

**TOWN OF NORTH HEMPSTEAD  
SOLID WASTE MANAGEMENT AUTHORITY**

MICHAEL J. KELLY, EXECUTIVE DIRECTOR



**CONTRACT DOCUMENTS  
FOR**

Town of North Hempstead Port Washington Landfill Solid Waste  
Management Authority (SWMA)- Electrical Infrastructure Upgrades

**BID NO. SWMA-0010-2021**

**TOWN OF NORTH HEMPSTEAD  
SOLID WASTE MANAGEMENT AUTHORITY**

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NOTICE TO BIDDERS

SEALED BIDS will be received by the Town of North Hempstead Solid Waste Management Authority (the "Authority") at the offices of the Town of North Hempstead Office of Purchasing, 220 Plandome Road, Manhasset, New York on February 25, 2021 at 11:00am., at which time they will be publicly opened and read and the Contract awarded as soon thereafter as practicable for:

Town of North Hempstead Port Washington Landfill Solid Waste Management Authority (SWMA)-  
Electrical Infrastructure Upgrades

BID NO. SWMA-0010-2021

Bids may be mailed or delivered to the Authority's Executive Director, 802 West Shore Road, Port Washington, New York 11050, provided the Bid is actually received by the Executive Director prior to the time of public opening; or Bids may be delivered to the place of public opening (i.e., the Authority's offices) immediately prior to the time of public opening.

All Bids must be sealed and submitted in the pre-marked envelope provided with the Bid Documents, or must be sealed and submitted in a package (envelope) MARKED IN THE SAME WAY as the pre-marked envelope provided with the Bid Documents.

All BIDDERS MUST complete the required Contractor's Qualifications Statement and must provide a copy of the required Statement of Financial Conditions, even if a Bidder is currently executing work for the Authority.

The Bids shall be in accordance with the requirements of the Specifications, Contract Plans and terms of the proposed Contract.

No bids shall be received unless made in writing on forms furnished, and unless accompanied by a Certified Check or Bid Bond made payable to the Town of North Hempstead Solid Waste Management Authority for an amount not less than five (5%) percent of the Bid price.

BIDDERS ARE HEREBY ADVISED THAT ALL BONDS AND INSURANCE DOCUMENTS SUBMITTED WILL BE VERIFIED FOR AUTHENTICITY BY DIRECT COMMUNICATION WITH THE SURETY/INSURANCE COMPANY.

ALL BONDING AND INSURANCE COMPANIES MUST BE LICENSED TO DO BUSINESS IN THE STATE OF NEW YORK.

The Authority reserves the right to reject any and all Bids, and to waive any informalities therein.

As described in the Bid Documents, all bidders are required to submit proof of participation in apprentice training programs which have been registered and approved by the New York State

Department of Labor for the trades participating in the work to be performed.

The Authority will not accept Bids from, nor award a Contract to, anyone who cannot prove to the satisfaction of the Board of the Authority that he has sufficient experience in this type of construction and financially able and organized to successfully carry out the work covered by the Plans and Specifications in the required completion time. Special qualification requirements are contained in the Contract Documents.

Contract Plans, Specifications, and other Contract Documents may be examined at the office of the Authority, 802 West Shore Road, Port Washington, New York 11050 or on the Authority's website on and after January 22, 2021.

BY ORDER OF THE BOARD OF THE TOWN OF NORTH  
HEMPSTEAD SOLID WASTE MANAGEMENT AUTHORITY

MICHAEL J. KELLY, EXECUTIVE DIRECTOR

Dated: Port Washington, New York  
January 22, 2021

**TOWN OF NORTH HEMPSTEAD  
SOLID WASTE MANAGEMENT AUTHORITY**

**INSTRUCTIONS TO BIDDERS**

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**TOWN OF NORTH HEMPSTEAD  
SOLID WASTE MANAGEMENT AUTHORITY**

**INSTRUCTIONS TO BIDDERS**

ITB-1 **PROJECT IDENTIFICATION**

These instructions relate to and are pertinent for the project of the Town of North Hempstead Solid Waste Management Authority:

**Town of North Hempstead Port Washington Landfill Solid Waste Management Authority  
(SWMA) - Electrical Infrastructure Upgrades  
BID NO. SWMA-0010-2021**

ITB-2 **BID DOCUMENTS**

Failure to fully comply with any of the requirements or instructions contained within any of these Documents may constitute sufficient cause for rejection of the Bid. Such rejections will be subject to the discretion of the Executive Director of the Authority.

The Bid Documents consist of the following documentary components.

- A. Notice to Bidders (Advertisement)
- B. Instructions to Bidders
- C. General Conditions
- D. Special General Conditions
- E. Standard Specifications (As defined in General Conditions)
- F. Addenda to Standard Specifications (As defined in General Conditions)
- G. Project (Technical) Specifications (As defined in General Conditions)
- H. Contract Plans (As listed in General Conditions)
- I. New York State Department of Labor Wage Rate Schedule
- J. Addendum to Bid Documents
- K. Bid Bond
- L. Proposal

ITB-3 **TIME FOR COMPLETION OF WORK**

All work under this Contract shall be completed within the time stated in the Proposal contained herein.

ITB-4 EXAMINATION OF BID DOCUMENTS AND FAMILIARITY WITH SITE

BEFORE SUBMITTING A PROPOSAL, ALL BIDDERS ARE ADVISED TO CAREFULLY EXAMINE THE CONTRACT PLANS, SPECIFICATIONS AND OTHER BID DOCUMENTS TO BECOME COGNIZANT OF CONDITIONS AND LIMITATIONS ASSOCIATED WITH FULFILLING REQUIREMENTS OF THE PLANS AND SPECIFICATIONS.

A MANDATORY PRE-BID WALK-THRU AT THE SITE OF THE PROPOSED WORK WILL BE HELD ON FEBRUARY 3, 2021 AT 10:00AM. POTENTIAL BIDDERS SHOULD MEET AT THE AUTHORITY'S ADMINISTRATION BUILDING AT 802 WEST SHORE ROAD, PORT WASHINGTON, NEW YORK. IN ACCORDANCE WITH THE AUTHORITY'S COVID-19 PROTOCOLS, POTENTIAL BIDDERS WILL BE REQUIRED TO WEAR MASKS DURING THE WALK-THRU AND WILL BE REQUIRED TO UNDERGO A TEMPERATURE CHECK AND HEALTH SCREENING PRIOR TO ENTERING ANY BUILDINGS.

Please of ignorance or misunderstanding of conditions that exist, or that may hereafter exist, or of conditions or difficulties that may be encountered in the execution of the work under this Contract, as a result of negligence by failing to make the necessary examinations and investigations as may be expected of a reasonably prudent Bidder, will NOT be accepted as grounds for any excuse on the part of a Contractor to fulfill in every respect all of the requirements of the Bid Documents, nor will such excuses be accepted by the Owner or Engineer as a basis for any claims whatsoever for extra compensation, or for an extension of Contract completion time.

ITB-5 INTERPRETATION OF BID DOCUMENTS

If any prospective Bidder is unsure of, or has any reservations about, the precise and true

meaning of any written or drawn material contained within any of the Bid Documents, or finds apparent discrepancies therein, or possible omissions therefrom, he shall promptly submit to the Executive Director, with a copy to the Engineer, a written request, fully describing the material in question, for an interpretation, explanation or revision thereto. The response to each request for clarification will be made only by an Addendum to the Bid Documents. When issued, this Addendum will be forwarded by Registered Mail (return receipt requested) or hand delivered, with written acknowledgment of receipt, to each person receiving a set of Bid Documents. Neither the Owner, the Executive Director, nor the Engineer may be held responsible or liable for any other explanations or interpretations of these Bid Documents.

ITB-6 ADDENDUM TO BID DOCUMENTS

Any Addendum issued during the bidding period shall become an integral part of the Bid Documents and shall be incorporated in the Bidder's Proposal. All Addendum shall be acknowledged in the Proposal, by entering the title, date and signature of the person signing the Proposal.

ITB-7 MODIFICATIONS TO BID DOCUMENTS

Proposals shall not take exception to, or request modifications for, any item of work described in the Bid Documents. Proposals shall not contain any recapitulation of the work to be performed. Oral proposals will not be considered.

ITB-8 RIGHTS OF AUTHORITY BOARD

The Authority Board reserves the right to reject any and all Bids and to waive any informalities in the Bids received, and to accept the Bid most favorable to the interests of the Owner, after all Bids have been analyzed, checked and verified.

ITB-9 TAX EXEMPTION

- A. The Owner is exempt from payment of Sales and Compensating Use Taxes of the State of New York and of cities and counties on all materials and supplies sold to the Owner



pursuant to the provisions of this Contract. These taxes are not to be included in Bids. This exemption does not, however, apply to tools, machinery, equipment or other property, sold or leased to the Contractor or a subcontractor, or to materials and supplies of a kind which will not be incorporated into the completed project, and the Contractor and his subcontractors shall be responsible for and pay any and all applicable taxes including Sales and Compensating Use Taxes, on such leased tools, machinery, equipment or other property or on such unincorporated materials and supplies, and the provisions set forth below will not be applicable to such tools, machinery, equipment, property and unincorporated materials and supplies.

- B. The Contractor agrees to sell, free of encumbrances, and the Owner agrees to purchase all of the materials and supplies (except as above set forth) required, necessary or proper for or incidental to the construction of the Project covered by this Agreement. Title to all materials and supplies to be sold by the Contractor to the Owner, pursuant to the provisions of the Contract, shall immediately vest in and become the sole property of the Owner upon delivery of such materials and supplies to the Project site. The Contractor shall mark or otherwise identify all such materials and supplies as the property of the Owner. The Contractor, at the request of the Owner, shall furnish to the Owner such confirmatory bills of sale and other instruments as may be required by it, properly executed, acknowledged, and delivered, confirming to the Owner title to such materials and supplies free of encumbrances. In the event that after title has passed to the Owner any of such materials and supplies are rejected as being defective or otherwise unsatisfactory, title to all such materials and supplies shall upon such rejection revert in the Contractor.
- C. The sum paid under this Agreement shall be deemed to be in full consideration for the performance by the Contractor of all his duties and obligations under this Agreement in connection with said sale of materials and supplies.
- D. The Contractor agrees to construct the Project and to furnish and perform all work and labor required, necessary or proper for or incidental thereto, except that the materials and supplies sold to the Owner under preceding paragraph shall be furnished by the Owner to

the Contractor for use in the performance of said work and labor, and the sum paid pursuant to this Agreement shall be deemed to be in full consideration for the performance by the Contractor of all his duties and obligations under this Agreement in connection with said work and labor.

- E. Billings between the Contractor and the Owner must reflect the terms of the Contract as set forth in B. and D. above, i.e., they must show separate amounts for material sold and labor performed.
- F. The purchase by the Contractor of the materials and supplies sold hereunder will be a purchase or procurement for resale to the Owner (an organization described in subdivision (a) of Par. 1116 of the Tax Law of the State of New York) and therefore not subject to the New York State Sales or Compensating Use Taxes or any such taxes of cities or counties. The sale of such materials and supplies by the Contractor to the Owner will not be subject to the aforesaid Sales and Compensating Use Taxes.
- G. The purchase by subcontractor of materials and supplies to be sold hereunder will also be a purchase or procurement for resale to the Contractor (either directly or through other subcontractors), and ultimately to the Owner, and therefore not subject to the aforesaid Sales and Compensating Use Taxes, provided that the subcontract agreements provide for the resale of such materials and supplies prior to and separate and apart from the incorporation of such materials and supplies into the permanent construction and that such subcontract agreements are in a form similar to this Contract with respect to the separation of the sale of materials and supplies from the work and labor to be provided.
- H. If as a result of such sale of materials and supplies (i) any claim is made against the Contractor or any subcontractor by the State of New York or any city or county for Sales or Compensating Use Taxes on the aforementioned materials and supplies or (ii) any claim is made against the Contractor or any subcontractor by a materialman or a subcontractor by the State of New York or any city or county for Sales or Compensating Use Taxes on the aforementioned materials and supplies, then, if the Contractor and subcontractors have

complied with the provisions of this Contract relating thereto, the Owner will reimburse the Contractor or any subcontractor, as the case may be, for an amount equal to the amount of such tax and any interest and/or penalties thereon, required to be paid in accordance with requirements of law, provided that:

- (1) The subcontract agreements in connection with this Contract provide for the resale of such materials and supplies prior to and separate and apart from the incorporation of such materials and supplies into the permanent construction.
  - (2) Such subcontract agreements are in a form similar to this Contract with respect to the separation of the sale of materials and supplies from the other work and labor to be provided, and
  - (3) Such separation is actually followed in practice, including the separation of payments for materials and supplies from the payments for other work and labor, and
- I. The Contractor and his subcontractors complete New York State Sales Tax Form ST120.1 (Contractor Exempt Purchase Certificate), and furnish such certificate to all persons, firms, or corporations from which they purchase materials and supplies for the performance of the work covered by this Contract; and
  - J. The Contractor and all subcontractors maintain and keep, for a period of six years after the date of final payment for the sale, or if a claim for Sales or Compensating Use Tax is pending or threatened at the end of such six (6) year period, until such claim is finally settled, records, which in the judgment of the Department of Taxation and Finance, adequately show (i) all materials and supplies purchased by them and (iii) all materials and supplies sold to the Owner pursuant to the provisions of this Contract; and
  - K. The Owner is afforded the opportunity, before any payment of tax is made, to contest said claim in the manner and to the extent that the Owner may choose and to settle or satisfy said claims, and such attorney as the Owner may designate is authorized to act for the purpose of contesting, settling and satisfying said claim; and

- L. The Contractor and the subcontractor give immediate notice to the Owner of any such claim, cooperate with the Owner and its designated attorney in contesting said claim and furnish promptly to the Owner and said attorney all information and documents necessary or convenient for contesting said claim, said information and documents to be preserved for six (6) years after date of final payment for the sale or, if such a claim is pending or threatened at the end of such six (6) years, until such claim is finally settled. If the Owner elects to contest any such claim, it will bear the expense of such contest.
  
- M. Nothing in the Section is intended or shall be construed as relieving the Contractor from his obligations under this Agreement and the Contractor shall have the full continuing responsibility to install the materials and supplies purchased in accordance with the provisions for the Contract , to protect the same, to maintain them in proper condition and to forthwith repair, replace, and make good any damage thereto without cost to the owner until such time as the work covered by the Contract is fully accepted by the Owner.

ITB-10 FORM OF PROPOSAL

EACH PROPOSAL MUST BE MADE ON THE "PROPOSAL FORM" ATTACHED HERETO AND SHALL REMAIN ATTACHED HERETO AS ONE OF THE BID DOCUMENTS AND SHALL BE SUBMITTED IN A SEALED ENVELOPE BEARING THE TITLE OF THE WORK AND THE NAME OF THE BIDDER.

The Proposal shall include a sum to cover the cost of all items included in the Bid Documents and shall be identified by the name of the person, firm or corporation, with the authorized signature thereto.

ITB-11 DELIVERY OF PROPOSALS

PROPOSALS MUST BE DELIVERED BY THE TIME AND TO THE PLACE STIPULATED IN THE ADVERTISEMENT. IT IS THE SOLE RESPONSIBILITY OF THE BIDDER TO SEE THAT HIS PROPOSAL IS RECEIVED IN THE PROPER TIME.

ANY PROPOSALS RECEIVED AFTER THE SCHEDULED CLOSING TIME FOR RECEIPT OF PROPOSALS SHALL BE RETURNED TO THE BIDDER UNOPENED.

ITB-12 CORRECTIONS TO PROPOSALS

Erasures or other corrections in the Bid Proposal must be initialized by the person signing the Proposal.

ITB-13 WITHDRAWAL OF PROPOSALS

Any Bidder may withdraw his Proposal, either personally, or by telegraphic or written request, if such a request is received by the Executive Director at any time during normal working hours prior to the scheduled closing time for receipt of Proposals. If a Contract is not awarded within 45 calendar days after opening of the Bids, all Bids will be considered to have been rejected for cause, unless, at the Authority's request the low Bidder agrees to hold his Bid valid for an additional stipulated length of time.

ITB-14 MULTIPLE PROPOSAL SUBMITTALS

Any person, firm or corporation will not be permitted to make more than one Proposal (Bid) for the work. If a person is a partner, officer or director of more than one firm interested in bidding for the Work, only one of the firms may submit a Bid.

ITB-15 NON-COLLUSIVE BIDDING CERTIFICATION

When each Bidder submits his Bid to the Owner for the work contemplated by the Bid Documents, each Bidder acknowledges that he has read and fully understands the content and intent of the non-collusive bidding statement incorporated into the Proposal.

ITB-16 BID BOND

Each Proposal must be accompanied by a Certified check or Bid Bond payable to the Owner for not less than 5% of the Bid amount. All such checks, except those of the three lowest bidders will be returned as soon as practicable after Bid opening. Checks of the

three lowest bidders will be returned as soon as practicable after the Award of Contract, (or rejection of Bids), but the Owner will not retain them more than forty-five (45) days after opening of Bids, except by mutual agreement.

ITB-17 QUALIFICATIONS OF BIDDERS

A BIDDER'S QUALIFICATION STATEMENT IS REQUIRED. The forms attached hereto indicate all the information required. Each Bidder shall be responsible for submitting his current Qualifications Statement with his Bid.

ITB-18 CONTRACTOR'S WORK CAPABILITY

THE BIDDER, FIRM, OR CORPORATION MUST BE CAPABLE OF PERFORMING AND SATISFACTORILY COORDINATING AND COMPLETING THE WORK REQUIRED IN THE CONTRACT WITHIN THE STIPULATED TIME PERIOD.

Before executing any subcontract, the successful bidder shall submit the names and qualifications of any proposed subcontractor and/or material suppliers to the Executive Director for approval.

ITB-19 ADDITIONAL DOCUMENTATION REQUIRED AT CONTRACT EXECUTION

- A. Agreement
- B. Insurance and Indemnity Certification
- C. Performance Bond & Labor and Material Bond

ITB-20 AGREEMENT

THE BIDDER WHOSE PROPOSAL HAS BEEN ACCEPTED WILL BE REQUIRED TO APPEAR AT THE OFFICE OF THE TOWN OF NORTH HEMPSTEAD TOWN ATTORNEY (AS COUNSEL TO THE AUTHORITY) WITH REQUIRED EXECUTED SURETY COMPANY BONDS AND PROOF OF INSURANCE COVERAGE; AND SHALL EXECUTE THE CONTRACT WITHIN TEN (10) WORKING DAYS FROM THE DATE OF THE SERVICE OF A NOTICE, delivered to him in person or mailed to the address given in the Proposal, that the Contract has been awarded to him.

In case of failure to execute the Contract (including the required bonds and insurance) within the time stated, the Bidder shall be deemed to have abandoned the Contract, and the amount of the Bid Deposit made by the Bidder may, at the option of the Authority, be forfeited and retained by the Owner as liquidated damages. The Agreement Form is included herein.

