terminal posts and secured to the terminal post using a brace band.
- 4. Secure the tension wire to the chain link fabric with 9-gauge hog rings, 18 inches on-center and to each line post with a tie wire.

3.03 CHAIN LINK FABRIC INSTALLATION

A. Fabric installation:

- 1. Install fabric to outside of the framework.
- 2. Attach fabric to the terminal post by threading the tension bar through the fabric
- 3. Secure the tension bar to the terminal post with tension bands at 5/16-inch carriage bolts spaced no greater than 12 inches on-center.
- 4. Small-mesh fabric less than 1 inch: attach to terminal post by sandwiching the mesh between the post and a vertical 2-inch wide by 3/16-inch steel bar using carriage bolts, through-bolted through the bar, mesh and post spaced 15 inches on-center.
- 5. Stretch chain link fabric taut and free of sag.
- 6. Secure fabric to the line post with tie wires spaced no greater than 12 inches on center and to rails spaced no greater than 18 inches on center.
- 7. Secure the fabric to the tension wire with hog rings spaced no greater than 18 inches apart.
- 8. Aluminum alloy wire ties shall be wrapped around the post or rail and attached to the fabric wire picket on each side of the post or rail by twisting the tie wire around the fabric wire picket two full turns per ASTM F567.

- 9. Excess wire shall be cut off and bent over to prevent injury.
- 10. Installed fabric shall have a ground clearance of no more than 2 inches.

3.04 GATE INSTALLATION

A. Swing Gates:

- 1. Install swing gates and gate posts in accordance with ASTM F567.
- 2. Direction of swing shall be as shown on the Drawings.
- 3. Gates shall be plumb in the closed position have a bottom clearance of 3 inches.
- 4. Hinge and latch offset opening space from the gate frame to the post shall be no greater than 3 inches in the closed position.
- 5. Double-gate drop bar receivers shall be set in concrete footings a minimum of 6 inches in diameter and 2 feet deep.
- 6. Install gate leaf holdbacks for all double-leaf gates.

3.06 NUTS AND BOLTS

A. Bolts:

- 1. Carriage bolts for fittings shall be installed with the head on the secure side of the fence.
- 2. Peen all bolts over after assembly to prevent removal of the nut.

3.07 ELECTRICAL GROUNDING

- A. Ground fences at a maximum interval of 1,000 feet in accordance with the IEEE C2, National Electric Safety Code.
- B. Protection at crossings of overhead electrical power lines: Ground fence at location of crossing and at a maximum distance of 150 feet on each side of the crossing.
- C. Grounding method: At each grounding location, drive a 10-foot grounding rod vertically until top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at the grounding location.

3.08 FIELD QUALITY CONTROL

A. Post and fabric testing: Test fabric tension and line post rigidity in accordance with ASTM F1916.

B. Gate Tests:

- 1. Prior to acceptance of installed gates, demonstrate proper operation of gates under each possible open and close condition specified.
- 2. Adjust gate to operate smoothly, easily, and quietly, free of binding, war, excessive deflection, distortion, non-alignment, misplacement, disruption, or malfunction, throughout the entire operational range.
- 3. Confirm latches and locks engage accurately and securely without forcing and binding.

3.09 MANUFACTURER'S SERVICES

A. Provide manufacturer's representative at the Site to train Owner's personnel in proper adjustment, operation, and maintenance of gates.

3.10 CLEANING

A. The area of the fence line shall be left neat and free of any debris caused by the fence installation.

END OF SECTION

SECTION 32 31 19

DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes aluminum fencing, gates, and accessories and shall include all components (pickets, posts, rails, gates, hardware, and accessories) as required, and shall be fabricated, coated, and assembled in the United States.
- B. Related Work specified elsewhere:
 - 1. Section 03 30 00, Cast-in-Place Concrete.

1.02 REFERENCE STANDARDS

- A. The following is a list of standards which may be referenced in this Section:
 - 1. American Architectural Manufacturers Association (AAMA):
 - a. 2603, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels
 - b. 2604, Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels
 - 2. ASTM International (ASTM):
 - a. B85, Standard Specification for Aluminum-Alloy Die Castings
 - b. B117, Practice for Operating Salt Spray (Fog) Apparatus
 - c. B221, Specification for Aluminum Alloy Extruded Bars, Shapes, and Tubes
 - d. D2247, Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity

1.03 SUBMITTALS

- A. Comply with General Conditions.
- B. Manufacturer's submittal package shall be provided prior to installation.
- C. Changes in specification may not be made after the bid date.
- D. Samples:
 - 1. If requested, samples of assembled materials, components, hardware, accessories, and/or color samples shall be provided.

1.04 QUALITY ASSURANCE

- A. The contractor shall provide laborers and supervisors who are familiar with the type of construction involved, and the materials and techniques specified.
- B. Manufacturer of fence system must have ten (10) years of documented experience in manufacturing the products specified in this section.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, materials should be checked for damage that may have occurred in shipping to the job site.
- B. Each package shall bear the name of the manufacturer.
- C. Store products in manufacturer's unopened packaging.
- D. Store materials in a secure and dry area to protect against damage, weather, vandalism, and theft.
- E. Transport, handle and store products with care to protect against damage before installation.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Ameristar Fence Products.
- B. Jerith Manufacturing.
- C. Superior Aluminum Products, Inc.
- D. Or approved equal.

2.02 MATERIALS

- A. Aluminum Extrusions: All posts and rails used in the fence system shall be extruded from HS-35 (TM) aluminum alloy having a minimum yield strength of 35,000 psi. All pickets shall have a minimum yield strength of 25,000 psi. 6063-T5 and 6063-T52 Alloys (in accordance with ASTM B221) are not acceptable for any components.
- B. Fasteners: All fasteners shall be stainless steel. Square drive screws shall be used to connect the pickets to the horizontal rails. Rail to post connections shall be made using self-drilling hex-head screws.

C. Accessories: Aluminum sand and die castings shall be used for all scrolls, post caps, finials, and miscellaneous hardware. Die castings shall be made from Alloy A360.0 as per ASTM B85 for superior corrosion resistance. Alloy A380.0 is not acceptable.

2.03 FINISH

A. Pretreatment:

- 1. A three stage non-chrome pretreatment shall be applied. The first step shall be a chemical cleaning, followed by a water rinse.
- 2. The final stage shall be a dry-in-place activator which produces a uniform chemical conversion coating for superior adhesion.

B. Coating:

- 1. Fence materials shall be coated with a TGIC polyester powder-coat finish system.
- 2. Epoxy powder coatings, baked enamel or acrylic paint finishes are not acceptable.
- 3. Coating shall have a cured film thickness of at least 2.0 mils.
- 4. Paint screw heads to match fence color.
- C. Tests: The cured finish shall meet or exceed AAMA 2604:
 - 1. Humidity resistance of 3,000 hours using ASTM D2247.
 - 2. Salt-spray resistance of 3,000 hours using ASTM B117.
 - 3. Outdoor weathering shall show no adhesion loss, checking or crazing, with only slight fade and chalk when exposed for 5 years in Florida facing south at a 45 degree angle.
- D. Finishes which only meet AAMA 2603 are not acceptable.

2.04 FABRICATION

- A. Horizontal rails shall be 1-5/8" channels formed in a modified "U" shape. Pickets shall pass through holes punched in the top of the rail. The top wall shall be 0.070" thick and the side walls 0.100" thick for superior vertical load strength. There shall be 3 horizontal rails in each section.
- B. Pickets shall be fastened to the rails using painted stainless steel screws. Screws shall be used on only one side of the rail, leaving the other side with a clean appearance. Pickets shall be 1" square and have a wall thickness of 0.062". Welding the pickets to the rails is not permitted.
- C. Posts shall be 2-1/2" square extrusions with pre-punched holes which allow the fence section rails to slide in. Posts shall be spaced 71-1/2" on center and have .075" walls. Gate posts shall be 4" square with 0.125" walls and used on both sides of a gate. Die cast aluminum caps shall be provided with all posts.

- D. Cantilever slide gates shall be fabricated according to manufacturer's standard methods. Swing gates shall have welded frames and shall support a 300 lb. vertical load on the latch side of the gate without collapsing. Walk gates shall be self-closing and self-latching.
- E. Assembled sections shall support a 1,000 lb. vertical load at the midpoint of any horizontal rail.
- F. Fence shall be 6 feet tall.
- G. Color shall be as selected by Owner from manufacturer's full range of color options.

2.05 WARRANTY

A. The entire fence system shall have a written Limited Lifetime Warranty against rust and defects in workmanship and materials. In addition, the finish shall be warranted not to crack, chip, peel, or blister for the same period.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify areas to receive fencing are completed to final grades and elevations.
- B. Ensure property lines and legal boundaries are clearly established.
- C. Prepare the grade and remove any surface irregularities which may cause interference with the installation of the aluminum fence.

3.02 FENCE INSTALLATION

- A. Install fence in accordance with the manufacturer's instructions.
- B. Excavate post holes to proper depth to suit local conditions for stability and support of the fence system without disturbing the underlying materials. Excavate deeper as required for adequate support in soft and loose soils.
- C. Set fence posts in concrete footers at manufacture's recommended spacing. For installations on a slope, the post spacing must be measured along the grade.
- D. Insert notched horizontal rails in pre-punched holes in post and fasten in place.
- E. Center and align posts in holes to required depth. Place concrete around posts and tamp for consolidation. After tamping, check alignment of posts, and make necessary corrections before the concrete hardens.

3.03 GATE INSTALLATION

- A. Set gate posts plumb and level for gate openings specified in Contract Drawings.
- B. Install gates to allow full opening without interference after concrete has hardened around gate posts. Adjust hardware for smooth operation. Install one drop rod for double gates.

3.04 ACCESSORIES

A. Install post caps and other accessories to complete fence.

3.05 CLEANING

- A. Contractor shall clean site of debris and excess materials. Post hole excavations shall be scattered uniformly away from posts.
- B. If necessary, clean fence system with mild household detergent and clean water. Excess concrete must be removed from posts and other fencing material before it hardens.

END OF SECTION

SECTION 32 91 19.13

TOPSOIL PLACEMENT AND GRADING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Topsoil Placement and Grading as shown on the Plans, as specified, and/or directed.

1.02 SUBMITTALS

- A. Comply with General Conditions, Submittal Procedures.
- B. The Contractor shall provide a pH test and organic content test for the Engineer's review for each source of topsoil to be used.

1.03 QUALITY ASSURANCE

A. Topsoil will be visually inspected upon delivery and material that does not comply with the Specification will be rejected.

PART 2 - PRODUCTS

2.01 MATERIAL

A. Topsoil

- 1. Topsoil for such depth as directed shall be removed from areas of the site where excavations are to be made or embankments placed. The soil so removed shall be transported and stored in piles at convenient locations designated or approved and shall be kept separate from all other classes of excavated material. Should the Contractor fail to keep separate from other material any soil removed, he shall procure and furnish at his own expense an equivalent quantity of satisfactory topsoil.
- 2. The Contractor is required to process the topsoil/compost. The material shall contain no admixture of refuse or any material toxic to plant growth and shall be free from subsoil, stones, clay lumps or similar objects larger than two inches in greatest dimension. Sod and herbaceous growth such as grass and weeds need not be removed. Topsoil shall not be delivered or placed in a frozen or muddy condition.
- 3. Contractor to condition topsoil as necessary. Topsoil from on-site and off-site sources shall have an acidity range of pH 5.5 to 7.6 and shall contain 4 to 20% organic matter as determined by loss of ignition of moisture-free samples dried at 100 degrees C.

- a. Where topsoil pH is below 5.5, lime shall be added at a rate of 2-1/2 lbs. per cubic yard of topsoil until the pH is above 5.5.
- b. Where topsoil pH is above 7.6, aluminum sulfate shall be added at a rate of 2-1/2 lbs. per cubic yard of topsoil until the pH drops below 7.6.

B. Soil Amendments

- 1. Lime: Natural dolomitic limestone containing not less than 85 percent of total carbonates with a minimum of 30 percent magnesium carbonates, ground so that not less than 90 percent passes a 10-mesh sieve and not less than 50 percent passes a 100-mesh sieve.
- 2. Aluminum Sulfate: Commercial grade, in dry powder form.

PART 3 - EXECUTION

3.01 PLACEMENT

- A. Topsoil shall include fine grading the surface of the ground upon which topsoil is to be placed and the furnishing and placing of topsoil in the areas to be seeded or planted.
- B. Depth of topsoil shall be minimum 4 inches unless otherwise shown or directed.
- C. After approval by the Engineer of the fine grading of the subgrade, the topsoil shall be spread and compacted with a light roller to the lines, grades and elevations shown on the drawings, or directed by the Engineer, without unsightly variations, ridges or other depressions which will hold water. Any stone, litter or objectionable material shall be removed from the topsoil and the surface raked to true lines. Any uneven spots shall be leveled. The work shall not be performed during unsuitable weather.

END OF SECTION

SECTION 32 92 19

SEEDING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Seeding as shown on the Plans, as specified, and/or directed.
- B. The Contractor shall seed new areas and disturbed areas where shown on the drawings, specified or directed by the Engineer. Contractor shall prepare the seed bed by scarifying or otherwise loosening topsoil to a depth of 2 inches, applying fertilizer, lime or aluminum sulfate, seed and mulch or rolled erosion control products at the rates specified.
- C. Topsoil shall be applied to the locations identified in the Contract Drawings and prepared as outlined in Section 32 91 19.13.

1.02 SUBMITTALS

- A. Comply with General Conditions, Submittal Procedures.
- B. The Contractor shall submit to the Engineer for approval the method of seeding and the information outlined in Article 2.01.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fertilizer:

- 1. Commercial starter fertilizer (30-0-4) shall contain not less than thirty percent nitrogen, zero percent available phosphoric acid and four percent water soluble potash. The fertilizer shall be inorganic or a combination of inorganic and organic substances.
- 2. If, as an alternative, the Contractor wishes to substitute another starter fertilizer, he may do so with the approval of the Engineer.
- 3. Commercial fertilizer shall be delivered in original bags of the manufacturer, showing weight, analysis and the name of the manufacturer.
- 4. If the commercial fertilizer is not used immediately after delivery, the Contractor shall store it in such a manner that its effectiveness will not be impaired.

B. Seed:

- 1. Grass seed shall be a mixture of the species and/or varieties specified, mixed in the proportions specified.
- 2. The seed shall be fresh, recleaned and of the latest crop year. It shall conform to Federal and State Standards. Each type of grass in the mixture shall meet or exceed the minimum percentage purity and germination listed for that type of grass.
- 3. The following seed mixture shall be used for ditches, slopes and all areas disturbed by construction.

Percentage	Species or	Percent
by Weight	<u>Variety</u>	Germination
30	Kentucky 31 Tall Fescue	90%
30	Perennial Ryegrass	90%
20	New Zealand White Clover	90%
20	Creeping Red Fescue	90%

- 4. The balance of material in an acceptable seed mixture, other than specified pure live seed shall, for the most part consist of nonviable seed, chaff, hulls, live seeds of crop plants and harmless inert matter. The percentage of weed shall not exceed one percent by weight for the mixture.
- 5. All seed mixtures furnished under this Item shall be mixed by the vendor and shall be delivered in standard sized bags of the vendor, showing the weight, analysis and vendor's name.
- 6. All seed shall be properly stored by the Contractor at the site of the work and any seed damaged during storage shall be replaced.

C. Mulch:

1. Straw or hay mulch shall consist of oats, wheat, rye or other approved crops which are free of noxious weeds. Weight shall be calculated on the basis of the straw having not more than 15% of moisture content.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Time For Seeding

1. Grass seed shall be sown from March 15th to June 1st or from August 15th to October 1st, unless otherwise approved by the Engineer. All seeding shall be done in a dry or moderately dry soil and at times when the wind does not exceed a velocity of five miles per hour. The Contractor is required to water seeded areas as necessary to provide favorable growing conditions as necessary.