**TOWN OF NORTH HEMPSTEAD  
SOLID WASTE MANAGEMENT AUTHORITY**

GENERAL CONDITIONS

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**TOWN OF NORTH HEMPSTEAD  
SOLID WASTE MANAGEMENT AUTHORITY**

**GENERAL CONDITIONS**

GC-1 **DEFINITIONS**

A. **CONTRACT DOCUMENTS**

The Contract Documents are comprised of the Bid Documents, the additional Documentation required for Contract execution, any Supplemental Agreements issued during the course of the Work, and the Maintenance Bond executed at the completion of Work.

These Documents are:

- (1) Notice to Bidders
- (2) Instructions to Bidders
- (3) General Conditions
- (4) Supplementary General Conditions
- (5) Standard Specifications (As defined hereinafter)
- (6) Addenda to Standard Specifications (As defined hereinafter)
- (7) Project Specifications (As defined hereinafter)
- (8) Contract Plans (As listed under GC-2), including any drawing issued by Addendum.
- (9) New York State Department of Labor Wage Rate Schedule
- (10) Schedule of Bid Prices
- (11) Addendum to Bid Documents
- (12) Bid Bond
- (13) Contractor's Qualification Statement
- (14) Proposal (including non-collusive bidding statement)
- (15) Agreement
- (16) Insurance and Indemnity Certification
- (17) Performance Bond & Labor and Material Bond

(18) Maintenance Bond

- B. A.A.S.H.T.O. American Association of State Highway and Transportation Officials.
- C. ACT OF GOD means an earthquake, flood, cyclone or other cataclysmic phenomenon of nature. Rain, wind or other natural phenomenon of normal intensity for the locality shall not be construed as an Act of God.
- D. AGREEMENT means the understanding between the parties involved with the work called for in the Bid Documents and governs the prosecution of such work.
- E. ARCHITECT is the Architect duly authorized in writing to act for the Owner through the Executive Director.
- F. A.S.T.M. American Society for Testing and Materials.
- G. AWARD is the decision of the Authority to accept the Proposal of the lowest responsive, responsible Bidder for the work included in these Contract Documents. An award letter will be issued by the Authority informing the Contractor that its bid was accepted. Within 10 days of receipt of the award letter the Contractor must:
- (1) Execute the Contract;
  - (2) Furnish the Authority with a performance bond and a labor and materials bond;
  - (3) Furnish a Certificate of Insurance completed by the Contractor's authorized insurance agent; and
  - (4) Should the Contract be in excess of \$500,000.00, furnish a verification that the Contractor will participate in an Apprenticeship Training Program that has been approved by the New York State Department of Labor.
- Failure to comply with these requirements and any other requirements contained herein will result in the Authority declaring the Contractor to have abandoned the Contract and the Contractor's forfeiture of the bid deposit and/or bid bond pursuant to paragraph H below.

- H. BID BOND/BID DEPOSIT is the security furnished by the Bidder by a certified check or bid bond payable to the Authority for not less than 5% of the bid amount with its Proposal for a project, as a guarantee that he will enter into a Contract for the work, if its Proposal is accepted. If the Contractor is the successful bidder, but fails to comply with paragraph G above and Section 46 below, it shall forfeit its bid bond/bid deposit.
- I. BIDDER is an individual, firm or corporation formally submitting a Proposal for the work contemplated, acting directly or through a duly authorized representative.
- J. BRIDGE is any structure whether single or multiple span construction with a clear span in excess of 20 feet when measurement is made horizontally along the center line of roadway from face to face of abutments or sidewalks immediately below the copings or fillets; or, there are no copings or fillets, at points six inches below the bridge seats or immediately under the top slab, in the case of frame structures. In the case of arches, the span shall be measured from spring line to spring line. All measurements shall include the widths of intervening piers or division walls.
- K. CHANGE ORDER(S) is a written agreement made and entered into by and between the Contractor and the Authority covering work not otherwise provided for, revisions in or amendments to the terms of the Contract. Such Change Order(s) shall become part of the Contract when approved and properly executed.
- L. EXECUTIVE DIRECTOR is the Executive Director of the Town of North Hempstead Solid Waste Management Authority.
- M. CONSTRUCTION MANAGER means the Construction Manager duly authorized in writing to act for the Owner through the Executive Director. The Construction Manager may also be referred to herein as the “Engineer” which term for the purposes of this Contract shall be synonymous with Construction Manager.
- N. CONTRACT means the total legal obligation which results from the parties

agreement and any other applicable rules of law.

- O. CONTRACTOR is the individual, firm or corporation undertaking the execution of the work under the terms of the Contract and acting directly or through its agents, representatives and employees.
- P. CONTRACT PLANS comprise all official drawings or reproductions of drawings issued by the Authority for use by Bidders in preparation of their Proposals and for the execution of the Contract.
- Q. CULVERT is the same as "bridge" except that the clear span is 20 feet or less.
- R. Reserved.
- S. EMPLOYEE is any person performing work under the Contract and who is under the direction or control, or receives compensation from the Contractor or subcontractor.
- T. ENGINEER is the Engineer duly authorized in writing to act for the Owner through the Executive Director.
- U. EQUIPMENT consists of all machinery, implements, tools, apparatus and incidentals necessary for the proper construction and acceptable completion of the work, together with the necessary supplies for upkeep and maintenance.
- V. ESTIMATED QUANTITIES are estimated unit quantities as compiled and shown on the Proposal Sheets. These quantities are subject to field determination and measurement for purposes of actual payments.
- W. FINAL ACCEPTANCE of the work by the Authority will follow a detailed inspection of the work by the Engineer for conformance with the requirements of the Contract Documents, and will exclude any latent defects discovered in the work

following such inspection.

- X. FINAL ESTIMATE is the certification or estimate of the Engineer submitted to the Executive Director upon completion of the Contract, stating from actual measurements the whole amount of work done by the Contractor and also the value of such work under and according to the terms of the Contract. The amounts to be paid shall be an amount computed by multiplying the prices bid for each unit by the number of actual units used or installed, as certified by the Engineer.
- Y. HIGHWAY is the whole strip of land bounded by the right-of-way lines.
- Z. INSPECTOR is an authorized representative of the Owner assigned to make any and all necessary technical inspections of the work performed and of the materials furnished by the Contractor.
- AA. LABORATORY is the Testing Laboratory designated by the Executive Director for testing the materials to be used under this Contract.
- BB. LIQUIDATED DAMAGES See SUPPLEMENTARY GENERAL CONDITIONS, RIGHT OF OWNER TO TERMINATE AND LIQUIDATED DAMAGES.
- CC. MATERIAL is any approved material acceptable to the Executive Director or the Engineer and conforming to the requirements of the Contract Documents.
- DD. MATERIAL SUPPLIER is any individual firm or corporation approved by the Department to supply material for the work to be performed under this Contract.
- EE. OWNER is the Town of North Hempstead Solid Waste Management Authority.
- FF. PARTIAL OR MONTHLY PAYMENTS are payments to the Contractor for work satisfactorily performed, as specified in GC-32, COMPENSATION TO BE PAID TO CONTRACTOR.

- GG. PROJECT CORRESPONDENCE AND MEMORANDA are written communications in any form relating to the Work of the Project prepared by the Authority, the Engineer, the Contractor or one of its subcontractors and/or material suppliers.
- HH. PROJECT RECORDS are specific historical data relating to work progress and the eventual satisfactory completion of the Work.
- II. PROPOSAL is the offer of a Bidder to perform the work described by the Bid Documents when made out and submitted on the prescribed Proposal Form, properly signed and guaranteed.
- JJ. PROPOSAL GUARANTY is a certified check or Surety Bond accompanying the Proposal submitted by the Bidder, as a guarantee that the Bidder will enter into a Contract with the Owner for the construction of the work, if the Contract is awarded to it.
- KK. SITE is the specific area adjacent to and upon which construction work is to be performed.
- LL. SPECIFICATIONS shall mean the Legal and Procedural Documents, General Conditions, and Supplementary General Conditions (if applicable), together with the modifications thereof, the worded details on Contract Plans, Standard Specifications, Project (Technical ) Specifications and all Addenda thereto.
- MM. SUBCONTRACTOR is any individual, firm or corporation to whom the Contractor, with the written consent of the Authority, sublets any part of the Contract. Material suppliers are not considered subcontractors.
- NN. TON is a short ton of 2,000 pounds.

- OO. AUTHORITY shall mean the Town of North Hempstead Solid Waste Management Authority.
- PP. AUTHORITY BOARD shall mean the Board of Directors of the Town of North Hempstead Solid Waste Management Authority.
- QQ. WORK as used herein, refers to work at the site of the project and includes all plant, labor materials supplies, equipment and other facilities and anything necessary or proper for, or incidental to, the carrying out and completion of this Contract.
- RR. WORK DAYS are calendar days, exclusive of Saturdays, Sundays and recognized legal holidays.
- SS. WRITTEN NOTICE shall be considered as served when delivered in person to a duly authorized representative of the Contractor or when sent by certified or registered mail to the Contractor. It shall be the duty of the Contractor to advise the Owner, as to any change in its business address until final completion has been declared and the Owner has accepted all Contractor Contractual obligations.



**GC-2 CONTRACT PLANS, STANDARD SPECIFICATIONS, PROJECT SPECIFICATIONS AND RELATED DATA**

A. LIST OF CONTRACT PLANS: The work contemplated shall conform to the following drawings, all of which form an integral part of the Contract Documents:

<u>Dwg. No.</u>	<u>Title</u>	<u>Date</u>
T-000	COVER SHEET	10/21/2020
S-001	FOUNDATION PLANS AND NOTES	10/21/2020
E-001	ELECTRICAL SYMBOL LIST, ABBREVIATIONS, DRAWING LIST AND NOTES	10/21/2020
E-101	ELECTRICAL ONE LINE DIAGRAMS-EXISTING PUMP & TREAT & BLOWER BUILDINGS-DEMO	10/21/2020
E-102	ELECTRICAL ONE LINE DIAGRAMS-PUMP & TREAT & BLOWER BUILDINGS	10/21/2020
E-201	ELECTRICAL EXISTING SITE PLAN	10/21/2020
E-202	ELECTRICAL SITE PLAN – NEW WORK	10/21/2020
E-301	ELECTRICAL PAT PLANS – PUMP & TREAT & BLOWER BUILDINGS – EXISTING AND DEMOLITION	10/21/2020
E-302	ELECTRICAL PART PLANS – NEW WORK	10/21/2020
E-401	ELECTRICAL DETAILS SHEET 1	10/21/2020
E-402	ELECTRICAL DETAILS SHEET 2	10/21/2020
E-403	ELECTRICAL DETAILS SHEET 3	10/21/2020
E-501	GENERATOR DETAIL	10/21/2020
E-502	GENERATOR ENCLOSURE DETAIL	10/21/2020
P-001	PLUMBING LEGENDS, NOTES RISER AND DIAGRAM	10/21/2020
P-002	PLUMBING NEW WORK SITE PLAN	10/21/2020
P-201	PLUMBING TREATMENT BUILDING-GAS NEW WORK	10/21/2020

<u>SECTION NO.</u>	<u>TITLE</u>	<u>PAGE</u>
011000	SUMMARY OF WORK	011000-1
013150	PROGRESS MEETINGS	013150-1
013200	TIME SCHEDULE	013200-1
013300	SHOP DRAWINGS, PROJECT DATA AND SAMPLES	013300-1
013500	CONSTRUCTION SIGN	013500-1
016600	STORAGE AND PROTECTION	016600-1
017300	CUTTING AND PATCHING	017300-1
017500	STARTING OF MECHANICAL/ELECTRICAL SYSTEMS	017500-1
017700	PROJECT CLOSEOUT	017700-1
017800	PROJECT RECORD DOCUMENTS	017800-1
030100	GENERAL PROVISIONS	030100-1
030550	CONCRETE	030550-1
031000	CONCRETE FORMWORK	031000-1
032000	CONCRETE REINFORCEMENT	032000-1
033900	CONCRETE CURING	033900-1
220001	GENERAL PROVISIONS	220001-1
220516	EXPANSION COMPENSATION AND FLEXIBLE CONNECTORS	220516-1
220523	MANUAL VALVES, COCKS, FAUCETS	220523-1
220529	PIPING AND EQUIPMENT SUPPORTS, ANCHORS AND SLEEVES	220529-1
222000	PIPE AND PIPE FITTINGS	222000-1
260100	BASIC ELECTRICAL REQUIREMENTS	260100-1
260500	BASIC ELECTRICAL MATERIALS AND METHODS	260500-1
260519	WIRES AND CABLES – BELOW 600 VOLTS	260519-1
260526	GROUNDING	260526-1
260529	FASTENERS, ATTACHMENTS AND SUPPORTING DEVICES	260529-1
260530	CONDUIT RACEWAYS	260530-1
260532	CABINETS, BOXES AND FITTINGS	260532-1
260543	UNDERGROUND CONDUIT SYSTEM	260543-1
260544	UNDERGROUND ELECTRICAL WORK	260544-1
260549	CONCRETE PAD FOR EQUIPMENT	260549-1
260553	ELECTRICAL IDENTIFICATION	260553-1
262413	SWITCHBOARDS – BELOW 600 VOLTS	262413-1
262416	PANELBOARDS	262416-1
262726	WIRING DEVICES – UNDER 600 VOLTS	262726-1

262816	CIRCUIT DISCONNECTS – BELOW 600 VOLTS	262816-1
262913	ENCLOSED MOTOR CONTROLLERS	262913-1
262923	VARIABLE FREQUENCY DRIVES	262923-1
263216	STAND-BY NATURAL GAS GENERATOR SETS	263216-1
263623	AUTOMATIC TRANSFER SWITCH	263623-1
264313	SURGE PROTECTION	264313-1
267210	ADDRESSABLE FIRE ALARM SYSTEMS	267210-1
311110	SITE CLEARING	311110-1
311316	TREE AND SHRUBS PROTECTION AND TRIMMING	311316-1
312316	EARTHWORK FOR STRUCTURES AND UTILITIES	312316-1
312323	FLOWABLE FILL	312323-1
321216	REMOVAL AND RESTORATION OF EXISTING ASPHALT CONCRETE PAVEMENT DISTURBED BY THE WORK OF THE CONTRACT	321216-1
321313	REMOVAL OF RESTORATION OF PORTLAND CEMENT CONCRETE PAVING DISTURBED BY THE WORK OF THE CONTRACT	321313-1
323113	CHAIN LINK FENCES AND GATES	323113-1
329113	RESTORATION OF LANDSCAPE WORK DISTURBED BY THE WORK OF THE CONTRACT	329113-1
329120	TOP SOIL	329120-1
329219	SEEDING	329219-1
330130	REPLACEMENT AND RESTORATION OF EXISTING UNDERGROUND SANITARY AND STORM DRAINAGE SYSTEMS	330130-1

- B. STANDARD SPECIFICATIONS: The County of Nassau 2009 Standard Specifications for the Construction of Highways and Bridges shall form part of these Contract Documents except as modified herein. The requirements and provisions of Part One of the Standard Specifications are hereby deleted and are replaced by the provisions of this Document. All of the requirements of Parts Two, Three, and Four shall apply to the Work of this Contract unless modified herein.
- C. PROJECT (TECHNICAL SPECIFICATIONS): The Project (Technical) Specifications include specific exclusions, modifications, or additions to the aforementioned Standard Specifications and form an integral part of this Contract.
- D. ACCURACY OF CONTRACT DOCUMENTS: The Contract Documents have been prepared with care and are intended to set forth as clearly as is practical the Work to be done. The Contractor must realize, however, that construction details cannot always be accurately anticipated and that in executing the Work, field conditions may require reasonable modifications in the details of plans and quantities of work involved. Work under all items in the Contract must be carried out to meet these field conditions to the satisfaction of the Owner and Engineer and in accordance with its instructions and the Contract Documents.
- E. CONFLICT: If there be conflicting variance between the Contract Plans and the Specifications, the Executive Director will determine which takes precedence. In case of conflict between the General Conditions of the Contract and the detailed Specifications requirements, the detailed Specifications requirements shall control.

The Contract Documents are complimentary, and what is called for by one shall be as binding as if called for by all. In the event of conflicting provisions in the Contract Documents, the drawings will take precedence over the specifications. In the event of conflicting provisions within the drawings the more specific provision will take precedence over the less specific. In the event of conflicting provisions within the specifications, the

more specific provision will take precedence over the less specific.

- F. DISCREPANCIES IN CONTRACT DOCUMENTS: Any discrepancies found between the Contract Plans and Specifications and site conditions or any errors or omissions in the Contract Plans or Specifications shall be immediately reported to the Engineer, who shall, as soon as practical, correct such errors or omissions in writing. Any Work done by the Contractor after its discovery of such discrepancies, errors or omissions shall be done at the Contractor's own risk.
  
- G. COPIES OF CONTRACT PLANS AND SPECIFICATIONS: The Authority will furnish two (2) copies of the Contract Plans and Specifications necessary for the execution of the Work at no charge to the Contractor. The Contractor shall reimburse the Authority for any costs incurred in providing additional copies of the Plans and Specifications in excess of the aforementioned two (2) copies.
  
- H. CONTRACT PLANS AND SPECIFICATIONS AT THE JOB SITE: Two complete sets of all Plans and Specifications shall be maintained by the Contractor at the job site and shall be available to the Engineer at all times.
  
- I. DIMENSIONS: Figured dimensions on the Plans are to be used. The Contractor shall notify the Engineer of missing dimensions required to execute the Work.
  
- J. SAMPLES: All samples called for in the Contract Documents or required by the Engineer shall be furnished by the Contractor, at its expense, and shall be submitted to the Engineer for its approval. Samples shall be furnished so as not to delay fabrication, allowing the Engineer reasonable time for analysis and examination of the samples submitted.

Samples for Tests: The Contractor shall furnish such samples of materials as may be required for examination and testing. All materials and workmanship shall be in accordance with approved samples. All samples of materials for testing shall be taken according to

methods provided in the Contract Documents. Recoverable samples and test residues remain the property of the Owner.

- K. SUBMITTALS: The Contractor shall provide shop drawings, bar schedules, erection plans and details, work schedules and procedures and such other drawings and material as may be necessary for the prosecution of the work in the shop and in the field as required by the Contract Documents and/or the Engineer's instructions. Deviations from the Plans and Specifications shall be called to the attention of the Engineer at the time of the first submission of shop drawings for approval. The Engineer's approval of any shop drawings shall not release the Contractor from responsibility for such deviations. Submittals shall be submitted according to procedures set forth in the Technical Specifications.

### GC-3 LAWS, ORDINANCES AND REGULATIONS

Each and every provision of law required by law to be inserted in this Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though it were included herein, and if through mistake, or otherwise, any such provision is not inserted, or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion. The Contractor shall keep itself fully informed of all Federal, State and Local laws and municipal ordinances and regulations in any manner affecting those engaged or employed in the Work, or in any way affecting the conduct of the Work, and of all orders and decrees of bodies or tribunals having any jurisdiction or authority over the same. If any discrepancy or inconsistency, should be discovered in this Contract, in relation to any such law, ordinance, regulation order or decree, the Contract shall at all times itself observe and comply with, and shall cause all its agents, subcontractors, and employees to observe and comply with all such existing laws, ordinances, regulations, orders and decrees; and shall protect, defend, indemnify and hold harmless the Owner, the Authority, the members of the Authority Boards and their officers, agents and employees against any claims or liability arising from or based on the violation of any such laws, ordinances, regulations, orders or decrees

whether by itself, its agents, subcontractors, or by its employees.