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B. Preparation of Seed Bed

- 1. After the finished grading is completed and just before seeding, the areas to be seeded shall be loosened to a depth of two inches and free from depressions which will hold water. All sticks, stones, clods, roots or other objectionable material which might interfere with the formation of a fine seed bed shall be removed from the soil.
- 2. Commercial fertilizer shall be evenly applied at the rate of 300 pounds per acre.

C. Seeding

- 1. Grass seed mixture shall be sown at the rate of 200 pounds per acre.
- 2. The seed shall be sown by hand or by an approved machine, in such a manner that a uniform stand will result.
- 3. After sowing, seeded areas shall be rolled with a light lawn roller weighing not more than one hundred pounds per foot of width.

D. Mulching

1. Within three days after the seed is sown, the seeded areas shall be covered with a uniform blanket of straw mulch at the rate of 1,000 pounds per acre of seeded area or as required to provide 90% coverage (i.e., lightly cover 90% of the surface).

E. Hydroseeding

- 1. The Contractor may substitute a hydroseeding process for hand seeding and mulching as specified above.
- 2. Where hydroseeding is used, the Contractor shall mix water, seed fertilizer, mulch and mulch anchorage at the following rates and apply to the prepared seed bed by means of a hand-held hose. No truck mounted spraying equipment shall be driven over the areas to be seeded. Discharge shall be in an uphill direction only unless otherwise approved by the Engineer.

a. Fertilizer - 300 lbs. per acre
b. Seed - 250 lbs. per acre

c. Mulch - Sufficient to equal 90% straw mulch coverage

d. Mulch Anchorage - Per Manufacturer's instructions
Chemical 750 lbs. wood fiber/acre
Wood Cellulose

- 3. Where the mulch anchorage is provided ready mixed with the mulch, no additional mulch anchorage will be required.
- 4. Mulch shall be a commercial cellulose hydromulch such as "Conwed 2000", "Turf Fiber", or equal. Soil seal or mulch anchorage used shall be approved by the Engineer. An asphalt emulsion shall not be used as mulch anchorage.

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F. Maintenance and Protection

- 1. The Contractor shall maintain and protect all seeded areas until final acceptance of the Seeding portion of the Contract.
- 2. Final acceptance will not be made until an acceptable uniform stand of grass is obtained in all newly seeded areas except that the Engineer at his discretion may accept a portion or portions of the work at various times.
- 3. Upon final acceptance of a seeded area by the Engineer, the Owner will assume responsibility for maintenance and protection of that area.
- 4. Any portions of seeded areas which are unacceptable, and which fail to show a uniform stand of grass from any cause, shall be reseeded as before except the fertilizer shall be applied at one-half the original rate. The seeding shall be repeated until the seeded areas are satisfactorily covered with grass.

END OF SECTION

SEEDING 4.23 32 92 19-4 409.005.001

SECTION 33 05 07.63

PIPE BURSTING

PART 1 - GENERAL

1.01 SUMMARY

A. Description:

- 1. Section includes requirements to replace existing sanitary sewers using a pipe bursting system.
- 2. This includes removal and replacement of service lateral connections, connections to manholes, construction of drop manholes, and placing replacement pipelines into service.

B. Related Work specified elsewhere:

1. Section 33 49 13, Manholes, Manhole Frames & Covers

1.02 REFERENCE STANDARDS

- A. The following is a list of standards that may be referenced in this section:
 - 1. ASTM International (ASTM):
 - a. A240, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - b. C425, Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings.
 - c. C1173, Standard Specification for Flexible Transition Couplings for Underground Piping Systems.
 - d. C1208, Standard Specification for Vitrified Clay Pipe and Joints for Use in Microtunneling, Sliplining, Pipe Bursting, and Tunnels.
 - e. D2657, Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.
 - f. D2837, Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products.
 - g. D3261, Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
 - h. D3262, Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe.
 - i. D3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
 - j. D4161, Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals.

- k. D6783, Standard Specification for Polymer Concrete Pipe.
- 1. F412, Standard Terminology Relating to Plastic Piping Systems.
- m. F477, Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- n. F714, Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter.
- 2. North American Society for Trenchless Technology (NASTT):
 - a. Pipe Bursting Good Practices Guidelines.

1.03 DEFINITIONS

A. Pipe Bursting:

- 1. Process of splitting or fracturing the host sewer main and forcing the fragments into the surrounding soil, for the purpose of inserting a new pipe of equal or larger diameter.
- 2. Accomplished by use of pneumatic, static or hydraulic bursting head, with pipe splitters as cutting wheels as needed.
- 3. Mole or bursting head is directionally guided by host sewer main and towed under tension by winch, chain, or rod assembly.
- 4. New pipe towed or jacked in immediately behind mole or bursting head.
- B. Host Sewer Main: Existing pipeline subject to pipe bursting system, made of vitrified clay, asbestos cement, polyvinyl chloride (PVC), cast iron, concrete, steel or lined pipe.
- C. Replacement Pipe: Pipe inserted into host sewer main by pipe bursting system.
- D. Continuous Pipe: Pipe, such as High Density Polyethylene (HDPE) pipe, with welded joints, assembled and inserted to form continuous section between access pits.
- E. Sectional Pipe: Pipe, such as HDPE pipe, vitrified clay pipe (VCP), polymer pipe, or PVC pipe assembled using leak proof joints and inserted into host sewer main in sections.
- F. Renew Lateral: Replace service lateral in public space or easement by pipe bursting, or if necessary by excavation and replacement.

1.04 SUBMITTALS

- A. Informational submittals:
 - 1. Pipe bursting plan including at minimum:
 - a. Description of process to be used.
 - b. Replacement pipe and fitting selection and composition.
 - c. Recommended manufacturer's installation procedures.
 - d. ASTM references.
 - e. Layout, storage and pipe handling area requirements for maintenance of pedestrian and vehicle traffic for each project site.

- 2. Plan for locating, exposing and re-connecting service laterals and restoring manhole connections.
- 3. Manhole connection to include waterstop/pipe restraint.
- 4. Proposed point repair method to remove sags, offset joints and constrictions or obstructions prior to bursting.
- 5. Certification backup equipment is available and can be delivered to project site within 24 hours.

B. Quality control submittals:

- 1. Certificates of Compliance for raw materials, pipe, joints, fittings, and service connections.
- 2. Certificates of Training for processes to be used, including joint fusion, if applicable.
- 3. Include installer's name, date of issuance and process for which certified.
- 4. Design calculations resulting in wall thickness for appropriate sized SDR for each trenchless technology installation.
- 5. Use soil depth at deepest manhole in installation.
- 6. Assume ground water table height of four feet below grade unless ground water monitoring data indicates different height.
- 7. List values of key parameters used in calculations, including but not limited to:
 - a. Density of soil, depth of burial, live loads, safety factors, pipe modulus of elasticity, soil modulus and total calculated pressure on the pipe.
 - b. Documentation of source of equations and methodologies used in calculations.
 - c. Allowable tensile stress during pulling of pipe.
 - d. Calculated pipe deflection versus allowable pipe deflection for selected pipe.
 - e. Critical buckling pressure.
 - f. Slip trench or entry pit dimensions for pipe insertion (as applicable).
 - g. Complete post-bursting inspection after bursting process, reconnection of laterals and renewals are completed.
- 8. Pulling log to include Allowable Tensile Load (ATL) and duration of pull of the replacement pipe.
- 9. Field-testing results.
- 10. Packing list, invoice, or delivery ticket with every shipment, to contain Contract number, type and class of pipe, length, and other pertinent information.

1.05 QUALITY ASSURANCE

A. Comply with applicable ASTM standards.

- B. Pipe Bursting System: Commercially-proven, minimum of 500,000 linear feet sewer main line and 3,500 linear feet of sewer service laterals of successful wastewater installation.
- C. Personnel performing pipe bursting:
 - 1. Certified by manufacturer of pipe bursting system having successfully completed training in:
 - a. Operating bursting head.
 - b. Installing proposed replacement pipe.
 - c. Operation and maintenance of all equipment to be used.
- D. Personnel performing fusing of HDPE pipe and fittings:
 - 1. Certified by manufacturer of fusing equipment having successfully completed training in:
 - a. Handling replacement pipe materials.
 - b. Butt fusion of pipe joints, saddle fusion of fittings for service laterals.
 - c. Operation and maintenance of all equipment to be used.
- E. Provide information regarding production, delivery, handling, and storage aspects of replacement pipe.
- F. Contractor: Internally inspect pre-bursting and post-bursting work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling and unloading:
 - 1. Transport, handle, and store pipes and fittings as recommended by manufacturer.
 - 2. Replace pipe or fittings damaged before or during installation at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 PIPE BURSTING SYSTEMS

- A. Pipe Insertion Method (PIM).
- B. TT Technology method.
- C. TRS System method.
- D. XPANDIT method.
- E. Or approved equal.

2.02 MATERIALS

A. General:

- 1. Same for mainline and lateral.
- 2. Minimum life span: 50 years.
- 3. Chemically resistant to internal exposure to sewage containing small quantities of hydrogen sulfide, carbon dioxide, methane, mercaptans, kerosene, moisture, and diluted sulfuric acid.
- 4. Chemically and physically resistant to external exposure of soil, bacteria, moisture, roots, and chemical attack due to material in surrounding ground.
- 5. Metal in saddles, clamps and appurtenances: 300 or 304 stainless steel following ASTM A240.
- 6. Elastomeric materials, gaskets, clamps, connectors: Oil resistant and manufactured following ASTM F477.
- 7. Select appropriate type pipe to maintain nominal inside diameter specified for each pipe segment.
- 8. Pipe and joints specifically designed for selected pipe bursting application.
- 9. Threaded or solvent-cement joints and connections are not permitted.
- 10. Sectional pipe: Joint following manufacturer's recommendations and approved submittals for leak-proof stab joint method, using EPDM O-ring synthetic elastomeric gaskets.

11. Fittings:

- a. Pressure rated and classified same as adjoining pipe.
- b. Inside diameter to match inside diameter of adjoining pipe.
- c. Designed for pipe bursting or pipe jacking applications.

B. HDPE pipe, joints, and fittings:

- 1. Polyethylene: Minimum cell classification of PE 345464C for black and PE345464E for colors following ASTM D3350.
- 2. Material designation: PE 3408 following ASTM F412.
- 3. Hydrostatic Design Basis at 73.4 degrees F: 1,600 psi following ASTM D2837.
- 4. Pipe:
 - a. Manufactured, sized and marked following ASTM F714.
 - b. Minimum wall thickness: SDR 17.
 - c. Measure length to provide continuous, homogeneous pipe from manhole to manhole with enough extra length to allow relaxing and finishing off at manholes.
 - d. Interior pipe color: Use fully bonded light-colored interior liner meeting specifications above.
 - e. Pipe markings:
 - 1) Mark following ASTM F714.
 - 2) Legibly marked in green to identify as sewer pipe.

- f. Approved Pipe Manufacturers:
 - Performance Pipe, Division of Chevron Phillips Chemical Company, LP.
 - 2) Poly Pipe.
 - 3) Or equal.
- 5. Molded fittings: Manufactured, sized and marked following ASTM D3261.
- 6. Field fabricated fittings: Stock manufactured, sized and marked following ASTM F714.
- 7. Joint connection minimum requirements:
 - a. Continuous pipe:
 - 1) Assemble pipe lengths in field with butt-fused joints following ASTM D2657 and approved submittals or with electrofused joints following approved submittals.
 - 2) In case of conflicts between ASTM D2657 and approved submittals or if the ASTM reference is nonspecific, follow approved submittals.
 - 3) Joint strength: Equal to or greater than pipe strength.
 - b. Excavations for pipe bursting insertion or depression removal made between manholes:
 - 1) Joint pipe ends using butt-fused joints or electrofusion coupling.
 - 2) With Engineer's approval, use full circle seal clamps specified herein or seal and restraint type mechanical couplings manufactured by:
 - a) Dresser Piping Specialties, Universal Style 90 for HDPE by HDPE, 2-inches and smaller.
 - b) Style 711 for HDPE by HDPE, 12-inches and smaller diameter pipes.
 - c) Smith-Blair, Inc., Maxi-Grip EZ for HDPE by HDPE 12-inches and smaller diameter pipes.
 - d) Or equal.
- C. Manhole connection materials:
 - 1. Concrete:
 - a. High strength, non-shrink, chemical resistant.
 - b. Cures in presence of water.
 - 2. Approved Manufacturers of flexible gasket connector:
 - a. A-Lok.
 - b. Kor-N-Seal.
 - c. Fernco.
 - d. Or equal.
 - 3. Approved Manufacturers of fused-on waterstop:
 - a. ISCO Industries Wall Anchor.
 - b. Central Plastics Electrofusion Flex Restraint.
 - c. Or equal.

- 4. Approved Manufacturers of hydrophobic grout for oakum collar:
 - a. Avanti AV 202.
 - b. DeNeef Hydro Active Sealfoam.
 - c. Or equal.

D. Connection Appurtenances:

- 1. Use full-circle elastomeric seal clamps for joining plain ends of pipe.
- 2. Rubber sleeve coupling with stainless steel shear ring.
- 3. Follow ASTM C1173.
- 4. Approved manufacturers:
 - a. Fernco.
 - b. Mission Rubber Company Flex-Seal.
 - c. DFW by NDS.
 - d. Or equal.
- 5. Joint lubricants.
 - a. Follow manufacturer recommendations.
 - b. Approved methods of application.
 - 1) By brush.
 - 2) By hand.

2.03 SOURCE QUALITY CONTROL

A. Follow referenced ASTMs.

PART 3 - EXECUTION

3.01 MAINLINE PREPARATION

- A. Respond to project site within 2 hours of Engineer's notification of problem on site.
- B. Cost incurred by the Owner due to failure to respond within time frame specified may be deducted from monies owed Contractor.

3.02 PRE-BURSTING INSPECTIONS

- A. Confirm, locate, and identify by building address, existing lateral connections and services attached to host sewer main. Furnish log to Engineer.
- B. Confirm host pipe is ready for bursting.
- C. Locate and protect existing utilities.
- D. External point repairs prior to bursting.
 - 1. Before bursting, perform external point repair to remove sags, offset joints and bursting constrictions or obstructions that cannot be removed internally, and may impede process or prevent successful completion.

- E. Maintaining invert and slope.
 - 1. Ascertain elevations of upstream and downstream manhole invert of host sewer main to be burst as well as intermediate point on mainline for verification that line and grade is maintained.
- F. Vibration monitoring equipment: Placed where necessary when directed by Engineer.

3.03 MANHOLE PREPARATION

- A. Enlarge manhole pipe openings to size sufficient to allow bursting head to pass without damaging manhole.
- B. Remove manhole drop connections that interfere with bursting process.
- C. Remove brick manhole and replace with precast manhole following Section 33 49 13, Manholes, Manhole Frames & Covers and as detailed on the Drawings.

3.04 BURSTING AND PIPE INSTALLATION

- A. Disconnect laterals from host sewer main following approved submittals.
- B. Provide access pits as required to facilitate pipe bursting insertion process.
 - 1. Locate pits where interference to vehicular traffic and inconvenience to public is minimized.
 - 2. Use sewer lateral connection locations, changes in sewer line and grade, and sags as access pit locations, and provide access to sewer from both directions.
 - 3. Prevent damage to adjacent areas during bursting process.
- C. Do not exceed approved submittal insertion rate or force at any time. Maintain logs verifying rate and force did not exceed submitted calculations.
- D. Use approved lubricant to ease installation friction. Match lubricants to soil and insertion conditions.
- E. Remove irregular internal bead projections that are not uniform and rolled-back from butt-fused joints.
- F. Remove and replace improperly burst sewer mains at no additional cost to the Owner.
- G. Contractor is responsible for all costs related to inaccurately located or misidentified live/active sewer lateral connections.
- H. Re-connect missed or active taps and abandon erroneously opened connections at no additional cost to the Owner.