GC-4 SECTIONS 139a AND 139b OF THE NEW YORK STATE FINANCE LAW

The Contractor hereby agrees to the provisions of Sections 139a and 139b of the New York State Finance Law which require that upon the refusal of a person, when called before a grand jury, head of a State department, temporary State commission or other State agency, or the organized crime task force in the Department of Law, head of a Municipal Department or other Municipal Agency, which is empowered to compel the attendance of witnesses and examine them under oath, to testify in an investigation, concerning any transaction or Contract had with the State, any political subdivision thereof, a public authority or with any public department, agency or official of the State of any political subdivision thereof or of a public authority, to sign a waiver of immunity against subsequent criminal prosecution or to answer any relevant question concerning such transaction or contract.

1. Such person, and any firm, partnership or corporation of which he is a member, partner, director or officer shall be disqualified from thereafter selling to or submitting bids to or receiving awards from or entering into any Contracts with the Authority of North Hempstead or any public department, agency or official thereof, for goods, work or services, for a period of five years after such refusal, and
2. Any and all Contracts made with the Authority of North Hempstead or any public department, agency or official thereof, since the effective date of this law, by such person, and by any firm, partnership or corporation of which he is a member, partner, director or officer may be canceled or terminated by the Authority of North Hempstead without incurring any penalty or damages on account of such cancellation or termination, but any moneys owing by the Authority of North Hempstead for goods delivered or Work done prior to the cancellation or termination shall be paid.

GC-5 LABOR, WAGES AND EQUAL EMPLOYMENT

The Contractor agrees that no laborer, workman or mechanic in the employ of the Contractor, subcontractor or other persons doing or contracting to do the whole or part of the Work contemplated by this Contract, shall be permitted or required to work normally more than eight (8) hours in any one calendar day or more than (5) days in any one week, except in cases where the Owner determines that there is an extraordinary emergency caused by an Act of God or danger to life or property. The Contractor further agrees that the wages and supplements to be paid for a legal day's work, as defined in Section 220 of the Labor Law, shall not be less than the prevailing rate of wage for a day's work in the same trade or occupation in the locality where the public work under this Contract is to be performed. In accordance with Section 220-D of the Labor Law, the Contractor agrees that the laborers, workmen and/or mechanics to be employed on the Work to be performed hereunder, shall be paid not less than the hourly minimum rate of wage as determined by the Industrial Commissioner of the Department of Labor of the State of New York. Attention is called to the fact that there are minimum rates as provided by law, and should the Contractor be compelled or desire to pay higher rates, no claim against the Owner will be entertained therefor.

In accordance with the provisions of Section 220-E of the Labor Law, the Contractor agrees as follows:

- A. That in the hiring of employees for the performance of Work under this Contract or any subcontract hereunder, no Contractor, subcontractor, nor any person acting on behalf of such Contractor or subcontractor, shall be reason of race, creed, color, 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;
- B. That no Contractor, subcontractor, nor any person on its 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 or national origin;

- C. That there be deducted from the amount payable to the Contractor by the Owner under this Contract a penalty of fifty dollars (\$50.00) for each person for each calendar day during which such person was discriminated against or intimidated in violation of the provisions of the Contract; and
- D. That this Contract may be canceled 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 the Contract.

This Contract shall be void unless Section 222 of the Labor Law Sections 291 through 299 of the Executive Law and the Civil Rights Law are complied with. The Contractor will also comply with all findings and requests of the State Division of Human Rights.

It shall be required that (a) in the employment of laborers and mechanics for Work on the project, preference shall be given to qualified local residents; (b) no person under the age of eighteen (18) years shall be employed on the project; (c) no person currently serving sentence in a penal or correctional institution and no inmate of an institution of mental deficiency shall be employed on the project; and (d) no person whose age, mental, or physical condition is such as to make its employment dangerous to its health or safety of others, shall be employed on the project; provided that this shall not operate against the employment of mentally or physically handicapped persons, otherwise employable, where such persons may be safely assigned to Work which they can ably perform.

There shall be paid each laborer or mechanic of the Contractor or subcontractor engaged in Work on the project under this Contract in trade or occupation listed in the Specifications, not less than the hourly wage rate set opposite the same, regardless of any contractual relationship which may be alleged to exist between the Contractor or any subcontractor

and such laborers and mechanics. All disputes in regard to the payment of wages in excess of those specified in this Contract shall be adjusted by the Contractor.

Any laborer or mechanic employed to perform Work on the project under this Contract, which Work is not covered by any of the foregoing classifications, shall be paid not less than the minimum rate of wages specified herein for the classification which most nearly corresponds to the Work to be performed by him, and such minimum wage rate shall be retroactive to the time of initial employment of such person in such classification.

The minimum wage rates for apprentices shall apply only to persons working with the tools of the trade they are learning under the direct supervision of journeyman mechanics. Contractors may utilize apprentices and such other appropriate classifications as are contained in the applicable collective bargaining agreement for the trade involved. Except as otherwise required by law, the number of apprentices in each trade or occupation employed by the Contractor or any subcontractor shall not exceed the number permitted by the applicable standards of the New York State Department of Labor, or in the absence of such standards, the number permitted under the usual practice prevailing between unions and the employer's associations of the respective trade or occupations.

The Contractor agrees that, in case of underpayment of wages to any worker on the project under this Contract by the Contractor or any subcontractor, the Owner may withhold from the Contractor out of payments due, an amount sufficient to pay such worker the difference between the wages required to be paid under this Contract and the wages actually paid such worker for the total number of hours worked including administrative costs incurred and reasonable attorneys fees and that the Owner may disburse such amount so withheld by it for and on account of the Contractor to the employee to whom such amount is due. The Contractor further agrees that the amounts to be withheld pursuant to this Section may be in addition to the percentages to be retained by the Owner pursuant to other provisions of this Contract.

The Contractor shall post on an appropriate conspicuous bulletin board at the site of the project a schedule showing all determined minimum wage rates for the various classes of laborers and mechanics to be engaged in the Work on the project under this Contract and all deductions, if any, required by law to be made from unpaid wages actually earned by the laborers and mechanics so engaged.

The Contractor and each of its subcontractors shall pay each of its employees engaged in the Work on the project in full in cash and not less often than once each week, less legally required deductions: provided that when circumstances render payment in cash infeasible or impracticable, payment by check may be effected upon consideration that funds are made available in a local bank and checks may be cashed without charge, trade requirements or inconvenience to the worker; this by approval of the Owner.

In accordance with Section 220, Subdivision 3 and 220-D of the Labor Law, the aforesaid established wage schedule on a minimum hourly rate basis, shall be paid for the following occupations on this project. Any person or corporation that willfully pays less than the established wage schedule may be subjected to civil and/or criminal penalties and/or damages.

(See New York State Department of Labor Wage Rate Schedule attached hereinafter.)

#### **GC-6 RISK OF LOSS**

It is further understood and agreed that all loss or damage arising out of the nature of the Work to be done under this Contract, or from any unforeseen obstructions or difficulties which may be encountered in the performance of the same, or from the action of the elements, or from encumbrances on the line of Work, or from any injury done in consequence of acts or omissions on the part of the Contractor, its employees or agents in carrying out any of the provisions or requirements of this Contract, shall be borne and assumed by the said Contractor.

**GC-7 RIGHT OF THE OWNER TO TERMINATE AND LIQUIDATED DAMAGES**  
**SEE SUPPLEMENTARY GENERAL CONDITIONS CONTAINED HEREIN.**

**GC-8 ENGINEER'S AUTHORITY**

In the performance of the Work, the Contractor shall abide by all orders, directives and requirements of the Engineer and shall perform all Work to the satisfaction of the Engineer. The Engineer shall determine the amount, quality, acceptability and fitness of all parts of the Work, shall interpret the Contract Plans, Specifications, Contract Documents and shall decide all other questions in connection with the Work. The Contractor shall not employ plant, equipment, materials, methods or personnel to which the Engineer objects. Upon request, the Engineer will confirm in writing any oral order, direction, requirements or determination.

**GC-9 SUSPENSION OF WORK**

The Engineer shall have the authority to suspend the Work, wholly or in part, for such period or periods, as it may deem necessary, due to unsuitable weather, or such conditions as are considered unfavorable for prosecution of the Work. In such instance the Contractor's sole remedy for a suspension of work shall be an extension of the contract completion time, which must be approved in accordance with GC-34. If any such suspension is based upon the failure on the part of the Contractor to carry out the provisions of the Contract or to supply materials meeting requirements of the Specifications, or as directed by the Owner, the Contractor may be subjected to damages, including but not limited to, liquidated damages set forth SGC-2. The Contractor shall not suspend operations without the Engineer's permission.

**GC-10 PROHIBITED INTERESTS**

No officer, employee, or consultant of the Owner who is authorized in such capacity and on behalf of the Owner to negotiate, make, accept, or approve, or to take part in negotiating, making, accepting, or approving any architectural, engineering, inspection, construction or material supply contract, or any subcontract in connection with the construction of the project, shall become directly or indirectly interested personally in this Contract, or in any part thereof.

No officer, employee, architect, attorney, engineer, consultant or inspector of or for the Owner who is authorized in such capacity and on behalf of the Owner to exercise any legislative, executive, supervisory or other similar functions in connection with construction of the project shall become directly or indirectly interested personally in this Contract, or in any part hereof, or in any material supply contract, subcontract, insurance contract, or any other contract pertaining to the project.

#### **GC-11 SURVEYS, PERMITS AND CODES**

- A. Unless otherwise expressly provided for in the Contract Documents, the Contractor shall perform all surveys necessary for the execution of the Work.
- B. The Contractor shall give all notices required by, and comply with, all applicable Laws, Ordinances, and Codes, including, but not limited to, the Town Code of the Town of North Hempstead. All disconnections and demolition shall comply with all applicable Ordinances and Codes including all written waivers. Before beginning the Work, the Contractor shall examine the Drawings and Specifications for compliance with applicable Ordinances and Codes, and shall immediately report any discrepancy to the Authority. Where the requirements of the Drawings and Specifications fail to comply with such applicable Ordinances and Codes, the Authority will adjust the Contract by Change Order to conform to such Ordinances or Codes (unless waivers in writing covering the difference have been granted by the governing body or department) and make appropriate adjustment in the Contract Price. Should the

Contractor fail to observe the foregoing provisions and do demolition work at variance with any applicable Ordinance or Code including any written waivers (notwithstanding the fact that such methods are in compliance with the Specifications), the Contractor shall correct the methods of doing such Work without cost to the Authority, but a Change Order will be issued to cover only the excess cost the Contractor would have been entitled to receive if the change had been made before the Contractor commenced Work on the items involved.

- C. The Contractor shall, at its own expense, secure and pay to the appropriate federal, state and local departments the fees or charges for all permits for water, demolition, sidewalks, sheds, removal of abandoned water taps, sealing of house connection drains, pavement cuts, and repaving of streets and sidewalks and all other building, electrical, plumbing, gas and sewer permits necessary under the local regulatory body or any of its agencies.
- D. The Contractor shall comply with the applicable Laws and Ordinances governing the disposal of materials, debris, rubbish and trash on or off the Project Area, and shall commit no trespass on any public or private property in any operation due to or connected with the demolition and site clearance.

## **GC-12 LIVE UTILITIES**

The Contractor is specifically directed to familiarize itself with the existence of aerial, surface or subsurface structures of municipal and other public service corporations within and surrounding the construction site. A careful search has been made, in good faith, and all pertinent or applicable subsurface public or private utilities and other such installations within or adjacent to the Contract area are shown in their approximate locations on the Contract Plans. However, there is no guarantee that all existing utilities have been found. The Contractor's attention is also directed to the fact that during the life of this Contract

utility companies may make changes in their facilities. The Contractor will be required to determine the exact locations and elevations of all pertinent structures, utilities and facilities before construction work and new installations are started, so that there will be no interference with the Work. Conflict between existing structures, utilities and facilities and new work shall be ascertained by the Contractor and called to the attention of the Engineer.

The Contractor shall have taken these conditions into consideration in preparing its Bid. The Engineer shall direct the public utility company to relocate or remove those utility structures that interfere with the Work. The Contractor shall not remove any structure or part of a structure owned by a public utility company without the approval of the Engineer.

The Contractor shall cooperate with the public utility companies whose structures (aerial, surface or subsurface) are within the limits of or adjacent to the right-of-way, to make it possible for them to maintain uninterrupted service. The Contractor shall conduct its operations in such a way as to delay or interfere as little as practicable with the work of the utility companies.

Prior to commencement of any construction Work affected, the Contractor shall contact each utility company for the purpose of requesting an on-site field mark out of their respective subsurface facilities.

The Contractor shall give the utility companies involved reasonable notice, but not less than 48 hours, in advance of any operations which may or will affect their structures.

The Contractor shall protect in a suitable manner all utilities encountered and shall repair at its cost any damage to structures, utilities and facilities caused by its operations. If the nature of the damage is such as to endanger the satisfactory functioning of the utilities and the necessary repairs are not immediately made by the Contractor, the Work may be done by the respective owning companies and the cost thereof charged to the Contractor.

It is understood and agreed that the Contractor has considered in its Bid all of the

permanent and temporary utility appurtenances in their present or relocated positions as shown on the Plans, and that no additional compensation will be allowed for any delays, inconveniences, or damage sustained by him due to any interference from the utility appurtenances or from the operation of moving them.

**GC-13 STATED ALLOWANCES**

The Contractor shall include in its Proposal any cash allowances stated in the Contract Documents. The Contractor shall provide the "Allowed Materials" as specified and/or approved by the Owner on the basis of the lowest and best Bid of at least three competitive Bids unless the Contract Documents specify a sole source. If the actual price for providing the "Allowed Materials" is more or less than the "Cash Allowance", the Contract price shall be adjusted accordingly.

**GC-14 COMMENCEMENT OF WORK**

The Contractor shall commence the Work on the date specified in the written Notice to Proceed, and shall fully complete the Work within the number of consecutive calendar days as set forth in this Contract, unless the Owner extends the time limit.

In case the successful Bidder, in anticipation of an Award of this Contract, voluntarily undertakes to commence the performance of any of the Contract Work on the same site of the project, it does so entirely at its own risk and without obligation or responsibility on the part of the Authority unless and until an Award of the Contract to him is made by Resolution of the Authority Board; and it hereby does agree and warrant that, as a prerequisite to the start of any such voluntary work, it accepts, assumes and undertakes all of the provisions of its Proposal and of the Contract Documents including all of the provisions and responsibilities relative to (1) damage, indemnification and holding the Authority harmless as set forth in said Contract Documents, and (2) actually furnishing in advance of any Contract operations, the required insurance policies of each and every kind



and amount as called for in said Contract Documents, particularly with relation to Worker's Compensation and Liability insurance policies as set forth in the related specifications; and it does also agree and warrant that all of such policies will be in force and effect on the date of the start of any such Contract operations, and continue in force and effect throughout such operations and further it does also agree that in the event the Authority elects not to award the Contract to it after it has voluntarily started any of the Contract Work that it will reimburse the Authority for engineering and inspection expenses actually incurred by the Authority, and remove all personnel and equipment as directed by the Authority.

**GC-15 PROTECTION OF WORK AND PROPERTY**

The Contractor shall at all times safely guard the Owner's property from injury or loss in connection with this Contract. It shall at all times safely guard and protect its own work and that of adjacent property from damage, loss or injury. All passageways, guard fences, lights, and other facilities required for protection by all authorities or local conditions must be provided and maintained.

It is further understood and agreed that loss or damage arising out of the nature of the Work to be done under this Contract or from any unforeseen obstruction or difficulties which may be encountered in the performance of the same or from the action of the elements or from encumbrances on the line of work or from any injury done in consequence of acts or omissions on the part of the Contractor, subcontractor, their employees, or agents in carrying out any of the provisions or requirements of this Contract shall be borne and assumed by the Contractor.

**GC-16 SANITARY PROVISIONS**

The Contractor shall provide and maintain sanitary accommodations for the use of its employees and subcontractors as may be necessary to comply with all the requirements of

authorities having jurisdiction.

**GC-17 IDENTIFICATION OF VEHICLES, MACHINERY AND EQUIPMENT**

All Contractor's and/or subcontractors under this Contract shall have identification of its company name clearly visible on all vehicles, field offices, storage units, machinery and equipment.

**GC-18 MATERIALS, WORKMANSHIP AND SAFETY**

- A. **MATERIALS FURNISHED BY THE CONTRACTOR:** All materials used in the Work shall meet the requirements of the Contract Documents, and no material shall be used until it has been approved by the Engineer.
  
- B. **STORAGE OF MATERIALS:** Materials shall be safely stored and shall be kept so as to insure the preservation of their quality and fitness for the Work. When considered necessary, they shall be placed on wooden platforms or other hard, clean surfaces and not on the ground. They shall be placed under secure cover at locations approved by the Engineer. Stored materials shall be located so as to facilitate prompt inspection. The Contractor shall be responsible for the storage and protection of said materials and any damage thereto. Private property shall not be used for storage purposes without the written permission of said property owner.
  
- C. **CHARACTER OR WORKERS:** The Contractor shall at all times be responsible for the conduct and discipline of its employees and/or any subcontractor or persons employed by subcontractors. All workers must have sufficient knowledge, skill and experience to perform properly the work assigned to them.

- D. REJECTED WORK AND MATERIALS:** All materials which do not conform to the requirements of the Contract Documents, or are not equal to samples approved by the Engineer, or are in any way unsatisfactory or unsuited to the purpose for which they are intended, will be rejected. Any defective Work, whether the result of poor workmanship, use of defective materials, damage through carelessness or any other cause, shall be removed within ten (10) days after written notice is given by the Engineer, and the Work shall be re-executed by the Contractor. The fact that the Engineer may have previously overlooked such defective Work shall not constitute an acceptance of any part of it. Should the Contractor fail to remove rejected Work or materials within ten (10) days after written notice to do so, the Owner may remove them and may store the materials, all at the Contractor's expense.
- E. CORRECTION OR WORK:** During the progress of the Work, all material whether incorporated in the Work or not, all processes of manufacture, and all methods of construction up to final acceptance shall be at all times and places subject to the inspection and approval of the Engineer. Should same fail to meet the Engineer's approval, it shall be forthwith reconstructed, made good, replaced and/or corrected, as the case may be, by the Contractor at its own expense.

The Contractor's obligation hereunder shall include the uncovering or taking down of finished Work and its restoration thereafter; provided, however, that the order to uncover, take down and restore shall be in writing, and further provided that if Work thus exposed proves satisfactory, and if the Contractor has complied with this Section, such uncovering or taking down and restoration shall be considered an item of Extra Work to be paid for in accordance with the provisions of GC-29. If the Work thus exposed proves unsatisfactory, the Authority has no obligation to compensate the Contractor for the uncovering, taking down or restoration.