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3.05 RELAX PERIOD

- A. Allow inserted HDPE pipes to rest for a period of 4 hours before cutting and trimming replacement pipe or making any manhole connections.
- B. If replacement pipe exhibits retraction, at end of relax period and after flexible manhole connectors' grout has set, anchor HDPE pipe at manholes following approved submittals.
- C. After relax period, cut and trim replacement pipe 3 inches inside upstream and downstream manholes.

3.06 MANHOLE RECONNECTION

- A. Replace exterior drops with inside drops, as detailed on the Drawings.
- B. Reconnect to manhole following approved submittals.
- C. Restrain and seal pipe at manhole wall.
- D. Use flexible gasket connector, fuse-on water stop or hydrophobic grout-soaked oakum collar embedded in concrete poured or parged across manhole wall opening.
- E. Flexible gasket connector:
 - 1. Preferred restraint and seal for precast manholes.
 - 2. Embed flexible connector in place in manhole wall, filling all voids, front and back, for full thickness of manhole wall.
- F. If flexible connector is not water tight, perform pipe seal with chemical grout.
- G. Oakum collar: When flexible gasket connector or fused-on water stop is not used, use quick setting non-shrink concrete and embed replacement pipe with chemical grout-soaked oakum collar within manhole wall connection and add exterior bentonite collar.

3.07 FIELD TESTING

- A. Stabilize test pressures for replacement pipe at 4.0 psig with a minimum holding time of two minutes and maximum 0.5 psig pressure drop.
- B. Repair or replace pipelines that fail air tests and re-test at no additional cost to the Owner.

END OF SECTION

SECTION 33 11 16

SITE UTILITY PIPING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Site Utility Piping as shown on the Plans, as specified and/or directed.

1.02 REFERENCES

- A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. American National Standards Institute (ANSI) Publications:
 - a. B16.1 Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800
 - b. B16.3 Malleable Iron Threaded Fittings
 - c. B16.4 Cast Iron Threaded Fittings, Class 125 and 250
 - d. B16.18 Cast Copper Alloy Solder Joint Pressure Fittings
 - e. B16.26 Cast Copper Alloy Fittings for Flared Copper Tubes
 - f. B18.2.2 Square and Hex Nuts
 - g. B18.5 Round Head Bolts (Inch Series)
 - h. B88 Seamless Copper Water Tube
 - i. B843 Magnesium Alloy Anodes for Cathodic Protection
 - 2. American Society for Testing and Materials (ASTM) Publications:
 - a. A47 Ferritic Malleable Iron Castings
 - b. A48 Gray Iron Castings
 - c. A120 Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, For Ordinary Uses
 - d. A307 Carbon Steel Bolts and Studs, 60,000 psi Tensile
 - e. A536 Ductile Iron Castings
 - f. A563 Carbon and Alloy Steel Nuts
 - g. A746 Ductile-Iron Gravity Sewer Pipe
 - h. B32 Solder Metal
 - i. B61 Steam or Valve Bronze Castings
 - i. B62 Composition of Bronze or Ounce Metal Castings
 - k. B88 Seamless Copper Water Tube
 - 1. C94 Ready-Mixed Concrete
 - m. D1527 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80
 - n. D1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

- o. D2235 Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings
- p. D2241 Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series)
- q. D2282 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (SDR-PR)
- r. D2466 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
- s. D2468 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 40
- t. D2469 Socket-Type Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 80
- u. D2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic
 Pipe and Fittings
- v. D2774 Underground Installation of Thermoplastic Pressure Piping
- w. D2855 Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings
- x. D3139 Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
- y. F402 Safe Handling of Solvent Cements and Primers Used for Joining Thermoplastic Pipe and Fittings
- z. F477 Elastomeric Seals (Gaskets) For Joining Plastic Pipe
- 3. American Water Works Association (AWWA) Publications:
 - a. C104/A21.4 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water (ANSI/AWWA C104/A21.4)
 - b. C105 Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids
 - c. C110 Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in., for Water and Other Liquids
 - d. C111 Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
 - e. C115 Flanged Ductile-Iron and Gray-Iron Pipe with Threaded Flanges
 - f. C151 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-lined Molds, for Water or Other Liquids
 - g. C153 Ductile Iron Compact Fittings, 3 in. Through 12 in. (75 mm Through 300 mm), for Water and Other Liquids
 - h. C203 Coal-Tar Protective Coatings and Linings for Steel Water Pipelines -- Enamel and Tape -- Hot-Applied
 - i. C500 Gate Valves, 3 in. Through 48 in. NPS, for Water and Sewage Systems
 - j. C502 Dry-Barrel Fire Hydrants
 - k. C503 Wet-Barrel Fire Hydrants
 - 1. C508 Swing-Check Valves for Waterworks Service, 2 in. Through 24 in. NPS

- m. C509 Resilient-Seated Gate Valves, 3 through 12 NPS, for Water and Sewage Systems
- n. C600 Installation of Ductile-Iron Water Mains and Their Appurtenances
- o. C606 Grooved and Shouldered Type Joints (ANSI/AWWA C606)
- p. C651 Disinfecting Water Mains
- q. C800 Underground Service Line Valves and Fittings
- r. C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 12 in., for Water
- s. M23 PVC Pipe Design and Installation
- 4. Copper Development Association, Inc., Publication:
 - a. Copper Tube Handbook
- 5. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Publication:
 - a. SP-80 Bronze Gate, Globe, Angle and Check Valves
- 6. Uniform Fire Prevention and Building Code of New York State Publications:
 - a. 2015 International Plumbing Code
 - b. 2016 New York State Uniform Code Supplement

1.03 DESIGN REQUIREMENTS

A. Water Service Lines: Provide water service line from water distribution main at building right-of-way to building service at point indicated. Water service lines shall be of seamless copper tubing. Provide water service line appurtenances where specified and where indicated.

1.04 SUBMITTALS

- A. Manufacturer's Data: Submit manufacturer's standard drawings or catalog cuts for the following items, except where both are specified:
 - 1. Pipe and Fittings
 - 2. Joints and Couplings, including gaskets for joints (submit both drawings and cuts for push-on joints)
 - 3. Valves
 - 4. Curb or Service Stops
 - 5. Valve Boxes
- B. Certificates of Compliance: Submit for each of the following materials:
 - 1. Pipe and Fittings, including shop-applied linings and coatings
 - 2. Pipe Joint Materials
 - 3. Valves

Certificates shall attest that tests set forth in each applicable referenced publication have been performed, whether specified in that publication to be mandatory or otherwise and that production control tests have been performed at

the intervals or frequency specified in the publication. Other tests have been performed within 3 years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Storage: Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping and jointing materials, and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.
- B. Handling: Handle pipe, fittings, valves, hydrants, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make satisfactory repairs if coatings or linings are damaged. Carry, do not drag pipe to the trench. Store rubber gaskets and plastic piping and jointing materials that are not to be installed immediately, under cover out of direct sunlight.

PART 2 - PRODUCTS

2.01 WATER SERVICE LINE MATERIALS

A. Piping Materials:

1. Ductile Iron Pipe: Sizes 4 inches and larger, outside coated, AWWA C104 cement mortar lined, AWWA C151 ductile-iron pipe, AWWA C111 rubber gasket joints, and AWWA C110 fittings. Provide concrete thrust blocks at the elbows and where the buried piping turns up toward the above grade into the building, and restrain the pipe riser with steel rods from the elbow to the flange above the floor penetration. Aboveground piping shall have flanged end connections conforming to AWWA C115 for flanged pipe and AWWA C110 for flanged fittings.

B. Valves, and Other Water Main Accessories:

- 1. Gate Valves on Buried Piping: MSS SP-80, Class 150, solid wedge, non-rising stem. Valves shall have flanged or threaded end connections, with a union on one side of the valve. Provide handwheel operators.
- 2. Valve Boxes: Provide a valve box for each gate valve on buried piping. Valve boxes shall be of cast-iron of a size suitable for the valve on which it is to be used and shall be adjustable. Provide a round head. Cast the word "WATER" on the lid. The least diameter of the shaft of the box shall be 5-1/4 inches. Each cast-iron box shall have a heavy coat of bituminous paint.

3.01 INSTALLATION

- A. Installation of Water Service and Distribution Lines:
 - 1. Location of Waterlines: The work covered by this Section shall terminate at a point approximately 6-inches above the finished floor within the building, unless otherwise indicated on the drawings. Do not lay waterlines in the same trench with gas lines or electric wiring.
 - 2. Earthwork: Perform earthwork operations in accordance with Section 31 23 43
 - 3. All pipe and fittings shall be carefully handled by means of suitable equipment, in such a manner as to prevent damage to materials and protective coatings or linings. Under no circumstances shall materials be dropped or damaged during installation. Pipe or fittings which are damaged during construction shall be repaired or replaced at no expense to the Owner.
 - 4. Pipe shall be laid on a prepared earth subgrade or special embedment as shown in the Contract Drawings, specified and directed. Selected material shall be put in the trench and tamped uniformly under the full length of pipe and up to the horizontal diameter of the pipe. Preparation of the subgrade, embedment of the pipe and backfilling shall be as specified in Section 31 23 43. Blocking under pipe will not be used without specific approval of the Engineer.
 - 5. Where bell and spigot pipe is utilized, the pipe shall be installed with the bell ends in the direction of laying. Except as otherwise specified, all pressure pipelines shall be laid on a flat bottom trench on a satisfactory foundation throughout the entire length. Bell holes may be dug to provide continuous support for the pipe. No pipe shall be laid upon a foundation in which frost exists, nor at any time when the Engineer shall deem that there is a danger of the formation of ice, or the penetration of frost at the bottom of the excavation.
 - 6. Where no depths, lines or grades are shown, specified or directed, the nominal depth of trench excavated shall be four and one half (4-1/2) feet. Otherwise pipe shall be laid to the lines and grades shown in the Contract Drawings, specified and directed.
 - 7. Connections to Existing Lines: Make connections in accordance with the recommended procedures of the manufacturer of pipe of which the line being tapped is made.
 - 8. Cutting of Ductile Iron Pipe:
 - a. Cutting of pipe shall be done with pipe cutters, motor drive saws using abrasive disks, or with hand saws as required. Where machining is necessary for cut ends or for extending factory machining, it shall be done in accordance with the manufacturer's recommendations for the type of pipe and joint used.

- 9. Ductile Iron Pipe Supports and Joint Restraints:
 - Joints in interior and underground piping shall be restrained as shown or directed. Restraining systems shall include Field Lok gaskets as manufactured by Griffin Pipe Products Co., or MJ restraining glands, lugs, clamps, threaded rods, rod couplings, nuts and washers as required. All units shall be constructed of corrosion resistant material. Clamps shall be fabricated of not less than 1/2" x 2" barstock. Rods and bolts shall have a minimum diameter of 3/4" unless otherwise shown. Cor-ten bolts shall be used on all buried mechanical joints. Structural members, pipe columns and concrete, where shown or indicated, shall also be used as means of pipe joint restraining. Tie rods and nuts shall have a minimum yield strength of 70,000 psi. Ferrous metal used in restraining systems for buried piping shall receive two coats of asphalt-based coating and shall be polyethylene encased in accordance with AWWA C105. Exposed systems shall be coated same as piping.
- 10. Ductile Iron Pipe Mechanical Joints:
 - a. Prior to assembly, the surfaces of the pipe which come into contact with the rubber gasket must be thoroughly wire brushed and wiped clean with clean rags to remove all loose rust and other foreign material. These surfaces must be clean before the joint is assembled. Just prior to slipping the gasket over the spigot end, the gasket and pipe surfaces shall be coated with an NSF approved lubricant.
 - b. The spigot must be centrally located in the bell, and the bolts must be tightened in such a manner that the gland is brought up toward the pipe flange evenly. Bolts must not be tightened excessively. If effective sealing is not attained with a tightening of the bolts by an average pull on the wrench, the joint shall be disassembled and reassembled after thorough cleaning.
 - c. Wherever it is necessary to deflect the pipe from a straight line, the maximum deflection for each joint shall not exceed 4° for 12" or smaller size pipe, or 80 percent of the manufacturer's recommendation, whichever is greater.
- 11. Ductile Iron Pipe Flanged Joints:
 - a. Flanged joints shall conform to AWWA Specification C115. They shall be firmly bolted with through, stud or tap bolts. Gaskets of the best quality sheet rubber packing or other approved material shall be used on all flanged joints.
- 12. Ductile Iron Pipe Fittings:
 - a. All fittings shall be supported independently from the pipe in such a manner that no part of the weight of the fitting is held by the pipe unless otherwise shown on the Plans or directed by the Engineer. Fittings and pipe within structures shall be placed to line and grade

and properly supported before joints are made. The Contractor shall furnish all the necessary pipe supports, including stirrups, rods, clamps, hangers, pipe columns and piers, necessary to sustain the pipe and fittings in a firm and substantial manner to the lines and grades given.

B. Disinfection: Flush and disinfect new potable waterlines and affected portions of existing potable waterlines in accordance with AWWA C651. Apply chlorine by the continuous feed method.

3.02 FIELD QUALITY CONTROL

- A. Field Tests and Inspections: The Owner's Representative will conduct field inspections and witness field tests specified in this Section. The Contractor shall perform field tests, and provide labor, equipment, and incidentals required for testing. The Contractor shall produce evidence, when required, that any item of work has been constructed properly in accordance with the drawings and specifications. Do not begin testing on any section of a pipeline where concrete thrust blocks have been provided until at least 5 days after placing of the concrete.
- B. Testing Procedure: Test water mains and water service lines in accordance with the applicable specified standard, except for the special testing requirements given in paragraph entitled "Special Testing Requirements". Test water service lines in accordance with applicable requirements of AWWA C600 for hydrostatic testing. No leakage will be allowed at copper tubing joints soldered, compression type, or brazed.
- C. Special Testing Requirements: For pressure test, use a hydrostatic pressure 50 psi greater than the maximum working pressure of the system, except that for those portions of the system having pipe size larger than 2 inches in diameter, hydrostatic test pressure shall be not less than 200 psi. Hold this pressure for not less than 2 hours. Prior to the pressure test, fill that portion of the pipeline being tested with water for a soaking period of not less than 24 hours. For leakage test, use a hydrostatic pressure not less than the maximum working pressure of the system. Leakage test may be performed at the same time and at the same test pressure as the pressure test.

SECTION 33 11 20

HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for High Density Polyethylene (HDPE) Pipe and Fittings as shown on the Plans, as specified, and/or directed.

PART 2 - PRODUCTS

2.01 MATERIAL

- A. All pipes shall be of high density high molecular weight material using PE 3408 grade resin and having a cell classification number of 345434C. All HDPE pipe shall conform to ASTM D3350.
- B. All perforated HDPE pipe shall have a SDR of 11 or lower unless otherwise specified. Dual contained solid pipe shall have a SDR of 17 or lower unless otherwise specified.
- C. Standard length of pipe shall be a minimum of 40 feet.
- D. All perforated pipe shall have 5/8-inch diameter perforations on 5-inch centers, in four rows 90 degrees apart. Smooth perforations, no burrs, or shavings.

2.02 CENTRALIZERS

A. Dual contained piping shall be factory fabricated for simultaneous fusion with internal centralizers spaced no greater than 4-feet on center and fused in place. Centralizers shall be furnished so the annular space between the HDPE pipes is evenly distributed within the conveyance line. The centralizers shall be configured to allow for liquid to flow freely along the invert of the pipe.

2.03 END SEALS

A. End seals shall be factory pre-fabricated fixed end seals which anchor the carrier and containment pipes together. End seals shall accommodate simultaneous fusion and centralizers shall be fused in place.