Inspection and approval by the Construction Manager of finished Work or of Work being performed, or of materials and equipment at the place of manufacture or

preparation, shall not relieve the Contractor of its obligation to perform the Work in strict accordance with the Contract. Finished or unfinished Work not found to be in strict accordance with the Contract shall be replaced as directed by the Construction Manager, even though such Work may have been previously approved and paid for. Such corrective Work is Contract Work and shall not be deemed Extra Work.

The Authority shall be the final judge of the quality and suitability of the Work, materials, processes and methods of construction for the purposes for which they are used. If, in the opinion of the Construction Manager, it is undesirable to replace any defective or damaged materials or to reconstruct or correct any portion of the Work damaged or not performed in accordance with the Contract Documents, the compensation to be paid to the Contractor hereunder shall be reduced by such amount as, in the judgment of the Commissioner, will be equitable.

F. **CONTRACTOR'S PERFORMANCE:** The Contractor shall provide all labor, materials and equipment necessary to complete the Work. Should the Contractor elect to perform Work after regular working hours, on Saturdays, Sundays or legal holidays, such work shall be performed only with the approval of the Engineer and without additional expense to the Owner.

G. **MEANS AND METHODS:** Unless otherwise expressly provided in the Contract Drawings, Specifications and Addenda, the Means and Methods of Construction shall be such as the Contractor may choose; subject, however, to the Construction Manager's right to reject the Means and Methods of Construction proposed by the Contractor which in the opinion of the Construction Manager:

1. Will constitute or create a hazard to the Work, or to persons or property;  
or
2. Will not produce finished Work in accordance with the terms of the

Contract; or

3. Will be detrimental to the overall progress of the Project.

The Construction Manager's approval of the Contractor's Means and Methods of Construction, or the Construction Manager's failure to exercise its right to reject such means or methods, shall not relieve the Contractor of its obligation to complete the Work as provided in this Contract; nor shall the exercise of such right to reject create a cause of action for damages.

**H. CUTTING AND PATCHING:** The Contractor shall do all necessary cutting and patching of the Work that may be required to properly receive the Work of the various trades of this Contract or as required by the Contract Documents to complete the Work. The Contractor shall restore all such cut or patched work to the satisfaction of the Engineer. All cutting required shall not be excessive for the purposes of installing the required Work.

**I. JOB SITE SAFETY AND USES OF PREMISES:** The Contractor expressly agrees to undertake at all times at its own expense:

1. Every precaution to prevent injury to all persons or damages to all property. The safety provisions of applicable laws shall be observed but job site safety is the sole responsibility of the Contractor and its subcontractors and cannot be assumed by the Authority, the Engineer or their agents or employees.
2. The storage of its apparatus, materials, supplies and equipment in orderly fashion at the site of the Work so as not to interfere with the progress of its Work, the Work of any other contractors or the Owner's normal plant operations.

3. The placement upon the Work or any part thereof only such loads as are consistent with the safety of that portion of Work.
4. The responsibility at all times for the protection and safety of the general public and of persons and employees who may for any reason enter within the limits of its Work.
5. The daily cleanup of all refuse, rubbish, scrap, materials, and debris caused by its operations, to the end that at all times the site of the Work shall present a neat, safe, orderly and workmanlike appearance in conformance with the requirements of OSHA, other applicable laws and the terms of this Contract.
6. The removal of all surplus materials, false work, temporary structures, including foundations thereof, and plants of any description so as to leave the site in a neat, orderly condition.
7. The disposal of such debris in a manner approved by the Engineer.

**GC-19 OMITTED WORK**

If any Contract Work in a lump sum Contract, or if any part of a lump sum item in a unit price, lump sum, or percentage-bid Contract is omitted by the Authority, the Contract price, subject to audit by the Authority, shall be reduced by a pro rata portion of the lump sum bid amount based upon the percent of Work omitted.

If the whole of a lump sum item or units of any other item is so omitted by the Commissioner in a unit price, lump sum, or percentage-bid Contract then no payment will be made therefor.

For units that have been ordered but are only partially completed, the unit price shall be

reduced by a pro rata portion of the unit price bid based upon the percentage of Work omitted.

In the event that the Contractor, with respect to any omitted Work, has purchased any non-cancellable material and/or equipment that is not capable of use except in the performance of this Contract and has been specifically fabricated for the sole purpose of this Contract, but not yet incorporated into the Work, the Contractor shall be paid for such material and/or equipment in accordance with Section 58, provided however that such payment is contingent upon the Contractor's delivery of such material and/or equipment in acceptable condition to a location designated by the Authority.

**GC-20 INSPECTION AND TESTING OF MATERIALS**

All materials, equipment and workmanship shall be subject to inspection, examination and testing by the Engineer and other representatives of the Owner, at any and all times that manufacture and/or construction is being performed.

**GC-21 "OR EQUAL" CLAUSE**

Whenever a material, article or piece of equipment is identified on the Contract Plans or in the Specifications by reference to manufacturers' or vendors' names, trade names, catalogue numbers, etc., and stipulates "or equal", it is intended merely to establish a minimum standard; and, any material, article, or equipment of other manufacturers and vendors which will perform adequately the duties imposed by the general design will be considered equally acceptable provided the material, article, or equipment so proposed, is, in the opinion of the Engineer, of equal substance and function. It shall not be purchased or installed by the Contractor without the Engineer's written approval. In such matters, the Engineer's decision will be final. ALL OTHER MATERIALS, EQUIPMENT, ETC., SHALL BE SUPPLIED AND INSTALLED AS SPECIFIED.

## **GC-22 CONSTRUCTION SCHEDULE AND PERIODIC ESTIMATES**

Before commencement of Work, the Contractor shall deliver to the Engineer for approval, a construction progress schedule in a format satisfactory to the Owner, showing the proposed dates of commencement and completion of each of the various subdivisions of Work required under the Contract Documents. The schedules shall show the order in which the Contractor proposes to carry on the Work, with dates at which the Contractor will start the several parts of the Work, an estimated date of completion of the several parts. The Contractor shall submit to the Engineer upon request, schedules of its and its subcontractor's quantities and costs, progress schedules, payrolls, reports, estimates, records, and other data as the Engineer may request in writing concerning Work performed or to be performed under this Contract.

The Contractor shall also furnish on a form (satisfactory to the Owner) for the Engineer's approval:

- A. A detailed estimate giving a complete breakdown of the Contract price, and
- B. Periodic itemized estimates of Work done for the purpose of making partial payments, pursuant to GC-31 below. The values employed in making up any of these schedules will be used only for determining the basis of partial payments.

## **GC-23 REQUESTS FOR INFORMATION OR APPROVAL**

From time to time as the Work progresses and in the sequence indicated by the approved progress schedule, the Contractor shall submit to the Construction Manager a specific request in writing for each item of information or approval required by the Contractor. These requests shall state the latest date upon which the information or approval is actually required by the Contractor, and shall be submitted in a reasonable time in advance thereof to enable the Engineer a sufficient time to act upon such submissions, or any necessary



resubmission thereof.

The Contractor shall not have any right to an extension of time on account of delays due to the Contractor's failure to submit requests for the required information or the required approval in accordance with the above requirements.

**GC-24 SEPARATE CONTRACTS**

Should the Owner plan to award other Contracts at the same general site (or adjacent thereto), the work under which may proceed simultaneously with the execution of this Contract, the Contractor shall coordinate his operations with those of other Contractors. Should a conflict arise, the decision of the Engineer shall prevail. Cooperation will be required in the arrangement for the storage of materials and in detailed execution of the work. The Contractor, including his subcontractors, shall keep himself informed of the progress and the work of other Contractors and shall notify the Engineer immediately of any apparent coordination problems with other Contractors where such coordination problems will interfere with his own operations. Failure of the Contractor to keep informed of the work progressing on the site shall be construed as acceptance by him of the status of the work as being satisfactory for proper coordination with his own work.

**GC-25 MUTUAL RESPONSIBILITY OF CONTRACTORS**

The Contractor shall be responsible for all losses or damages suffered by other Contractors or subcontractors through his neglect. If such other Contractors or subcontractors shall assert any claim against the Owner on account of any damage alleged to have been so sustained, the Owner shall notify the Contractor who shall defend, indemnify and save harmless the Owner and the Engineer against any such claim.

**GC-26 POWER OF CONTRACTOR TO ACT IN AN EMERGENCY**

In the event of an emergency which threatens loss or injury of property and/or safety of life, the Contractor shall act without previous instruction from the Engineer as he sees fit. The Contractor shall notify the Authority, Engineer and any affected authorities immediately thereafter.

The amount of reimbursement claimed by the Contractor on account of any such action shall be determined in the manner provided in Section GC-31 herein.

#### **GC-27 SUPERINTENDENCE BY CONTRACTOR**

At the site of the Work, the Contractor shall employ a Construction Superintendent or foreman who shall have full authority to act for the Contractor. It is understood that such representative shall be acceptable to the Engineer and shall be one who can be continued in the capacity for the particular job involved unless he ceases to be on the Contractor's payroll.

When it is necessary to give directions to the Contractor, orders will be given by the Engineer. Such orders shall be received and obeyed by the Construction Superintendent or foreman. In general, the Engineer's instructions will be confirmed in writing.

#### **GC-28 SUBCONTRACTING - WORK BY OTHERS**

The Contractor may utilize the services of specialty subcontractors on those parts of the Work which, under normal contracting practices, are performed by specialty subcontractors.

The Contractor shall not award any work to any subcontractor without prior written

approval of the Executive Director. Approval will not be given until the Contractor submits to the Executive Director a written statement concerning the proposed award to the subcontractor. The statement shall contain such information as the Executive Director may require.

The Contractor shall be fully responsible to the Owner for the acts and omissions of its subcontractors, and of persons either directly or indirectly employed by them.

The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to work and termination thereof and to bind subcontractors to the Contractor by the terms of these Contract Documents insofar as applicable to subcontractors, including but not limited to requiring the sub-contractor to name the Authority as additional insured as required by this Contract, requiring the sub-contractor to comply with all payment requirements pursuant to New York State Finance Law, requiring the sub-contractor to participate in a New York State approved Apprenticeship Training Program as required by New York Labor Section 222.

Nothing contained in this Contract shall create any contractual relation between any subcontractor and the Owner.

**GC-29 CHANGES IN WORK**

A. Changes: It is mutually agreed that it is inherent in the nature of construction that some changes in the Contract Plans and Specifications may be necessary during the construction to adjust them to actual field conditions, and that the Owner shall have the right at any time during the progress of the Work to alter the Contract Plans or character of work, increase or decrease any or all of the quantities shown for the Bid Proposal, omit any portion of the Work and order quantities shown for the Bid Proposal, omit any portion of the Work and order extra work as may be considered necessary or desirable to complete satisfactorily the proposed construction. Such changes shall not be considered as a waiver of any conditions of the Contract nor

invalidate any of the provisions thereof. The work involved shall be performed on the basis of the Contract unit prices unless the following conditions prevail:

- (1) A change ordered by the Owner that involves a substantial change in the nature of the design or in the type of construction under a Contract pay item or items that results in materially increasing or decreasing the cost of performance.
- (2) The Owner orders performance of unforeseen extra work essential to complete the Contract Work but for which no basis of payment is provided therein.

B. Changes in Work: It is mutually agreed that prior to commencement of work as required by on or more of the aforementioned conditions, a written Change Order acceptable to both parties shall be executed setting forth a detailed outline of the basis for payment of such work.

Agreed prices as stipulated in the Change Order must be supported by a complete price analysis, and shall be so written as to indicate acceptance on the part of the Contractor as evidenced by its signature.

If prices cannot be agreed upon, or there are no applicable unit prices for unforeseen extra work which can be readily established or substantiated, the Contractor shall proceed with the performance of the Work on a force account basis, to be compensated in the following manner:

- (1) Materials: The cost of necessary materials, including transportation to site. Materials used, if acquired by direct purchase, must be covered by receipted or acceptable invoices. All prices on salvaged materials incorporated in either temporary or permanent work shall be billed at a fair market value, and in an amount less than the original cost when new. A reasonable salvage credit shall be given to the Authority by the Contractor for all salvageable material

recovered by him. Salvage value of substantial material recovered must be jointly determined by and be acceptable to the Contractor and the Owner.

- (2) Labor Costs: The cost of all labor directly engaged on the force account work, and for foremen in direct charge of the specific operations. Each class of labor shall be billed separately at actual payroll rates. Average payroll rates based on different classes of labor will not be accepted. Total labor costs shall include Workmen's Compensation Insurance, public liability and property damage insurance, unemployment insurance, Federal old-age benefits, other payroll taxes and payments required to be made to labor organizations under existing labor agreements, and the rates for such costs shall be substantiated by satisfactory evidence furnished by the Contractor.
  
- (3) Equipment and Plant Rental: The cost of equipment and plant rental. The base hourly rates shall be the daily rates as listed in the current Rental Rates for Construction Equipment prepared by Associated Equipment Distributors divided by eight (8).
  - a) If the force account work requires only partial day's work (less than 8 hours) and the equipment was specifically brought on the site for this work and cannot be utilized on other work in the Contract, the Contractor will be paid at the base daily rate (8 hours).
  - b) The first 8 hours will be paid at 100% of the above base hourly rate. For over 8 hours, up to and including 20 hours, payment will be made at 90% of the above base hourly rate.
  - c) For over 20, up to and including 40 hours, payment will be made at 80% of the above base hourly rate.

d) For over 40 hours, the rate will be 45% of the above base hourly rate.

The number of hours to be paid for shall be the number of hours that the equipment or plant is actually used on a specified force account job, except as specified in (a) above. Equipment to be used by the Contractor shall be specifically described and be of suitable size and suitable capacity required for the Work to be performed. In the event the Contractor elects to use equipment of a higher rental value than that suitable for the Work, payment will be made at the rate applicable to the suitable equipment. The equipment actually used and the suitable equipment paid for will be recorded as part of the record for force account work. The Engineer shall determine the suitability of the equipment and its decision regarding the suitability of equipment will be final. If there is a differential in the rate of pay of the operator of oversize of higher rate equipment, the rate paid for the operator will likewise be that for the suitable equipment.

In the event that a rate is not established in the Associated Equipment Distributors Rental Rates for a particular piece of equipment or plant, the Engineer shall establish a rate for that piece of equipment or plant that is consistent with its cost and use.

It is mutually understood that the base daily rates include all costs incidental to equipment and plant rentals such as maintenance, repairs, gas, oil, electric current, etc., and also the cost of moving to and from the site. Labor is not included in these rates and will be paid as provided for elsewhere herein.

4. Profit and Overhead: Twenty percent (20%) of the total of material and labor costs only, as specified in the foregoing paragraphs (1) and (2), will be allowed as compensation for profit and overhead.

If any of the Work is performed by a subcontractor, the Contractor shall be paid the actual and reasonable cost of such subcontracted work computed as outlined above, or on such other basis as might be approved by the Engineer, plus an additional allowance of five percent (5%) of materials and labor costs as specified in the foregoing paragraphs (1) and (2), to cover the Contractor's profit, superintendence, administration, insurance and other overhead. The cost of transportation of materials shall be excluded when computing the above-described charges for profit and overhead for subcontracted work. Overhead may be defined to include the following items:

- a) Premium on bond;
- b) Premium on insurance as may be required other than Worker's Compensation Insurance, premium on public liability and property damage insurance, unemployment insurance, Federal old-age benefits, other payroll taxes and such reasonable charges that are paid by the Contractor pursuant to written agreement with its employee;
- c) All salary and expenses of executive officers, supervising officers or supervising employees;
- d) All clerical or stenographic employees;
- e) All charges for minor equipment, such as small tools, including shovels, picks, axes, saws, bars, sledges, lanterns, jacks, cables, pails, wrenches, etc., and other miscellaneous supplies and services;
- f) All drafting room accessories such as paper, tracing media, reproduction processes, etc.

5. Reports: Payments for force account work will be made on the basis of the following reports:

The Contractor will deliver to the Engineer a daily summary of force account work done on the Contract. This summary will be delivered to the Engineer not later than closing time on the day following that for which the work is reported.

The summary shall contain:

- a) A list of materials used indicating the amount and nature of each material. The cost (if known) should also be included. This must be later documented by proper receipts.
- b) A list of equipment used indicating the number of hours used and the kind, type and size of equipment.
- c) A list of personnel by name, including the hours and rate at which they were used on the force account work.
- d) A statement of the Work accomplished by force account for that day.
- e) This summary will be dated and signed by the Contractors' authorized representative and the Engineer.
- f) The Contract number and other identification as well as the name of the Contractor shall appear on the statement.
- g) The Engineer will make any notations, remarks, or comments on this form that may assist in final payments.

Within 5 calendar days after the end of each pay period, the Contractor shall deliver to the Engineer, FORCE ACCOUNT SUMMARY OF LABOR, used on



the Work which shall include the name, hourly rate of pay, hours worked, fringe benefits, and/or other items as shown on the actual payroll.

On completion of the specific force account work, the Contractor shall, within 10 calendar days, deliver to the Engineer a FORCE ACCOUNT SUMMATION wherein all materials, equipment, and labor charges are shown and totaled together with such other expenditures as are concerned with the force account item. This summation shall be dated and signed by the Contractor's authorized representative and the Engineer.

**GC-30 DISPUTED WORK**

If the Contractor is of the opinion that any Work ordered to be done as Contract Work by the Owner is extra work and not Contract Work, or that any order of the Owner violates the provisions of the Contract, the Contractor shall promptly notify the Owner, in writing, within 10 days of its contentions with respect thereto. If such notification is not given, the Contractor shall be deemed to have waived the claim for such extra compensation.

If the Owner determines that the Work in question is properly described by one or more of the conditions specified under the subject heading "Changes in Work", equitable compensation shall be provided for as specified under the subject heading "Changes in Work".

If the Owner determines that the Work in question is Contract Work and not extra work, or that its order complained of is proper, he shall direct the Contractor to proceed, and the Contractor must promptly comply. During the progress of such disputed Work the Contractor and Engineer shall keep daily records of all materials, labor and equipment used in connection with such Work and the cost thereof, as specified for force account work under the subject heading "Changes in Work". Within 10 days of completion of such disputed work, the Contractor shall submit a written verified statement for a claim supported by the aforementioned daily records to the Executive Director for consideration

and adjustment if warranted by the facts. Determinations and decisions by the Executive Director regarding disputed work shall constitute a condition precedent to the right of the Contractor to receive any money thereof, and before final acceptance by the Authority all matters of dispute must be adjusted to the mutual satisfaction of the parties hereto.

Contractor's Cost Records: The Contractor shall maintain records of all payrolls and of the details that comprise its total cost pursuant to any of the provisions under the subject headings "Changes in Work" and "Disputed Work", and he shall, at any time within 6 years following the date of acceptance of the project, make such records available, upon request therefore, to the Authority for review and audit if deemed necessary by the Executive Director. In case all or a part of such records are not made so available, the Contractor understands and agrees that any items not supported by reason of such unavailability of the records shall be disallowed, or if payment therefore has already been made the Contractor shall, upon demand in writing by the Executive Director, refund to the Authority the amount so disallowed.

#### **GC-31 CLAIMS FOR EXTRA COST**

If the Contractor claims that any instructions by drawings or otherwise involve extra cost or any extension of time, he shall so notify the Owner in writing within ten (10) days after the receipt of such instructions, and in any event, before proceeding to execute the Work. Thereafter, the procedure shall be the same as described in GC-29 and GC-30.

#### **GC-32 COMPENSATION TO BE PAID TO CONTRACTOR**

The Contractor will be paid the bid unit and/or lump sum prices for the quantities or work which he performs under the items of work included in the Contract. The sum total for these items shall constitute full payment for the job completed, tested and ready for use. The price stipulated herein shall include not only the materials and work specifically belonging under the various items, but also all other materials, work, and expenses which

are necessary to complete as a whole the Work contemplated by this Contract and which are specified, shown on drawings or implied in such manner as to enable the Contractor to know the need of such materials, work or expenses.

**A. PARTIAL PAYMENTS TO CONTRACTORS:** Unless otherwise provided herein:

- 1) No later than the 15th calendar day after the receipt of an approved estimate and claim, the Owner will make a progress payment to the Contractor on the basis of an estimate of the work performed since the date of any previously approved partial payment (or since inception of work in the case of the first partial payment). The estimate shall be certified to be the Contractor and approved by the Engineer. Partial payments will not be made more often than once every four (4) weeks, unless otherwise mutually agreed to by the Owner and the Contractor.

The Owner will retain five (5%) percent of the amount of each estimate until a point of substantial completion, as determined by the Owner, is reached by the Contractor, at which time the Owner shall pay the Contractor for the total work of the Contract less an amount equal to twice the amount of the remaining work to be completed under the Contract, plus an amount adequate to satisfy any claims, liens, or judgments against the Contractor which have not been suitably discharged. Upon completion and acceptance of each separate building, public work, or other division of this Contract on which the price is stated separately, the Owner may make payment in full to the Contractor including retained percentages thereon less authorized deductions (as enumerated above), if the Executive Director finds that satisfactory performance is being made by the Contractor.

- 2) In preparing estimates, the material delivered on the site and preparatory work

done may be taken into consideration.

- 3) All material and work covered by paid partial payments will become the sole property of the Owner, but this provision shall not be construed as relieving the Contractor from its sole responsibility for the care and protection of materials and work upon which payments have been made or the restoration of any damaged work, or as a waiver of the right of the Owner to require the fulfillment of all of the terms of the Contract.
- 4) A prerequisite to any and all payments to the Contractor is the need for the job site to meet the requirements for a clean, neat and orderly site.

**B. OWNER'S RIGHT TO WITHHOLD CERTAIN AMOUNTS AND MAKE APPLICATION THEREOF:**

The Contractor agrees that he will indemnify and save the Owner harmless from all claims growing out of the demands of subcontractors, laborers, workmen, mechanics, material, men, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies including commissary, incurred in the furtherance of the performance of this Contract. The Contractor shall, at the Owner's request, furnish satisfactory evidence that all obligations for the nature hereinabove designated have been paid, discharged, or waived. If the Contractor fails to do so, then the Owner may, after having served written notice to the Contractor and its Surety, either pay unpaid bills of which the Owner has written notice, or withhold from the Contractor's subsequent payments a sum of money deemed reasonably sufficient to pay any and all such claims until satisfactory evidence is furnished that all liabilities have been fully discharged, whereupon payment to the Contractor shall be resumed, in accordance with the terms of this Contract, but in no event shall the provisions of this paragraph be construed to impose any obligations upon the Owner to either the Contractor or its Surety. In paying any unpaid bills of the Contractor, such payment shall be considered as a payment made under the Contract by the Owner to the Contractor, and the Owner

shall not be liable to the Contractor or Surety for any such payments made in good faith.

- C. **FINAL PAYMENT TO CONTRACTOR:** After final acceptance of the work, filing of a certificate of completion by the Engineer, and the filing and acceptance of all required bonds, guarantees, warranties and the like (as required by the terms of the Contract), a final estimate of all the work performed and materials placed shall be prepared by the Engineer and the value to all such work and materials shall be determined. This value, less any prior payments and less any other monies to be deducted under the terms of this Contract, shall constitute the Final Payment to be made to the Contractor for the completion of all work under this Contract. Such Final Payment will be made no later than thirty (30) calendar days after receipt by the Owner of the final estimate and/or receipt of the approved certificates, bonds, etc., as required by the terms of this Contract.

### **GC-33 ASSIGNMENTS**

The Contractor shall not assign the whole or any part of this Contract or any monies due or to become due hereunder without the written consent of the Owner. If the Owner consents, and the Contractor assigns all or any part of any monies due or to become due under this Contract, the instrument shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the Contractor shall be subject to prior liens of all persons, firms and corporations for services rendered or materials supplied for the performance of the Work called for in the Contract.

### **GC-34 EXTENSION OF TIME: NO WAIVER**

If the Contractor shall be delayed in the completion of its work by reason of unforeseeable causes, beyond its control and without its fault or negligence, including, but not restricted to acts of God, or of the public enemy, floods, epidemics, quarantine, restrictions, strikes,

riots, civil commotions, freight embargoes or priority regulations, the period hereinafter specified for completion of its work may be extended by such time as shall be fixed by the Owner. Such extension of time shall not be deemed as a waiver by the Owner of any other provisions of the Contract.

The Contractor shall not be entitled to receive a separate extension of time for each of several causes of delay operating concurrently, but, if at all, only for the actual period of delay in completion of the Work as determined by the Executive Director, irrespective of the number of causes contributing to produce such delay. If one of several causes of delay operating concurrently results from any act, fault or omission of the Contractor or of its Subcontractors or Material persons, and would of itself (irrespective of the concurrent causes) have delayed the Work, no extension of time will be allowed for the period of delay resulting from such act, fault or omission.

Permitting the Contractor to continue with the Work after the time fixed for its completion has expired, or after the time to which such completion may have been extended has expired, or the making of any payment to the Contractor after such time, shall in no way operate as a waiver on the part of the Authority of any of its rights under this Contract.

#### **GC-35 PARTIAL COMPLETION AND ACCEPTANCE**

If, at any time prior to the issuance of the certificate of completion referred to in Section GC-36, the Engineer determines that any portion of the permanent construction has been satisfactorily completed, and, if the Engineer determines that such portion of the permanent construction is not required for the operations of the Contractor but is needed by the Owner, the Engineer shall issue to the Contractor a letter to that effect, and thereupon, or at any time thereafter, the Owner may take over and use the portion of the permanent construction described in such letter, and may exclude the Contractor therefrom, except for any necessary minor corrective (Punch List) work.

The issuance of such a letter shall not be construed to constitute an extension of the Contractor's time to complete the Work of the entire Contract. The issuance of such a letter shall not function to release the Contractor or its Sureties from any obligations under this Contract or the Performance Bond.

**GC-36 CERTIFICATE OF COMPLETION**

When, in the opinion of the Contractor, the Work is complete and ready for final inspection, he shall so notify the Engineer in writing and the Engineer will arrange to give the Work a minute and thorough inspection. Any Work resulting from such inspection (Punch List) shall be completed and corrected before a final certificate of completion is issued. Upon satisfactory completion of all Work, the Engineer will file a written certificate with the Owner, with a copy to the Contractor, confirming the entire amount of Work performed and the compensation paid therefore.

The acceptance by the Contractor or by anyone claiming by or through it of the final payment shall be and shall constitute a release to the Owner of all claims and all liability to the Contractor for all things done or furnished in connection with this Work and for every act and neglect of the Owner and others relating to and arising out of this Work and for any prior act, neglect or default on the part of the Authority or any of its officers, agents or employees, excepting only a claim against the Authority for the amounts deducted or retained in accordance with the terms and Sections of this Contract or by Law, and excepting any claims, not otherwise waived. No payment however, final or otherwise, shall operate to release the Contractor or its Sureties from any obligations under this Contract.

The Contractor is warned that the execution by it of a release in connection with the acceptance of the final payment, containing language purporting to reserve claims other than those herein specifically excepted from the operation of this Section, or those for amounts deducted by the Executive Director from the final requisition or by the Authority

from the final payment as certified by the Engineer and approved by the Executive Director, shall not be effective to reserve such claims, anything stated to the Contractor orally or in writing by any officer, agent or employee of the Authority to the contrary notwithstanding.

Should the Contractor refuse to accept the final payment as tendered by the Authority, it shall constitute a waiver of any right to interest thereon.

The Contractor, however, shall not be barred from commencing an action for breach of Contract under this section to the extent permitted by Law and by the terms of the Contract provided that a detailed and verified statement of claim is served upon the Authority not later than forty (40) days after the mailing of such final payment. The statement shall specify the items upon which the claim will be based and any such claim shall be limited to such items.

**GC-37 NO ESTOPPEL**

Neither the Authority, any officer, agent or employee thereof, shall be bound, precluded or estopped by any determination, decision, approval, order, letter, payment or certificate made or given under or in connection with this Contract by the Authority, the Executive Director, the Engineer or any other officer, agent or employee of the Authority, either before or after the final completion and acceptance of the Work and payment therefor:

From showing the true and correct classification, amount, quality or character of the Work actually done; or that any such determination, decision, order, letter, payment or certificate was untrue, incorrect or improperly made in an particular, or that the Work, or any part thereof, does not in fact conform to the requirements of this Contract; and

From demanding and recovering from the Contractor any overpayment made to it, or such damages as the Authority may sustain by reason of the Contractor's failure to perform each



and every part of its Contract.

**GC-38 WORK FOR PRIVATE OWNERS**

In order that the progress of the Work contemplated by the Contract Documents shall not be impeded or delayed, it is understood and agreed that, during the terms of this Contract, the Contractor will not engage in the construction or reconstruction of sidewalks, driveways, aprons or other structures for the owners or lessees of property immediately abutting the Authority highway right-of-ways or Authority property within the areas of the Authority where work is being performed. Violation of these prohibitions shall be construed to be a breach of this Contract, and the Authority shall have the right to terminate this Contract.

**GC-39 CONTRACTOR'S LIABILITY (HOLD HARMLESS)**

Hold Harmless: It is expressly understood that the Contractor shall defend, indemnify, and save harmless the Town of North Hempstead Solid Waste Management Authority, the Town of North Hempstead, their agents, servants and employees, from all claims, suits, actions, damages and costs, of every name and description, arising out of the performance of this Contract or from any defective condition of the materials furnished it or supplied or contemplated to be furnished or supplied under this Contract.

**GC-40 INSURANCE**

The Contractor agrees to procure and maintain (i) Worker's Compensation Insurance as required by the Laws of the State of New York, or proof that the Contractor is not required to secure same, as evidenced by certificates or affidavits approved by the State Workers' Compensation Board pursuant to State Workers' Compensation Law § 57 (2), (ii) Disability benefits insurance or proof that the Contractor is not required to secure same, as evidenced by certificates or affidavits approved by the State Workers' Compensation

Board pursuant to State Workers' Compensation Law 220 (2), (iii) Commercial General Liability Insurance (with completed operations, plus X.C.U. when applicable), and (iv) Automobile Liability Insurance in the amount specified on the enclosed Authority of North Hempstead Insurance Certificate. Said policies identified in subparagraphs (iii) and (iv) shall contain assurance of the existence of contractual coverage defending, indemnifying, and holding harmless the Town of North Hempstead Solid Waste Management Authority, the Town of North Hempstead, and their employees, agents, and representatives (the "Indemnitees") from any and all loss and/or damage arising out of the performance of this Contract, and shall name the Indemnitees as additional insured thereunder. The Contractor's insurance shall be primary and fully exhausted in all circumstances prior to the Authority's own insurance being utilized. Said contractual coverage shall be absolute and not dependent upon any question of the negligence of the Contractor (and its employees, agents, and representatives), except, however, that the Contractor shall not be held liable when an occurrence results solely from the negligence of the Authority. The above insurance is to be with New York State admitted insurance carriers holding an "A" rating from AM Best Company, and the Contractor is required to give the Authority thirty (30) days advance written notice of termination, expiration or cancellation of any insurance coverage required hereunder.

**GC-41 PERFORMANCE BOND AND LABOR AND MATERIALS BOND**

WHEN THE CONTRACT IS EXECUTED AND SIGNED BY THE CONTRACTOR, HE SHALL SIMULTANEOUSLY FURNISH A FAITHFUL PERFORMANCE BOND FOR AN AMOUNT NOT LESS THAN ONE HUNDRED PERCENT (100%) OF THE CONTRACT AMOUNT AND A LABOR AND MATERIALS PAYMENT BOND (FOR PAYMENT TO ALL PERSONS PERFORMING LABOR OR FURNISHING MATERIALS IN CONNECTION THEREWITH) FOR NOT LESS THAN ONE HUNDRED PERCENT (100%) OF THE CONTRACT AMOUNT. These bonds shall stipulate that they are for this Contract and that they will remain in effect for the duration of the Contract. The bonds shall be issued by a surety company acceptable to and

approved by the Owner, or the Contract may elect to furnish securities subject to the approval of the Owner and in a form satisfactory to the Owner covering all aspects of the Agreement, bearing the date herewith and forming part of this Contract.

**GC-42 GUARANTEE FOR WORK PERFORMED & MAINTENANCE BOND**

The Contractor shall guarantee his work for a period of time of one year from the date of Final Acceptance against any and all omissions and defects which may develop or require remedial work action as a result of its performance of the Contract.

The Contractor shall furnish a Maintenance Bond to the Owner, executed by the Contractor as principal, and having a surety thereon a surety company acceptable to the Owner, guaranteeing that the Contractor shall maintain the work for a period of one year from the date of issue of the Certificate of Completion without cost to the Owner. Such Maintenance Bond shall cover restoration of the Work and all of its appurtenances, including, but not limited to, disturbed equipment and/or utilities, and properties, which have been a part of or have become a part of the Work under this Contract.

The Maintenance Bond shall be in the sum of one hundred percent (100%) of the final Contract Price.

**GC-43 CHOICE OF LAW, CONSENT TO JURISDICTION AND VENUE**

This Contract shall be deemed to be executed in the County of Nassau, State of New York, regardless of the domicile of the Contractor, and shall be governed by and construed in accordance with the Laws of the State of New York and the Laws of the United States, where applicable.

The parties agree that any and all claims asserted against the Authority arising under this Contract or related thereto shall be heard and determined in the courts of the State of New

York (“New York State Courts”) located in the County of Nassau. To effect this Contract and intent, the Contractor agrees:

- A. If the Authority initiates any action against the Contractor, service of process may be made on the Contractor either in person, wherever such Contractor may be found, or by registered mail addressed to the Contractor at its address as set forth in this Contract, or to such other address as the Contractor may provide to the Authority in writing; and
- B. With respect to any action between the Authority and the Contractor in New York State Court, the Contractor hereby expressly waives and relinquishes any rights it might otherwise have:
  - 1. To move to dismiss on grounds of *forum non conveniens*;
  - 2. To remove to Federal Court; and
  - 3. To move for a change of venue to a New York State Court outside Nassau County.
- C. With respect to any action brought by the Authority against the Contractor in Federal Court located in the Eastern District of New York, the Contractor expressly waives and relinquishes any right it might otherwise have to move to transfer the action to a United States Court outside the Eastern District of New York.
- D. If the Contractor commences any action against the Authority in a Court located other than in the County of Nassau, State of New York, upon request of the Authority, the Contractor shall either consent to a transfer of the action to a State Court of competent jurisdiction located in the County of Nassau and State of New York or, if the Court where the action is initially brought will not or cannot transfer the action, the Contractor shall consent to dismiss such action without prejudice and may thereafter reinstate the action in a State Court of competent jurisdiction in the County of Nassau.
- E. If any provision(s) of this Section is held unenforceable for any reason, each and all other provision(s) shall nevertheless remain in full force and effect.

**GC-44 MONEY RETAINED AGAINST CLAIMS**

If any claim shall be made by any person or entity (including other contractors with the Authority on this Project) against the Authority or against the Contractor and the Authority:

- (1) For an alleged loss, damage, injury, theft and/or vandalism of the kind, which in the opinion of the Authority, may not be covered by the contingent, liability, commercial general liability or property damage insurance policy, or which, together with previously filed claims, is in excess of the amount payable under

such policies; or

- (2) For an infringement of copyrights, patents or use of patented articles, tools, etc.;
- or
- (3) For damage claimed to have been caused directly or indirectly by the failure of the Contractor to perform the Work in strict accordance with this Contract.

The amount of such claim as referred to in this section or so much thereof as the Commissioner may deem necessary, may be withheld by the Authority, as security against such claim, from any money due hereunder. The Authority, in its discretion, may permit the Contractor to substitute other satisfactory security in lieu of the monies so withheld.

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

**Liens:** If at any time before or within thirty (30) Days after the Work is completed and accepted by the Authority, any persons claiming to have performed any labor or furnished any material toward the performance or completion of this Contract, shall file with the Authority any notice as is described in the New York State Lien Law, or any act of the Legislature of the State of New York, the Authority shall retain, from the monies due or to become due under this Contract, so much of such monies as shall be sufficient to pay the amount claimed in said notice, together with the reasonable costs of any action or actions brought or that may be brought to enforce such lien. The monies so retained shall be held by the Authority until the lien thereon created by the said act and the filing of the said notice shall be discharged pursuant to Law.

#### **GC-45 AUTHORITY'S RIGHT TO DECLARE CONTRACTOR IN DEFAULT**

In addition to those instances specifically referred to in other Sections herein, the Authority shall have the right to declare the Contractor in default of this Contract, after a vote of the Authority Board, if:

- (1) The Contractor fails to commence Work when notified to do so by the Authority;
- or if
- (2) The Contractor shall abandon the Work; or if
- (3) The Contractor shall refuse to proceed with the Work when and as directed by the

Authority; or if

- (4) The Contractor shall, without just cause, reduce its working force to a number which, if maintained, would be insufficient, in the opinion of the Authority, to complete the Work in accordance with the Progress Schedule; or if
- (5) The Contractor shall fail or refuse to increase sufficiently such working force when ordered to do so by the Authority; or if
- (6) The Contractor shall sublet, assign, transfer, convert or otherwise dispose of this Contract other than as herein specified; or sell or assign a majority interest in the Contractor; or if
- (7) The Contractor fails to secure and maintain all required insurance; or if
- (8) A receiver or receivers are appointed to take charge of the Contractor's property or affairs; or if
- (9) The Authority shall be of the opinion that the Contractor is or has been unnecessarily or unreasonably or willfully delaying the performance and completion of the Work, or the award of necessary subcontracts, or the placing of necessary material and equipment orders; or if
- (10) The Authority shall be of the opinion that the Contractor is or has been willfully or in bad faith violating any of the provisions of this Contract; or if
- (11) The Authority shall be of the opinion that the Work cannot be completed within the time herein provided therefor or within the time to which such completion may have been extended; provided, however, that the impossibility of timely completion is, in the Authority's opinion, attributable to conditions within the Contractor's control; or if
- (12) The Work is not completed within the time herein provided therefor or within the time to which the Contractor has had such completion extended; or if
- (13) Any statement or representation of the Contractor in the Contract or in any document submitted by the Contractor with respect to the Work, the Project, or the Contract (or for purposes of securing the Contract) was untrue or incorrect when made.