2.04 COUPLINGS AND FUSION

- A. Joining of HDPE pipe shall be by butt fusion or where circumstances warrant couplings shall be by the electrofusion socket type connection that provides a welded connection. All joints shall be internally de-beaded after the joining of the pipe for a smooth interior finish. Electrofusion locations will require Engineer approval. Electrofusion couplings shall not be used unless otherwise approved by the Engineer.
- B. The socket type couplings shall be manufactured by GF ELGEF, or equal.

2.05 FLANGES

- A. Provide ANSI B16.1, Class 150 flanges for all flange connections. Backup rings shall be lightweight stainless steel.
- B. Bolting of Flanges: Material used for bolts and studs shall be stainless steel conforming to ASTM A276, Type 304, and material for nuts shall be stainless steel conforming to ASTM A276, Type 304. Dimensions of bolts, studs, and nuts shall conform to ANSI B18.2.1 and ANSI B18.2.2 with threads conforming to ANSI B1.1 coarse type with Class 2A fit for bolts and studs, and Class 2B fit for nuts. Bolts or studs shall extend through the nuts and may have reduced shanks of a diameter not less than the diameter at root of threads. Stainless steel bolts shall have American Standard regular square or heavy hexagon heads and shall have American Standard heavy, semi-finished hexagonal nuts.

2.06 SUBMITTALS

- A. The Contractor shall submit to the Engineer for approval, data for all pipe and fittings which he proposes to use. The data shall demonstrate complete compliance with the provisions of the Plans and Specifications.
- B. The Contractor shall submit to the Engineer for approval, manufacturer's certifications for all personnel that will fusion weld the pipe and fittings along with dates and duration of employment.

PART 3 - EXECUTION

3.01 QUALITY ASSURANCE

A. All pipe will be inspected on delivery, and materials that do not comply with the Specification will be rejected. The Contractor shall furnish all labor required to handle the pipe during inspection and shall remove the rejected materials from the site of the work.

3.02 INSTALLATION

- A. Installation of all pipe, fittings, specials, adapters and appurtenances shall conform to the manufacturer's recommendations and the following summary of installation recommendations. Where specifications and recommendations conflict, the strictest shall apply.
- B. Electrofusion couplings shall not be used in the cell without prior Engineer's approval.
- C. Proper implements, tools and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe and convenient execution of the work.
- D. Cutting of pipe shall be done with pipe cutters, motor drive saws using abrasive disks, or with handsaws as required. Where machining is necessary for cut ends or for extending factory machining, it shall be done in accordance with the manufacturer's recommendations for the type of pipe and joint used. The flame cutting of pipe by means of an oxyacetylene torch will not be allowed.
- E. Pipe shall be laid to the lines and grades on a prepared earth subgrade or special embedment as shown, specified or directed.
- F. The interior surface of all pipe shall be clean when installed, and shall be kept clean until final acceptance. Removable end caps shall be placed on all open ends of pipelines when pipe laying is not actively in progress. The bulkheads shall be designed to prevent the entrance of dirt, debris or small animals, and shall not be removed until pipe laying is resumed.

3.03 LEAKAGE TEST

A. All solid HDPE Pipes and Fittings shall be tested after joining for leakage by the Contractor at no cost to the Owner in accordance with the manufacturer's recommendation for the intended use. No leakage is permitted, although appropriate allowances for expansion of pipe shall be taken into consideration for the test pressure.

SECTION 33 31 11

SANITARY SEWERAGE GRAVITY PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes all material and performance requirements for gravity sewer piping materials as called on the Plans, including:
 - 1. Sanitary sewerage pipe and fittings.
 - 2. Pipe to manhole connectors.

1.02 REFERENCE STANDARDS

- A. The following is a list of standards which may be referenced in this section:
 - 1. American Water Works Association (AWWA):
 - a. C105, Polyethylene Encasement of Ductile Iron Pipe Systems.
 - b. C110, Ductile Iron and Gray Iron Fittings, 3 inches through 48 inches, for Water.
 - c. C111, Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
 - d. C205, Cement-Mortar Protective Lining and Coating for Steel Water Pipe, 4 inches and Larger, Shop-applied.
 - e. C208, Dimensions for Fabricated Steel Water Pipe Fittings.
 - f. C302, Reinforced Concrete Pressure Pipe, Non-cylinder Type.
 - g. C900, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 inch through 12 inch, for Water Distribution.
 - 2. ASTM International (ASTM):
 - a. A48, Gray Iron Castings
 - b. A74, Cast Iron Soil Pipe and Fittings
 - c. A746, Standard Specification for Ductile Iron Gravity Sewer Pipe.
 - d. C76, Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - e. C150, Standard Specification for Portland Cement.
 - f. C361, Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
 - g. C443, Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
 - h. C564, Rubber Gaskets for Cast Iron Soil Pipe and Fittings
 - i. C923, Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes
 - j. D1784, Standard Specification for Rigid Poly(Vinyl Chloride)
 (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC)
 Compounds.

- k. D2241, Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
- D2412, Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
- m. D3034, Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- n. D3212, Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- o. E329, Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
- p. F477, Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- q. F679, Standard Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
- 3. Cast Iron Soil Pipe Institute (CISPI):
 - a. 301, Hubless Cast-Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications
 - b. 310, Patented Joint for Use in Connections with Hubless Cast-Iron Sanitary System

1.03 SUBMITTALS

A. Submittals:

- 1. Manufacturer's Data: Submit manufacturer's standard drawings or catalog cuts of the following items:
 - a. Pipe and fittings
 - b. Joints and couplings
 - c. Frames and covers for manholes
- 2. Certificates of Compliance: Submit for the following:
 - a. Pipe and fittings, including factory applied linings
 - b. Pipe joint materials
 - c. Cast iron frames, covers, and gratings

Certificates shall attest that tests set forth in each applicable referenced publication have been performed, whether specified in that publication to be mandatory or otherwise. Production control tests shall have been performed at the intervals or frequency specified in the referenced publication. Other tests shall have been performed within 3 years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

1.04 DELIVERY, STORAGE, AND HANDLING:

A. Delivery and Storage:

1. Piping: Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Store plastic piping and jointing materials and

- rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.
- 2. Metal Items: Check upon arrival; identify and segregate as to types, functions, and sizes. Store off the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.
- 3. Cement, Aggregate, and Reinforcement: As specified in Section 03 30 00, "Cast-In-Place Concrete".
- B. Handling: Handle pipe, fittings, and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition. Take special care not to damage linings of pipe and fittings; if lining is damaged, make satisfactory repairs. Carry, do not drag, pipe to trench.

PART 2 - PRODUCTS

2.01 CAST IRON (CI)

- A. Cast-Iron Hub and Spigot Pipe and Fittings
 - 1. Conform ASTM A74
 - 2. ASTM C564 or CISPI HSN 85 rubber compression gasket joints, or calked and leaded joints.

2.02 POLYVINYL CHLORIDE (PVC)

- A. PVC Pipe and Fittings
 - 1. Piping and fittings shall be ASTM D3034 SDR 35 PVC.

2.03 PVC JOINTS SHALL HAVE FLEXIBLE ELASTOMERIC SEALS CONFORMING TO ASTM D3212. CONCRETE MATERIALS

A. Concrete materials shall be as specified in Section 03 30 00, "Cast-In-Place Concrete".

2.04 CLEANOUTS

A. Cleanouts Exterior to Buildings: Provide cast iron cleanouts and countersunk plugs. Provide 24 by 24 by 4 inch thick concrete slab with top 1.0 inch above grade with cleanout located in center of slab.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Notify the Engineer immediately of manufacturing imperfections or damage caused by improper handling.
- B. Verify size, pipe condition, and pipe class prior to installation of pipe.

3.02 INSTALLATION OF PIPELINES AND APPURTENANT CONSTRUCTION

A. General:

1. Where the location of the sewer is not clearly defined by dimensions on the drawings, do not lay sewer line closer horizontally than 10 feet to a water main or service line. Where sanitary sewer lines pass below waterlines, lay pipe so that no joint in the sewer line will be closer than 3 feet, horizontal distance, to the waterline.