Before the Executive Director may present to the Authority Board for a vote, a resolution declaring the Contractor in default, the Authority shall give the Contractor an opportunity to be heard, upon not less than two (2) days notice.

**GC-46 EXERCISE OF THE RIGHT TO DECLARE DEFAULT**

The right to declare the Contractor in default for any of the grounds specified or referred to herein shall be exercised by sending the Contractor a notice, signed by the Executive Director, setting forth the ground or grounds upon which such default is declared (hereinafter referred to as a "Notice of Default").

The Commissioner's determination, ratified by a vote of the Authority Board that the Contractor is in default shall be conclusive, final, binding and nonreviewable on the parties and such a finding shall preclude the Contractor from commencing a plenary action for any damages relating to the Contract. If the Contractor protests the determination of the Executive Director, the Contractor may commence a lawsuit in a court of competent jurisdiction of the State of New York under Article 78 of the New York Civil Practice Law and Rules.

#### **GC-47 QUITTING THE SITE**

Upon receipt of such notice the Contractor shall immediately discontinue all further operations under this Contract and shall immediately quit the Site, leaving untouched all materials, equipment, tools and supplies then on the Site.

#### **GC-48 COMPLETION OF THE WORK**

The Authority Board, after declaring the Contractor in default, may direct the Executive Director to then have the Work completed by such means and in such manner, by Contract with or without public letting, or otherwise, as it may deem advisable, utilizing for such purpose such of the Contractor's materials, equipment, tools and supplies remaining on the Site, and also such Subcontractors, as the Executive Director may deem advisable.

After such completion, the Executive Director shall make a certificate stating the expense incurred in such completion, which shall include the cost of re-letting and also the total amount of liquidated damages (at the rate provided for in the Contract) from the date when the Work should have been completed by the Contractor in accordance with the terms hereof to the date of actual completion of the Work. Such certificate shall be binding and conclusive upon the Contractor, its Sureties, and any person claiming under the Contractor, as to the amount thereof.

The expense of such completion, including any and all related and incidental costs, as so certified by the Commissioner, and any liquidated damages assessed against the Contractor, shall be charged against and deducted out of monies which are earned by the Contractor prior to the date of default. Should the expense of such completion, as certified by the Commissioner, exceed the total sum which would have been payable under the Contract if it had been completed by the Contractor, any excess shall be paid by the Contractor.

#### **GC-49 PARTIAL DEFAULT**

In case the Executive Director shall present to the Authority Board a resolution declaring the Contractor in default as to a part of the Work only, after a vote by the Authority Board, the Executive Director shall direct the Contractor to discontinue such part, and the Contractor shall continue performing the remainder of the Work in strict conformity with the terms of this Contract, and shall in no way hinder or interfere with any other contractor(s) or persons whom the Commissioner may engage to complete the Work as to which the Contractor was declared in default.

The provisions of GC-49, 50, 51, 52, 54, 55 and/or 56 relating to declaring the Contractor in default as to the entire Work shall be equally applicable to a declaration of partial default, except that the Executive Director shall be entitled to utilize for completion of the part of the Work as to which the Contractor was declared in default only such materials, equipment, tools and supplies as had been previously used by the Contractor on such part.

#### **GC-50 PERFORMANCE OF UNCOMPLETED WORK**

In completing the whole or any part of the Work under the Contract, the Executive Director shall have the power to depart from or change or vary the terms and provisions of this Contract, provided, however, that such departure, change or variation is made for the purpose of reducing the time or expense of such completion. Such departure, change or variation, even to the extent of accepting a lesser or different performance, shall not affect the conclusiveness of the Executive Director 's certificate of the cost of completion, nor shall it constitute a defense to an action to recover the amount by which such certificate exceeds the amount which would have been payable to the Contractor hereunder but for its default.

#### **GC-51 OTHER REMEDIES**

In addition to the Authority's right to declare the Contractor in default, the Authority Board shall have the absolute right, in its sole non-reviewable discretion and without a hearing, to direct the Commissioner to complete or cause to complete any or all unsatisfactory or uncompleted punch list Work that remains after the completion date specified in the Final Approved Punch List. A written notice of the exercise of this right shall be sent to the Contractor who shall immediately quit the Site.

The previous provisions of this Contract shall be in addition to any and all other legal or equitable remedies permissible in the premises.

The exercise by the Authority of any remedy set forth herein shall not be deemed a waiver by the Authority of any other legal or equitable remedy contained in this Contract or provided under Law.

The expense of such completion, including any and all related and incidental costs, as so



certified by the Executive Director, shall be charged against and deducted out of monies which have been earned by the Contractor prior to the date of the exercise of the right; the balance of such monies, if any, subject to the other Sections of this Contract, are to be paid to the Contractor without interest after such completion. Should the expense of such completion, as certified by the Executive Director, exceed the total sum which would have been payable under the Contract if it had been completed by the Contractor, then any excess shall be paid by the Contractor.

#### **GC-52 TERMINATION BY THE AUTHORITY**

- A. In addition to termination pursuant to any other Section of this Contract, the Executive Director may, at any time, after a vote by the Authority Board, terminate this Contract by written notice to the Contractor. In the event of termination, the Contractor shall, upon receipt of such notice, unless otherwise directed by the Executive Director:
1. Stop Work on the date specified in the notice;
  2. Take such action as may be necessary for the protection and preservation of the Authority's materials and property;
  3. Cancel all cancelable orders for material and equipment;
  4. Assign to the Authority and deliver to the Site or another location designated by the Executive Director, any non-cancelable orders for material and equipment that is not capable of use except in the performance of this Contract and has been specifically fabricated for the sole purpose of this Contract and not incorporated in the Work;
  5. Take no action which will increase the amounts payable by the Authority under this Contract.
- B. In the event of termination by the Authority pursuant to this Section, payment to the Contractor shall be in accordance with paragraphs B(1), B(2) or B(3) below, to the extent that each respective paragraph applies.
1. Lump Sum Contracts or Items: On all lump sum Contracts, or on lump sum items payment shall be made pursuant to paragraphs 1(a) and 1(b) below, less all payments previously made pursuant to this Contract.
    - a. For Work completed prior to the notice of termination, the Contractor shall be paid a pro rata portion of the lump sum bid amount, plus approved change orders, based upon the percent completion of the Work, as determined by the Executive Director.
    - b. For non-cancelable material and equipment, less salvage value, that is not capable of use except in the performance of this Contract and has been

specifically fabricated for the sole purpose of this Contract, but not yet incorporated in the Work, the Contractor shall be paid the lesser of:

1. The direct cost, as defined in paragraph E below; or
  2. The fair and reasonable value, whichever is less, of such material and equipment, plus necessary and reasonable delivery costs.
  3. In addition, the Contractor shall be paid five (5%) percent of the amounts arrived at from the application of paragraphs (b)(1) or (b)(2), whichever applies.
2. Unit Price Contracts or Items: On all unit price Contracts, or on unit price items in a Contract, the Authority will pay the Contractor the sum of paragraphs (a) and (b) below, less all payments previously made pursuant to this Contract:
- a. For all completed units, the unit price stated in the Contract, and
  - b. For units that have been ordered but are only partially completed, the
  - c. Contractor will be paid:
    1. A pro rata portion of the unit price stated in the Contract based upon the percent completion of the unit and
    2. For non-cancelable material and equipment, payment will be made pursuant to B(1)(b) of this Section.
3. Time and Material Contracts or Items: On all Contracts or items in a Contract where time and material records are specified as the basis for payment of the Work, the Contractor shall be paid in accordance with Section 28, less all payments previously made pursuant to this Contract.
4. Direct Costs: Direct Costs as used in this Section shall mean:
- a. The actual purchase price of material and equipment, plus necessary and reasonable delivery costs,
  - b. The actual cost of labor involved in construction and installation at the site, and
  - c. The actual cost of necessary bonds and insurance purchased pursuant to requirements of this Contract less any amounts that have been or should be refunded by the Contractor's sureties or insurance carriers.

- d. Direct Cost shall not include overhead.
- C. In no event shall any payments under this Section exceed the Contract price for such items.
- D. All payments pursuant to this Section shall be in the nature of liquidated damages and shall be accepted by the Contractor in full satisfaction of all claims against the Authority.
- E. The Authority may deduct or set off against any sums due and payable pursuant to this Section, any deductions authorized by this Contract or by Law (including, but not limited to, liquidated damages) and any claims it may have against the Contractor. The Authority's exercise of the right to terminate the Contract pursuant to this Section shall not impair or otherwise effect the Authority's right to assert any claims it may have against the Contractor in a plenary action.
- F. Where the Work covered by the Contract has been substantially completed, as determined in writing by the Executive Director, termination of the Work shall be handled as an omission of Work pursuant to this Contract, in which case a Change Order will be issued to reflect an appropriate reduction in the Contract Sum, or if the amount is determined after final payment, such amount shall be paid by the Contractor.

**TOWN OF NORTH HEMPSTEAD**

**SOLID WASTE MANAGEMENT AUTHORITY**

**PROPOSAL**

**and**

**BIDDER'S QUALIFICATION STATEMENT**

**PROPOSAL**

Proposal of \_\_\_\_\_

(Hereinafter called "Bidder")(a/an \_\_\_\_\_  
(NAME OF STATE)

corporation/partnership/individual/joint venture).

(STRIKE OUT INAPPLICABLE TERMS)

To the Town of North Hempstead Solid Waste Management Authority (hereinafter called Owner):

The Bidder, in compliance with your invitation for Bids for:

**Town of North Hempstead Port Washington Landfill Solid Waste Management Authority  
(SWMA) - Electrical Infrastructure Upgrades  
BID NO. SWMA-0010-2021,**

having examined the Bid Documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials, and supplies, and to construct the project in accordance with the Bid Documents, within the time set forth therein, and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Bid Documents, of which this Proposal becomes a part thereof.

Bidder hereby agrees to commence the work under this Contract on the date to be specified in the written "Notice to Proceed". All insurance must be in force and be on file with the Authority by the date on which work commences. This project shall be completed within 60 Calendar Days from the date of the "Notice to Proceed".

Bidder acknowledges receipt of the following Addendum (List all):

	<u>Addendum</u>	<u>Date</u>	<u>Signature of Person Signing Proposal</u>
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____

Bidder agrees to perform the work described in the Bid Documents for the sum shown, in words, as the total or gross Bid in the Schedule of Bid Prices herein.

Bidder understands that the Owner reserves the right to reject any or all Bids and to waive any informalities in the bidding.

The Bidder agrees that this Bid shall be good and may not be withdrawn for a period of 90 calendar days after the scheduled closing time for receiving Bids.

Within ten (10) working days from the date of the service of a notice of acceptance of this Proposal, delivered to him in person or mailed to the address given in this Proposal, Bidder will execute a formal Contract with the Owner and deliver the required Insurance Certificate and Surety Bonds.

The Bid security attached in the sum of \_\_\_\_\_  
\_\_\_\_\_ (\$ \_\_\_\_\_) is to become the property of the Owner in the event the required Bonds and Insurance are not provided and the Contract is not executed within the time above set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

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 knowledge and belief:

- (1) The prices in this Bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other Bidder or with any competitor;
- (2) Unless otherwise required by law, the prices which have been quoted in the Bid have not been knowingly disclosed by the Bidder and will not knowingly be disclosed by the Bidder prior to Bid opening, directly or indirectly, to any Bidder or to any competitor; and
- (3) No attempt has been made or will be made by the Bidder to induce any other person, partnership or corporation to submit or not to submit a Bid for the purpose of restricting competition.

In addition, by submission of this Bid, each Bidder and each person signing on behalf of any Bidder certifies, under penalty of law, that the Bidder understands and agrees to comply with the terms and conditions of the Authority's stormwater management program and agrees to implement any corrective actions identified by the Authority or a representative of the Authority. Bidder understands that the Authority must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from the Municipal Separate Storm Sewer Systems ('MS4's") and that it is unlawful for any person to directly or indirectly cause or contribute to a violation of water quality standards. Further, Bidder understands that any non-compliance by the Authority will not diminish, eliminate or lessen Bidder's own liability

Respectfully submitted:

By: \_\_\_\_\_  
(Signature)

(Seal - if Bid is by a corporation)

\_\_\_\_\_  
(Title)

---

(Business Address)

Date: \_\_\_\_\_



**SCHEDULE OF BID PRICES**

Bidder agrees to perform the work described in the Bid Documents for the sum shown, in words, as the total or gross Bid as follows:

**TOTAL GROSS BID: \$ \_\_\_\_\_**

**TOTAL GROSS BID MUST BE WRITTEN IN WORDS:**

---

**DOLLARS** **CENTS**

**In case of discrepancy between the amount shown in figures and the amount shown in words, the amount shown in words will govern, and will be used as the unit price to determine correct extensions of the amount bid. As necessary, the Total Gross Bid will be corrected in accordance with the foregoing.**

The Executive Director may recommend a rejection of a bid for any of the following reasons:

- a. The Bidder fails to furnish any of the information required by the bid documents.
- b. The bid proposal, in the opinion of the Executive Director, contains unbalanced bid prices, unless the bidder can demonstrate with labor and material breakdowns that the prices are not unbalanced for the appropriate quantities represented in the itemized Bid Proposal.

**BIDDER'S QUALIFICATION STATEMENT**

The signatory of this questionnaire certifies under oath the truth and correctness of all statements and of all answers to interrogatories hereinafter made.

SUBMITTED TO: Executive Director  
Town of North Hempstead Solid Waste Management Authority  
802 West Shore Road  
Port Washington, New York 11050

SUBMITTED BY: \_\_\_\_\_  
A Corporation  
A Partnership  
An Individual  
A Joint Venture  
(Bidder to strike out  
inapplicable terms)

PRINCIPAL OFFICE ADDRESS:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Persons or firms submitting Bids must be engaged in the lines of work required in these Specifications, or shall be able to refer to work of similar character performed by them. Bidders must present satisfactory evidence of experience, ability and financial standing, and also a statement as to their plant and machinery.

Responses to questions concerning work (projects) currently under way or completed within the past five (5) years shall list only work for which the Bidder was the prime Contractor. Subcontract work shall not be listed. If additional space is required, or if pre-printed data is utilized, sheets may be securely attached to these pages.

1. How many years has your organization been in business as a general contractor?
  
2. How many years has your organization been in business under its present name?
  
3. If a corporation, answer the following:
  - a. Date of incorporation:
  - b. State of incorporation:
  - c. President's name:
  - d. Vice President's name(s):
  
  - e. Secretary's or Clerk's name:
  - f. Treasurer's name:
  
4. If individual or partnership, answer the following:
  - a. Date of organization:
  - b. Name and address of all partners. (State whether general or limited partnership):
  
5. If other than corporation or partnership, describe organization and name principals:

6. We normally perform \_\_\_\_\_ percent of the work with our own forces. List work normally subcontracted.
  
7. Has any construction contract to which you have been a party been terminated by the Owner; have you ever terminated work on a project prior to its completion for any reason; has any surety which issued a performance bond on your behalf ever completed the work in its own name or financed such completion on your behalf; has any surety expended any monies in connection with a Contract for which they furnished a bond on your behalf? If the answer to any portion of this question is “yes”, attach separate sheets, furnishing details of all such occurrences including name of Owner, Architect or Engineer, and Surety, and name and date of Project.
  
8. Has any officer or partner of your organization ever been an officer or partner of another organization that had any construction Contract terminated by the Owner; terminated work on a project prior to its completion for any reason; had any surety which issued a performance bond complete the work in its own name or financed such completion; or had any surety expend any monies in connection with a Contract for which they furnished a bond? If the answer to any portion of this question is “yes”, attached separate sheets, furnishing details of all such occurrences including name of Owner, Architect or Engineer, and surety, and name and date of Project.
  
9. Complete the experience tables on the following pages:

**9A. LIST THE MAJOR CONSTRUCTION PROJECTS YOUR ORGANIZATION HAS UNDERWAY ON THIS DATE.**

<b>PROJECT</b>	<b>OWNER</b>	<b>ARCHITECT ENGINEER</b>	<b>CONTRACT AMOUNT</b>	<b>PERCENT COMPLETE</b>	<b>SCHEDULED COMPLETION DATE</b>	<b>NAME, ADDRESS, &amp; TEL. NO. OF REFERENCED CONTRACT</b>

**9B. LIST FIVE MAJOR CONSTRUCTION PROJECTS YOUR ORGANIZATION HAS COMPLETED WITHIN THE LAST FIVE (5) YEARS;**

**PROJECTS LISTED SHOULD BE OF SIMILAR SCOPE AND RELEVANT TO THE PROJECT BEING BID.**

PROJECT	OWNER	ARCHITECT ENGINEER	CONTRACT AMOUNT	PERCENT COMPLETE	SCHEDULED COMPLETION DATE	NAME, ADDRESS, & TEL. NO. OF REFERENCED CONTRACT

Attach separate sheet(s) and:

10. List name and construction experience of the principal individuals of your organization. Show present position or office, years of experience, type of work for which individual was responsible (and in what capacity).
11. List the states and categories of construction in which your organization is legally qualified to do business.
12. In accordance with SGC-6, attach to this bid proposal proof of your current apprenticeship agreements appropriate for the type and nature of work to be performed under this contract, registered with and approved by the New York State Commission of Labor
13. List name, address and telephone number of an individual who represents each of the following and whom OWNER may contact for a financial reference:
  - 13.1 A surety:
  - 13.2 A bank:
  - 13.3 A major material supplier:
14. Attach a financial statement, prepared on an accrual basis, in a form which clearly indicates Bidder's assets, liabilities and net worth.
  - 14.1 Date of financial statement:
  - 14.2 Name of firm preparing statement:

15. Dated at \_\_\_\_\_, this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

\_\_\_\_\_  
(Print or Type Name of Bidder)

By: \_\_\_\_\_

\_\_\_\_\_  
(Title)

(Seal, if corporation)

------(Affidavit for Individual)-----

\_\_\_\_\_ being duly sworn, deposes and says that:

- a) the financial statement, taken from his/her books, is a true and accurate statement of his/her financial condition as of the date thereof; and
- b) all of the foregoing qualification information is true, complete, and accurate.

------(Affidavit for Partnership)-----

\_\_\_\_\_ being duly sworn, deposes and says that:

- a) he/she is a member of the partnership of \_\_\_\_\_,
- b) he/she is familiar with the books of said partnership showing its financial condition;
- c) the financial statement, taken from the books of said partnership, is a true and accurate statement of the financial condition of the partnership as of the date thereof; and
- d) all of the foregoing qualification information is true, complete and accurate.



------(Affidavit for Corporation)-----

\_\_\_\_\_ being duly sworn, deposes and says that:

a) he/she is \_\_\_\_\_ of \_\_\_\_\_  
(Full Name of Corporation)

b) he/she is familiar with the books of said corporation showing its financial condition; c) the financial statement, taken from the books of said corporation, is a true and accurate statement of the financial condition of said corporation as of the date thereof; and d) that all of the foregoing qualification information is true, complete and accurate.