B. Pipe Laying and Jointing:

1. Inspect each pipe and fitting before and after installation; replace those found defective and remove from site. Provide proper facilities for lowering sections of pipe into trenches. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Provide batter boards not more than 25 feet apart in trenches for checking and ensuring that pipe invert elevations are as indicated. Laser beam method may be used in lieu of batter boards for the same purpose.

C. Cast Iron Soil Piping:

- 1. Unless otherwise specified, install pipe and fittings in accordance with paragraph entitled, "Pipe Laying and Jointing" of this Section and with the recommendations of the pipe manufacturer. Make joints with the rubber gaskets specified for cast iron soil pipe joints and assemble in accordance with the recommendations of the pipe manufacturer.
- 2. Cleanouts: Construct cleanouts of cast iron soil pipe and fittings with countersunk plugs. Provide 24-inch by 24-inch by 6-inch thick concrete slab with top flush with grade and cleanout located in center of slab.

D. PVC Soil Piping:

- 1. Pipe of PVC shall be considered flexible, thermoplastic pipe and shall be installed in accordance with ASTM D2321. Pipe deflection, expressed as a percentage of the undeflected inside diameter, shall not exceed five percent (5%) after backfilling and compaction is complete. Blocking will not be permitted under pipe.
- E. WYE OR TEE BRANCHES: Wye or tee branches shall be located at the points designated by the Engineer. Wye branches shall be so installed that the lower lip of the branch is not more than two (2) inches below the outside top of the pipe. Tees shall be installed with the branch vertical.

3.03 FIELD QUALITY CONTROL

- A. Field Tests and Inspections:
 - 1. The Contractor shall perform field tests and provide labor, equipment, and incidentals required for testing.
- B. Drainage Piping Leakage Tests:
 - 1. Subject the entire system to a final hydronic leakage test. Cap the end of the piping at the storage tank inlet, fill the piping with not less than a 10-foot head of water, and allow to stand for a minimum of 3 hours with no measurable leakage. Prior to testing for leakage, backfill trench up to at least lower half of pipe. When leakage or pressure drop exceeds the allowable amount specified, make satisfactory correction and retest pipeline section in the same manner. Correct visible leaks regardless of leakage test results.

SECTION 33 49 13

MANHOLES, MANHOLE FRAMES & COVERS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Manholes, Manhole Frames & Covers as shown on the Plans, as specified, and/or directed.

PART 2 - PRODUCTS

2.01 DEFINITION

A. Standard and drop manholes shall be constructed of precast, reinforced concrete or poured in the field concrete bases, precast reinforced concrete riser sections and concentric or eccentric tapered tops, as shown on the Plans, specified, or directed.

2.02 MANHOLES

- A. If the bases are poured in the field, they shall be constructed of Class "C" concrete to a point six (6) inches above the outside top of the main sewer.
- B. The barrel of manholes shall be of precast, concrete sections of approved standard design of the manufacturer, and shall conform to ASTM Des: C478 latest edition for Precast Reinforced Concrete Manhole Sections, except as may be modified herein. Precast concrete manhole risers shall have a minimum nominal inside diameter of forty-eight (48) inches, when used on sewer lines up to and including twenty-one inches in diameter and sixty (60) inches for use on sewers twenty-four thru thirty-six inches in diameter. Special instructions will be furnished for construction of manholes for sewers of larger than 36 inch diameter.
- C. Joints between precast reinforced concrete manhole sections shall be the rubber gasket type and shall conform to ASTM Des: C443 latest edition for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
- D. Compressive strength of concrete used in risers shall be 4000 psi, and the maximum permissible absorption shall be eight (8) percent. Riser sections shall be reinforced with either one or two lines of steel, the total area per linear foot of which shall be not less than .0025 times the inside diameter in inches or .12 in.²/linear foot minimum. Tapered sections, where required, shall be of the truncated cone design, having the same wall thickness and reinforcing as the cylindrical sections.

- E. The Owner reserves the rights to choose either eccentric or flat slab tops at no additional charge.
- F. Cored or Cast Arch or circular openings shall be provided in the manhole sections as required to receive lateral sewers or pipelines or drop pipes in drop manholes, as required. Manhole steps shall be of the type shown on the Contract Drawings and shall be arranged and spaced as shown on the Contract Drawings.

PART 3 - EXECUTION

3.01 CONSTRUCTION

- A. Precast concrete pipe sections shall fit together readily, and all joints shall have all voids filled with cement mortar applied, both inside and outside the manhole. The top of the uppermost ring or truncated cone shall be formed to receive the manhole frame and cover, or other appurtenant casting.
- B. The bench walls of standard and drop manholes shall be constructed of Class "C" concrete as shown on the drawings. The top of the bench wall shall have an increasing slope away from the channel. All channels shall be constructed to conform to the invert of the pipe and permit a smooth and uninterrupted flow through the manhole.
- C. Drop manholes shall consist of a standard manhole having a drop of pipe installed as shown on the Drawings. All pipe and fittings at the top and the one at the bottom of the drop shall be included and constructed as part of the manhole as shown on the drawings.
- D. Where masonry courses are required to bring manhole frames to grade, top ring or cone sections shall have a flat surface formed to receive the first course of brick masonry.
- E. Ground water test pipes shall be provided in each manhole if required on the Contract Drawings. The test pipes shall be 3/4" diameter galvanized steel with hot dip bituminous coating, nine inches long with a ninety degree elbow and threaded cap. The test pipe shall be set at an elevation of two inches above the bench wall and eight inches from the center line of the manhole steps. The pipes shall be grouted into the precast manhole wall with a non-shrink grout.
- F. Manholes upon completion shall be watertight.

3.02 PIPE TO MANHOLE CONNECTIONS

A. All concrete pipe shall be grouted into manhole walls with non-shrink grout.

- B. All other pipe materials shall be connected to manholes by means of a resilient and watertight flexible connection.
- C. Resilient connectors shall conform to ASTM C923.
- D. Where resilient connectors are installed, concrete used to form the manhole channel shall not be permitted under the pipe protruding through the manhole wall. Oakum or Styrofoam shall fill the void under the protruding pipe to maintain the connection flexibility. The concrete channel shall meet the pipe invert as shown.

3.03 COMPLETION

- A. Manholes, in all cases, shall be completely constructed and fitted with their frames and covers as the work progresses and as each structure is reached. After the final inspection and acceptance of the pipeline or other facility served by the manholes, the Contractor shall, unless otherwise ordered, seal all covers with an approved fibrated mastic compound.
- B. The Contractor shall, at his own cost and expense, reset any and all manhole frames and covers, as required, to meet the finished grade of pavements replaced by the Contractor as specified herein.

3.04 ALTERNATIVE CONSTRUCTION

A. Manholes may be constructed of alternative materials provided such manholes are submitted to the Engineer for approval prior to construction.

3.05 MANHOLE VENTS

A. Manholes with waterproof frames and covers shall be provided gas vents when specified, shown or as directed by the Engineer. Payment for gas vents shall be included in the unit price for waterproof frames and covers.

3.06 CASTINGS

A. Manhole frames and covers, grates, inlets, steps and other castings shall be in accordance with ASTM Des: A48, Grade 30. They shall be equal in quality and at least equal in weight to those referred to on the Plans by the manufacturer's catalog numbers. When specified or shown, manhole covers shall have the name of the Owner in addition to the word "Sewer" or other appropriate designation cast as shown on the Plans. Manhole frames and covers shall be supplied with eccentric cam lug locking devices, when specified or shown. All manholes, grates, manhole frames and grate frames shall be machined to provide nonrocking covers or grates.

3.07 PAINTING AND WATERPROOFING

A. All castings shall be thoroughly cleaned and free from rust. All manholes shall be waterproofed on the outside with two coats of bituminous coal tar coating as manufactured by Koppers "Bitumastic Super Service Black", Mobil "Hi-Build Bituminous Coating" or equal.

3.08 LEAKAGE TEST

- A. All manholes shall be tested for leakage by filling the structures with water and observing the drop in the water surface elevation for a period of 24 hours.
- B. Allowable leakage shall be as defined by the specification for Non-Pressure Sewers.