------(Acknowledgment)-----

\_\_\_\_\_ being duly sworn, deposes and says that he/she is

\_\_\_\_\_ of \_\_\_\_\_  
(Name of Bidder)

that he/she is duly authorized to make the foregoing affidavit and that he/she makes it on behalf of  
( ) himself/herself: ( ) said partnership; ( ) said corporation.

Sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_,  
in the County of \_\_\_\_\_, State of \_\_\_\_\_.

\_\_\_\_\_  
(Notary Public)

My commissioner expires \_\_\_\_\_

(Seal)

**TOWN OF NORTH HEMPSTEAD**  
**SOLID WASTE MANAGEMENT AUTHORITY**

**AGREEMENT**  
**and**  
**INSURANCE CERTIFICATE**

**AGREEMENT**

THIS AGREEMENT, made on the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_ by and between the Town of North Hempstead Solid Waste Management Authority, 802 West Shore Road, Port Washington, N.Y. 11050, herein called \_\_\_\_\_ the \_\_\_\_\_ OWNER, \_\_\_\_\_ and \_\_\_\_\_, \_\_\_\_\_,  
(FIRM NAME AND ADDRESS)

hereinafter called the CONTRACTOR, is for all work required for  
**Town of North Hempstead Port Washington Landfill Solid Waste Management Authority (SWMA) - Electrical Infrastructure Upgrades**  
**BID NO. SWMA-0010-2021**

hereinafter called the Project. NOW, THEREFORE, THE OWNER and CONTRACTOR for the consideration hereinafter set forth, agree as follows:

THE CONTRACTOR AGREES to perform and complete in a workmanlike manner all work required for the Project, in strict compliance with the Contract Documents, which are hereby made a part of this Agreement.

Work under this Agreement shall commence upon written Notice to Proceed and shall be completed within the Contract time as heretofore stated in the Proposal.

THE OWNER AGREES to pay, and the Contractor agrees to accept, in full payment for the performance of this Contract, the Contract amount of: \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) as finally adjusted, if necessary, in accordance with the provisions of the Contract Documents.

IN WITNESS WHEREOF the parties have duly executed this Agreement in duplicate originals the date and year first above written.

**ATTEST:**

**TOWN OF NORTH HEMPSTEAD SOLID  
WASTE MANAGEMENT AUTHORITY**

\_\_\_\_\_  
Executive Director

By: \_\_\_\_\_  
Chair of the Board of the Authority

(Corporate Seal)

\_\_\_\_\_(L.S.)  
Contractor

By: \_\_\_\_\_(L.S.)  
(Corporate Seal)

**APPROVED:**

\_\_\_\_\_  
Assistant Treasurer

\_\_\_\_\_  
Counsel to the Authority

**STATE OF NEW YORK )**  
**) ss.:**  
**COUNTY OF NASSAU )**

On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, before me personally came \_\_\_\_\_, to me known and known by me to be the individual described in, and who executed the foregoing instrument and acknowledged to me that he executed the same.

\_\_\_\_\_  
Notary Public

**STATE OF NEW YORK )**  
**) ss.:**  
**COUNTY OF NASSAU )**

On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, before me personally came \_\_\_\_\_, and that he is the \_\_\_\_\_ of the Corporation described in and which executed the foregoing instrument; that he knows the seal of said Corporation; that the seal affixed to said instrument is such Corporate seal; that it was so affixed by order of the Board of Directors of said Corporation, and that he signed his name thereto by like order.

\_\_\_\_\_  
Notary Public

**TOWN OF NORTH HEMPSTEAD  
SOLID WASTE MANAGEMENT AUTHORITY  
INSURANCE CERTIFICATE**

The following insurance currently exists on behalf of

(Name and Address of Insured Contractor):

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Contract Description: \_\_\_\_\_

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(1) Worker's Compensation:

Insurance Carrier: \_\_\_\_\_

Policy	Number(s):
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(2) Commercial General Liability with completed operations (plus X.C.U. when applicable), to which the Authority of North Hempstead has been added as additional insured, and Automobile Liability:

(a) \$ 5,000,000.00 Combined single limit (bodily and personal injury/property damage)

Insurance \_\_\_\_\_ Carrier:

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Policy	Number(s):
--------	------------

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(b) Contractual coverage defending, indemnifying and holding harmless both the Authority of North Hempstead and their employees, agents and representatives from any and all loss and/or damage arising out of the performance of the above contract. Said contractual coverage shall be absolute and not dependent upon any question of the negligence of the Contractor (or its employees, agents and representatives).

Insurance

Carrier:

\_\_\_\_\_

Policy

Number(s):

\_\_\_\_\_

- (3) The above insurance is effective with New York State admitted insurance companies, and is A rated or equivalent to A rated.
- (4) Policy cancellation or non-renewal shall be effective only upon thirty (30) days prior notice by certified mail to:

Town of North Hempstead  
 Solid Waste Management Authority  
 Office of Counsel to the Authority  
 220 Plandome Road  
 P.O.B. 3000  
 Manhasset, New York 11030

Authorized Insurance Agent's Signature and Title:

\_\_\_\_\_

Name, Insurance Affiliation and Address:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

DATED: \_\_\_\_\_

**TOWN OF NORTH HEMPSTEAD**

**SOLID WASTE MANAGEMENT AUTHORITY**

**NEW YORK STATE - DEPARTMENT OF LABOR**

**WAGE RATE SCHEDULE**

**The New York State Department of Labor Prevailing Wage Rate Schedule for this project is on the following pages, 95 -1 through 95 - 130.**

**Page 96 continues after wage rates**





Andrew M. Cuomo, Governor

Roberta Reardon, Commissioner

Town of North Hempstead  
Georgina Carr, Procurement Coordinator  
220 Plandome Road  
Manhasset NY 11030

Schedule Year 2020 through 2021  
Date Requested 01/14/2021  
PRC# 2021000421

Location SWMA  
Project ID#  
Project Type Electrical Infrastructure Upgrades

### 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 2020 through June 2021. 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](http://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](http://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.ny.gov](http://www.labor.ny.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](http://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, contemporaneous, 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.



Andrew M. Cuomo, Governor

Roberta Reardon, Commissioner

Town of North Hempstead  
Georgina Carr, Procurement Coordinator  
220 Plandome Road  
Manhasset NY 11030

Schedule Year 2020 through 2021  
Date Requested 01/14/2021  
PRC# 2021000421

Location SWMA  
Project ID#  
Project Type Electrical Infrastructure Upgrades

### Notice of Contract Award

New York State Labor Law, Article 8, Section 220.3a requires that certain information regarding the awarding of public work contracts, be furnished to the Commissioner of Labor. One "Notice of Contract Award" (PW 16, which may be photocopied), **MUST** be completed for **EACH** prime contractor on the above referenced project.

Upon notifying the successful bidder(s) of this contract, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

### Contractor Information

All information must be supplied

Federal Employer Identification Number: _____		
Name: _____		
Address: _____ _____		
City: _____	State: _____	Zip: _____
Amount of Contract: \$ _____	Contract Type:	
Approximate Starting Date: ____/____/____	<input type="checkbox"/> (01) General Construction	
Approximate Completion Date: ____/____/____	<input type="checkbox"/> (02) Heating/Ventilation	
	<input type="checkbox"/> (03) Electrical	
	<input type="checkbox"/> (04) Plumbing	
	<input type="checkbox"/> (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, [www.labor.ny.gov](http://www.labor.ny.gov). <https://labor.ny.gov/formsdocs/ui/1A999.pdf>

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](mailto: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](http://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*

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#### **1. Purpose and Scope:**

This Item describes the Public Work Enforcement Fund (the Fund, PWEF) and its relevance to State agencies and public benefit corporations engaged in construction or reconstruction contracts, maintenance and repair, and announces the recently-enacted increase to the percentage of the dollar value of such contracts that must be deposited into the Fund. This item also describes the roles of the following entities with respect to the Fund:

- New York State Department of Labor (DOL),
- The Office of the State of Comptroller (OSC), and
- State agencies and public benefit corporations.

#### **2. Background and Statutory References:**

DOL uses the Fund to enforce the State's Labor Law as it relates to contracts for construction or reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law. State agencies and public benefit corporations participating in such contracts are required to make payments to the Fund.

Chapter 511 of the Laws of 1995 (as amended by Chapter 513 of the Laws of 1997, Chapter 655 of the Laws of 1999, Chapter 376 of the Laws of 2003 and Chapter 407 of the Laws of 2005) established the Fund.

#### **3. Procedures and Agency Responsibilities:**

The Fund is supported by transfers and deposits based on the value of contracts for construction and reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law, into which all State agencies and public benefit corporations enter.

Chapter 407 of the Laws of 2005 increased the amount required to be provided to this fund to .10 of one-percent of the total cost of each such contract, to be calculated at the time agencies or public benefit corporations enter into a new contract or if a contract is amended. The provisions of this bill became effective August 2, 2005.

**To all State Departments, Agency Heads and Public Benefit Corporations  
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND**

OSC will report to DOL on all construction-related ("D") contracts approved during the month, including contract amendments, and then DOL will bill agencies the appropriate assessment monthly. An agency may then make a determination if any of the billed contracts are exempt and so note on the bill submitted back to DOL. For any instance where an agency is unsure if a contract is or is not exempt, they can call the Bureau of Public Work at the number noted below for a determination. Payment by check or journal voucher is due to DOL within thirty days from the date of the billing. DOL will verify the amounts and forward them to OSC for processing.

For those contracts which are not approved or administered by the Comptroller, monthly reports and payments for deposit into the Public Work Enforcement Fund must be provided to the Administrative Finance Bureau at the DOL within 30 days of the end of each month or on a payment schedule mutually agreed upon with DOL.

Reports should contain the following information:

- Name and billing address of State agency or public benefit corporation;
- State agency or public benefit corporation contact and phone number;
- Name and address of contractor receiving the award;
- Contract number and effective dates;
- Contract amount and PWEF assessment charge (if contract amount has been amended, reflect increase or decrease to original contract and the adjustment in the PWEF charge); and
- Brief description of the work to be performed under each contract.

Checks and Journal Vouchers, payable to the "New York State Department of Labor" should be sent to:

Department of Labor  
Administrative Finance Bureau-PWEF Unit  
Building 12, Room 464  
State Office Campus  
Albany, NY 12240

Any questions regarding billing should be directed to NYSDOL's Administrative Finance Bureau-PWEF Unit at (518) 457-3624 and any questions regarding Public Work Contracts should be directed to the Bureau of Public Work at (518) 457-5589.



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](mailto:dol.misclassified@labor.ny.gov). All complaints of fraud and violations are taken seriously. You can remain anonymous.**

**Employer Name:**

IA 999 (09/16)



# Attention Employees

**THIS IS A: PUBLIC WORK PROJECT**

If you are employed on this project as a **worker, laborer, or mechanic** you are entitled to receive the **prevailing wage and supplements rate** for the classification at which you are working.

Chapter 629 of the Labor Laws of 2007:

**These wages are set by law and must be posted at the work site. They can also be found at:**  
[www.labor.ny.gov](http://www.labor.ny.gov)

If you feel that you have not received proper wages or benefits, please call our nearest office.\*

Albany	(518) 457-2744	Patchogue	(631) 687-4882
Binghamton	(607) 721-8005	Rochester	(585) 258-4505
Buffalo	(716) 847-7159	Syracuse	(315) 428-4056
Garden City	(516) 228-3915	Utica	(315) 793-2314
New York City	(212) 932-2419	White Plains	(914) 997-9507
Newburgh	(845) 568-5156		

\* For New York City government agency construction projects, please contact the Office of the NYC Comptroller at (212) 669-4443, or [www.comptroller.nyc.gov](http://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 or 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 requirements 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 than 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](http://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

**Nassau County General Construction**

**Asbestos Worker** **01/01/2021**

**JOB DESCRIPTION** Asbestos Worker **DISTRICT 4**

**ENTIRE COUNTIES**  
 Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

**WAGES**  
 Per Hour: 07/01/2020

Asbestos Worker \$ 44.00  
 Removal & Abatement Only\*

NOTE: \*On Mechanical Systems that are NOT to be SCRAPPED.

**SUPPLEMENTAL BENEFITS**

Per Hour:  
 Asbestos Worker \$ 8.70  
 Removal & Abatement Only

**OVERTIME PAY**  
 See (B, B2, \*E, J) on OVERTIME PAGE  
 Hours worked on Saturdays are paid at time and one half only if forty hours have been worked during the week.

**HOLIDAY**  
 Paid: See (1) on HOLIDAY PAGE  
 Overtime: See (5, 6, 8) on HOLIDAY PAGE

**REGISTERED APPRENTICES**  
 Apprentice Removal & Abatement Only:  
 1000 hour terms at the following percentage of Journeyman's rates.

1st	2nd	3rd	4th
78%	80%	83%	89%

**SUPPLEMENTAL BENEFIT**

Per Hour:  
 Apprentice  
 Removal & Abatement \$ 8.70

4-12a - Removal Only

**Boilermaker** **01/01/2021**

**JOB DESCRIPTION** Boilermaker **DISTRICT 4**

**ENTIRE COUNTIES**  
 Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

**WAGES**  
 Per Hour: 07/01/2020 01/01/2021

Boilermaker \$ 61.24 \$63.38  
 Repairs & Renovations 61.24 63.38

**SUPPLEMENTAL BENEFITS**

Per Hour: 07/01/2020 01/01/2021  
 Boilermaker 32% of hourly 32% of hourly  
 Repair \$ Renovations Wage Paid Wage Paid  
 + \$ 25.35 + TBA

NOTE: "Hourly Wage Paid" shall include any and all premium(s) pay.

Repairs & Renovation Includes replacement of parts and repairs & renovation of existing unit.

**OVERTIME PAY**  
 See (D, O) on OVERTIME PAGE  
 Repairs & Renovation see (B,E,Q)

**HOLIDAY**  
 Paid: See (8, 16, 23, 24) on HOLIDAY PAGE  
 Overtime: See (5, 6, 8, 11, 12, 15, 16, 22, 23, 24, 25) on HOLIDAY PAGE

NOTE: \*Employee must work in pay week to receive Holiday Pay.  
 \*\*Employee gets 4 times the hourly wage rate for working Labor Day.

**REGISTERED APPRENTICES**

Wage per hour:  
 (1/2) Year Terms at the following percentage of Boilermaker's Wage

1st	2nd	3rd	4th	5th	6th	7th
65%	70%	75%	80%	85%	90%	95%

Supplemental Benefits Per Hour:

Apprentice(s)	07/01/2020 32% of Hourly Wage Paid Plus Amount Below	01/01/2021 32% of Hourly Wage Paid Plus Amount Below
1st Term	\$ 19.38	\$ TBA
2nd Term	20.24	TBA
3rd Term	21.08	TBA
4th Term	21.94	TBA
5th Term	22.79	TBA
6th Term	23.65	TBA
7th Term	24.48	TBA

NOTE: "Hourly Wage Paid" shall include any and all premium(s)

4-5

**Carpenter**

**01/01/2021**

**JOB DESCRIPTION** Carpenter

**DISTRICT 8**

**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

**WAGES**

Per hour: 07/01/2020

Piledriver	\$ 55.93
Dockbuilder	\$ 55.93

**SUPPLEMENTAL BENEFITS**

Per hour:

Journeyworker	\$ 52.44
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**OVERTIME PAY**

See (B, E2, O) on OVERTIME PAGE

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE.

Paid: for 1st & 2nd yr.

Apprentices See (5,6,11,13,25)

Overtime: See (5,6,11,13,25) on HOLIDAY PAGE.

**REGISTERED APPRENTICES**

Wages per hour

(1)year terms:

1st	2nd	3rd	4th
\$22.37	\$27.97	\$36.35	\$44.74

Supplemental benefits per hour:

All Terms:	\$ 34.34
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8-1556 Db

**Carpenter**

**01/01/2021**

**JOB DESCRIPTION** Carpenter

**DISTRICT 8**

**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

**WAGES**

Per hour: 07/01/2020

Carpet/Resilient

Floor Coverer \$ 54.00

INCLUDES HANDLING & INSTALLATION OF ARTIFICIAL TURF AND SIMILAR TURF INDOORS/OUTDOORS.

**SUPPLEMENTAL BENEFITS**

Per hour: \$ 46.99

**OVERTIME PAY**

See (B, E, Q) on OVERTIME PAGE

**HOLIDAY**

Paid: See (18, 19) on HOLIDAY PAGE.

Paid for 1st & 2nd yr.

Apprentices See (5,6,11,13,16,18,19,25)

Overtime: See (5,6,11,13,16,18,19,25) on HOLIDAY PAGE.

**REGISTERED APPRENTICES**

Wage per hour - (1) year terms:

	1st	2nd	3rd	4th
	\$24.20	\$27.20	\$31.45	\$39.33

Supplemental benefits per hour:

	1st	2nd	3rd	4th
	\$16.06	\$17.56	\$21.16	\$23.16

8-2287

**Carpenter**

**01/01/2021**

**JOB DESCRIPTION** Carpenter

**DISTRICT 8**

**ENTIRE COUNTIES**

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

**WAGES**

Per Hour: 07/01/2020

Marine Construction:

Marine Diver \$ 70.80

Marine Tender 50.34

**SUPPLEMENTAL BENEFITS**

Per Hour:

Journeyworker \$ 52.34

**OVERTIME PAY**

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

**HOLIDAY**

Paid: See (18, 19) on HOLIDAY PAGE

Overtime: See (5, 6, 10, 11, 13, 16, 18, 19) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

Wages per hour:

One (1) year terms.

1st year	\$ 22.37
2nd year	27.97
3rd year	36.35
4th year	44.74

Supplemental Benefits  
Per Hour:

All terms \$ 34.34

8-1456MC

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**Carpenter**

**01/01/2021**

**JOB DESCRIPTION** Carpenter

**DISTRICT 8**

**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

**WAGES**

Per hour: 07/01/2020

Building

Millwright \$ 55.70

**SUPPLEMENTAL BENEFITS**

Per hour:

Millwright \$ 54.16

**OVERTIME PAY**

See (B, E, Q) on OVERTIME PAGE

**HOLIDAY**

Paid: See (18,19) on HOLIDAY PAGE.

Overtime See (5,6,8,11,13,18,19,25) on HOLIDAY PAGE.

**REGISTERED APPRENTICES**

Wages per hour:

One (1) year terms:

1st.	2nd.	3rd.	4th.
\$29.99	\$35.44	\$40.89	\$51.79

Supplemental benefits per hour:

One (1) year terms:

1st.	2nd.	3rd.	4th.
\$34.79	\$38.49	\$42.84	\$49.60

8-740.1

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**Carpenter**

**01/01/2021**

**JOB DESCRIPTION** Carpenter

**DISTRICT 8**

**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

**WAGES**

Per Hour:

07/01/2020

Timberman \$ 51.05

**SUPPLEMENTAL BENEFITS**

Per Hour:

07/01/2020

\$ 51.79

**OVERTIME PAY**

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

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE.

Paid: for 1st & 2nd yr.

Apprentices See (5,6,11,13,25)

Overtime: See (5,6,11,13,25) on HOLIDAY PAGE.

**REGISTERED APPRENTICES**

Wages per hour:

One ( 1 ) year terms:

	1st	2nd	3rd	4th
	\$20.42	\$25.53	\$33.18	\$40.84

Supplemental benefits per hour:

All terms \$ 34.07

8-1556 Tm

**Carpenter**

**01/01/2021**

**JOB DESCRIPTION** Carpenter

**DISTRICT 8**

**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Westchester

**PARTIAL COUNTIES**

Orange: South of but including the following, Waterloo Mills, Slate Hill, New Hampton, Goshen, Blooming Grove, Mountainville, east to the Hudson River.

Putnam: South of but including the following, Cold Spring, TompkinsCorner, Mahopac, Croton Falls, east to Connecticut border.

Suffolk: West of Port Jefferson and Patchogue Road to Route 112 to the Atlantic Ocean.

**WAGES**

Per hour: 07/01/2020 10/18/2020

Core Drilling:

Driller \$ 41.19 \$ 41.74

Driller Helper 32.62 32.92

Note: Hazardous Waste Pay Differential:

For Level C, an additional 10% above wage rate per hour

For Level B, an additional 10% above wage rate per hour

For Level A, an additional 10% above wage rate per hour

Note: When required to work on water: an additional \$ 0.50 per hour.

**SUPPLEMENTAL BENEFITS**

Per hour:

Driller and Helper \$ 27.95

**OVERTIME PAY**

OVERTIME: See (B,E,K\*,P,R\*\*) on OVERTIME PAGE.

**HOLIDAY**

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

Overtime: \* See (5,6) on HOLIDAY PAGE.

\*\* See (8,10,11,13) on HOLIDAY PAGE.

8-1536-CoreDriller

**Carpenter**

**01/01/2021**

**JOB DESCRIPTION** Carpenter

**DISTRICT 8**

**ENTIRE COUNTIES**

Bronx, Kings, New York, Putnam, Queens, Richmond

**PARTIAL COUNTIES**

Nassau: That portion of the county that lies west of Seaford Creek and south of the Southern State Parkway.

**WAGES**

Per hour: 07/01/2020

Show Exhibit \$ 54.50

Bldg. Carpenter 54.00\*

\* Not applicable in Putnam County

**SUPPLEMENTAL BENEFITS**

Per hour worked:

Show Exhibit \$ 51.23

Bldg. Carpenter 46.73



**OVERTIME PAY**

See (B, E, Q) on OVERTIME PAGE

**HOLIDAY**

Paid: See (18,19) on HOLIDAY PAGE.

Paid:for 1st & 2nd yr.

Apprentices See (5,6,11,13,16,18,19,25)

Overtime: See (5,6,11,13,16,18,19,25) on HOLIDAY PAGE.

**REGISTERED APPRENTICES**

Wages per hour: Show Exhibit

(1) year terms:

1st.	2nd.	3rd.	4th.
\$21.80	\$27.25	\$35.43	\$43.60

Supplemental benefits per hour:

All terms \$ 33.79

Wages per hour: Bldg. Carpenter

(1) year terms:

1st	2nd	3rd	4th
\$19.20	\$22.20	\$26.45	\$34.33

Supplemental benefits per hour:

1st	2nd	3rd	4th
\$15.80	\$17.30	\$20.90	\$22.90

8-EXHIB

**Carpenter - Building / Heavy&Highway**

**01/01/2021**

**JOB DESCRIPTION** Carpenter - Building / Heavy&Highway

**DISTRICT 4**

**ENTIRE COUNTIES**

Nassau, Suffolk

**WAGES**

Per Hour: 07/01/2020

Carpenter (Building) \$ 49.89

Carpenter (Heavy Highway) \$ 49.89

"NOTE" ADD 15% to straight time hourly wage for NEW YORK STATE D.O.T. and other GOVERNMENTAL MANDATED Off-Shift Work.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday, with one-half (1/2) hour allowed for a lunch period.

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:

Both Carpenter Categories \$ 33.10

**OVERTIME PAY**

See (B, E, Q) on OVERTIME PAGE

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE

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

**REGISTERED APPRENTICES**

One(1) Year Terms at the following:

Per Hour:

1st	2nd	3rd	4th	5th
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\$ 23.85      \$ 28.00      \$ 30.08      \$ 32.16      \$ 36.32

Supplemental Benefits  
 Per Hour:

All Terms:                      \$ 18.45

4-Reg.Council Nass/Suff

**Carpenter - Building High Rise Concrete Form Work**

**01/01/2021**

**JOB DESCRIPTION** Carpenter - Building High Rise Concrete Form Work

**DISTRICT 8**

**ENTIRE COUNTIES**

Bronx, Kings, New York, Queens, Richmond

**PARTIAL COUNTIES**

Nassau: Work performed beginning at the Intersection of the City Line & North Shore of Long Island, then running Southerly to the Southern State Pkwy, then East to Seaford Creek in Nassau County, then South to Atlantic Ocean, then West to Southern tip of Richmond County

**WAGES**

Per hour:    07/01/2020

Building High Rise:

Concrete Carpenter A                              \$ 50.78  
 Concrete Carpenter B\*                            \$ 40.19

\*NOTE: Tier B work excludes erection of decking, perimeter debris netting, leading edge work, self & climbing form systems and the installation of cocoon systems.

**SUPPLEMENTAL BENEFITS**

Per hour:

Concrete Carpenter A                              \$ 43.29  
 Concrete Carpenter B                              \$ 16.60

**OVERTIME PAY**

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

**HOLIDAY**

Paid:    See (1) on HOLIDAY PAGE  
 Overtime:                                      See (5, 6, 8, 11, 13, 25) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

Wage per hour:

One (1) year terms:

Concrete Carpenter Apprentices	1st \$ 17.52	2nd \$ 23.95	3rd \$ 30.53	4th \$ 38.15
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Supplemental benefits per hour:

Concrete Carpenter Apprentices	1st \$ 16.15	2nd \$ 16.28	3rd \$ 16.41	4th \$ 16.56
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8-NYC Bldg/212

**Carpenter - Heavy&Highway**

**01/01/2021**

**JOB DESCRIPTION** Carpenter - Heavy&Highway

**DISTRICT 8**

**ENTIRE COUNTIES**

Bronx, Kings, New York, Queens, Richmond

**PARTIAL COUNTIES**

Nassau: That portion of the county that lies West of Seaford Creek and South of the Southern State Parkway.

**WAGES**

Per hour:    07/01/2020

Heavy&Highway Carpenter                      \$ 55.93

**SUPPLEMENTAL BENEFITS**

Per hour worked:

Heavy & Highway  
 Carpenter \$ 52.34

**OVERTIME PAY**

See (B, E2, Q) on OVERTIME PAGE

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE  
 Overtime: See (5, 6, 11, 13, 25) on HOLIDAY PAGE

Paid : for 1st & 2nd yr  
 Apprentices See (5, 6, 11, 13, 25)

**REGISTERED APPRENTICES**

Wage per hour:

One (1) year terms:

	1st	2nd	3rd	4th
Heavy & Highway	\$ 22.37	\$ 27.97	\$ 36.35	\$ 44.74

Supplemental Benefits:

Per Hour:

All terms \$ 34.34

8-NYC H/H

**Electrician**

**01/01/2021**

**JOB DESCRIPTION** Electrician

**DISTRICT 4**

**ENTIRE COUNTIES**

Nassau, Suffolk

**WAGES**

Per Hour: 07/01/2020 09/26/2020

Electrician  
 Electrical Maintenance \$ 44.12 \$ 44.54

Traffic Signal \$ 45.05 \$ 45.50

**"PLEASE NOTE"**

Applicable to "EXISTING ELECTRICAL SYSTEMS" including, but not limited to TRAFFIC SIGNALS & STREET LIGHTING. Not used for add-ons.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday, with one-half (1/2) hour allowed for a lunch period.

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:

Electrician 12% of Hourly Wage Paid + \$18.60 12% of Hourly Wage Paid + \$19.50

NOTE: "Hourly Wage Paid" shall include any and all premium(s) pay

**OVERTIME PAY**

See (B, E2, K, P) on OVERTIME PAGE

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE  
 Overtime: See (5, 6, 15, 16, 25) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

One(1) Year Term(s) at the following Percentage of Journeyman(s) Wage:

1st	2nd	3rd	4th	5th	6th
40%	50%	60%	70%	80%	90%

Supplemental Benefits:

	07/01/2020	09/26/2020
1st	3% + \$3.65	3% + \$3.65
2nd	8% + \$4.19	8% + \$4.19
3rd	9% + \$5.20	9% + \$5.20
4th	10% + \$ 6.96	10% + \$ 6.96
5th	11% + \$10.91	11% + \$10.91
6th	12% + \$14.01	12% + \$14.01

NOTE: Percentages are on "Hourly Wage Paid"  
 NOTE: "Hourly Wage Paid" shall include any and all premium(s) pay

4-25m

**Electrician** **01/01/2021**

**JOB DESCRIPTION** Electrician **DISTRICT 4**

**ENTIRE COUNTIES**

Nassau, Suffolk

**WAGES**

Per Hour:	07/01/2020	3/28/2021
Tree Trimmer/Remover		
Line Clearance Specialist	\$ 35.75	\$ 36.82
Groundman*	\$21.45	\$ 22.09

These rates apply to all tree trimming/removal contracts including but not limited to "Electrical Line Clearance"/"Long Island Railroad Right of Ways".

For Building Construction or Road/Highway Construction Contracts, Heavy & Highway Laborer and Operating Engineer classifications Apply.

\* Note: Groundman Classification not to exceed 20% of the company(s) workforce on Project. Please contact local office for clarification.

**SUPPLEMENTAL BENEFITS**

Per Hour:	07/01/2020	3/28/2021
Tree Trimmer	20.50% of Hourly	20.50% of Hourly
Line Clearance Specialist and Groundman	Wage Paid + \$11.07	Wage Paid + \$11.57

NOTE: "Hourly Wage Paid" shall include any and all premium(s) paid

**OVERTIME PAY**

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

**HOLIDAY**

Paid: See (5, 6, 8, 16, 23, 24, 25, 26) on HOLIDAY PAGE  
 Overtime: See (5, 6, 8, 16, 23, 24, 25, 26) on HOLIDAY PAGE

4-1049/Tree

**Electrician** **01/01/2021**

**JOB DESCRIPTION** Electrician **DISTRICT 4**

**ENTIRE COUNTIES**

Nassau, Suffolk

**WAGES**

Per Hour:	07/01/2020	04/25/2021
Electrician/Wireman	\$ 54.00	\$ 55.00
HVAC Controls	54.00	55.00
Fire Alarms	54.00	55.00

**SUPPLEMENTAL BENEFITS**

Per Hour:	07/01/2020	04/25/2021
Electrician/Wireman (all categories)	16% of Hourly Wage Paid	16% of Hourly Wage Paid



1st	13% of *Wage paid + \$5.40
2nd	16% of *Wage paid + \$5.90
3rd	16% of *Wage paid + \$6.15
4th	16% of *Wage paid + \$6.50
5th	16% of *Wage paid + \$18.22
6th	16% of *Wage paid + \$19.16

\*Wage Paid includes any and all Premiums

4-25 Pump & Tank

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**Electrician** **01/01/2021**

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**JOB DESCRIPTION** Electrician **DISTRICT 4**

**ENTIRE COUNTIES**  
 Nassau, Suffolk

**WAGES**

Per Hour:	07/01/2020
Telephone and Intergrated Tele-Data System Electrician	\$ 38.18

This rate classification applies to ALL Voice, Data & Video work.: Excluding Fire Alarm Systems and Energy Managment Systems (HVAC Controls), in those cases the regular Electrician rate applies. To ensure proper use of this rate please call Nassau Offices at (516)228-3912 or Suffolk Offices at (631)687-4882.

**SUPPLEMENTAL BENEFITS**

Per Hour:

Tele-Data Electrician	16% of Hourly Wage Paid + \$19.85
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NOTE: "Hourly Wage Paid" shall include any and all premium(s) pay

**OVERTIME PAY**

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

**HOLIDAY**

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6, 15, 16, 25) on HOLIDAY PAGE

4-25tela

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**Electrician Lineman** **01/01/2021**

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**JOB DESCRIPTION** Electrician Lineman **DISTRICT 4**

**ENTIRE COUNTIES**  
 Nassau, Queens, Suffolk

**WAGES**

For Utility Distribution & Transmission Line Construction:	
Per Hour:	07/01/2020
Lineman/Splicer	\$ 57.41
Material Man	49.95
Heavy Equip. Operator	45.93
Groundman	34.45
Flagman	25.83

For Natural Gasline Construction:

Per Hour:	07/01/2020
Journeyman U.G.Mech.	\$ 50.10

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday.

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:

Utility Distribution & Transmission Line Construction:

07/01/2020

All Classifications 32% of Hourly  
 Wage Paid +  
 \$ 13.09

NOTE: "Hourly Wage Paid" shall include any and all premium(s) pay

Natural Gasline Construction:

Per Hour: 07/01/2020

Journeyman U.G.Mech. 28% of Hourly  
 Wage Paid +  
 \$14.60

**OVERTIME PAY**

See (B, E, Q) on OVERTIME PAGE

OVERTIME for Natural Gas Mechanic:(B,G,P)

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 16, 23, 25, 26) on HOLIDAY PAGE

Same as Above for Natural Gas Mechanic.

**REGISTERED APPRENTICES**

1000 hour Terms at the following Percentage of Journeyman's Wage.  
 (Lineman Only)

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFIT: 07/01/2020

All Terms 31% of Hourly  
 Wage Paid +  
 \$13.09

4-1049 Line/Gas

**Elevator Constructor**

**01/01/2021**

**JOB DESCRIPTION** Elevator Constructor

**DISTRICT 4**

**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

**PARTIAL COUNTIES**

Rockland: Entire County except for the Township of Stony Point

Westchester: Entire County except for the Townships of Bedford, Lewisboro, Cortland, Mt. Kisco, North Salem, Pound Ridge, Somers and Yorktown.

**WAGES**

Per hour:

07/01/2019	03/17/2021
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Elevator Constructor	\$ 69.56	\$ 72.29
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Modernization & Service/Repair	\$ 54.56	\$ 56.77
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**SUPPLEMENTAL BENEFITS**

Per Hour:

Elevator Constructor	\$ 41.92	\$ 42.92
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Modernization & Service/Repairs	\$ 40.86	\$ 41.82
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**OVERTIME PAY**

Constructor See ( D, M, T ) on OVERTIME PAGE.

Modern/Service See ( B, F, S ) on OVERTIME PAGE.

**HOLIDAY**

Paid: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE  
 Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

**WAGES PER HOUR:**

\*Note: 1st Term is based on Average wage of Constructor & Modernization.  
 Terms 2 thru 4 Based on Journeymans wage of classification Working in.

**1 YEAR TERMS:**

1st Term*	2nd Term	3rd Term	4th Term
50%	55%	65%	75%

**SUPPLEMENTAL BENEFITS**

**Elevator Constructor**

1st Term	\$ 33.38	\$ 34.05
2nd Term	34.20	34.91
3rd Term	35.55	36.30
4th Term	36.89	37.70

**Modernization & Service/Repair**

1st Term	\$ 33.33	\$ 34.00
2nd Term	33.82	34.50
3rd Term	35.09	35.83
4th Term	36.36	37.15

4-1

**Glazier**

**01/01/2021**

**JOB DESCRIPTION** Glazier

**DISTRICT 8**

**ENTIRE COUNTIES**

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

**WAGES**

Per hour:	7/01/2020	5/31/2021
		Additional
Glazier	\$ 57.55	\$ 2.00
*Scaffolding	58.55	
Glass Tinting & Window Film	29.17	
**Repair & Maintenance	29.17	

\*Scaffolding includes swing scaffold, mechanical equipment, scissor jacks, man lifts, booms & buckets 24' or more, but not pipe scaffolding.

\*\*Repair & Maintenance- All repair & maintenance work on a particular building, whenever performed, where the total cumulative contract value is under \$148,837. All Glass tinting, window film, regardless of material or intended use, and all affixing of decals to windows or glass.

**SUPPLEMENTAL BENEFITS**

Per hour:	7/01/2020
Journeyworker	\$ 34.59
Glass tinting & Window Film	20.29
Repair & Maintenance	20.29

**OVERTIME PAY**

See (B,H,V) on OVERTIME PAGE.

For 'Repair & Maintenance' and 'Glass Tinting & Window Film' see (B, B2, I, S) on overtime page.

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE  
 Overtime: See (4, 6, 16, 25) on HOLIDAY PAGE

For 'Repair & Maintenance' and 'Glass Tinting & Window Film' Only

Paid: See(5, 6, 16, 25)

Overtime: See(5, 6, 16, 25)

**REGISTERED APPRENTICES**



Wage per hour:

(1) year terms at the following wage rates:

7/01/2020

1st term	\$ 20.14
2nd term	28.21
3rd term	34.10
4th term	45.80

Supplemental Benefits:

(Per hour)

1st term	\$ 16.16
2nd term	22.76
3rd term	25.16
4th term	29.73

8-1087 (DC9 NYC)

**Insulator - Heat & Frost**

**01/01/2021**

**JOB DESCRIPTION** Insulator - Heat & Frost

**DISTRICT** 4

**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

**WAGES**

Per Hour: 07/01/2020

Insulators	
Heat & Frost	\$ 69.01

**SUPPLEMENTAL BENEFITS**

Per Hour:

Insulators	\$ 34.16
Heat & Frost	

**OVERTIME PAY**

See (\*C, \*\*O, V) on OVERTIME PAGE

\* 8th Hour paid at time and one half

\*\* Triple time for Labor Day (If worked)

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE

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

**REGISTERED APPRENTICES**

Wages:

1 year terms Per Hour:

Hired prior to 8/21/2017

	1st	2nd	3rd	4th
7/1/2020	\$27.14	\$33.93	\$41.40	\$51.76

Hired after 8/21/2017

7/1/2020	\$24.16	\$31.06	\$37.95	\$44.85
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Supplemental Benefits:

Hired prior to 8/21/2017

7/1/2020	\$13.62	\$17.03	\$20.54	\$25.62
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Hired after 8/21/2017

7/1/2020	\$11.96	\$15.37	\$18.79	\$22.24
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4-12

**Ironworker**

**01/01/2021**

**JOB DESCRIPTION** Ironworker

**DISTRICT** 9

**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

**WAGES**

Per Hour:	07/01/2020	01/01/2021
		Additional
Ironworker Rigger	\$ 67.13	\$ 1.36

Ironworker Stone Derrickman	\$ 67.13
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**SUPPLEMENTAL BENEFITS**

Per hour:	\$ 40.94
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**OVERTIME PAY**

See (B, D1, \*E, Q, \*\*V) on OVERTIME PAGE

\*Time and one-half shall be paid for all work on Saturday up to eight (8) hours and double time shall be paid for all work thereafter.

\*\* Benefits same premium as wages on Holidays only

**HOLIDAY**

Paid:	See (18) on HOLIDAY PAGE
Overtime:	See (5, 6, 8, 25) on HOLIDAY PAGE

\*Work stops at schedule lunch break with full day's pay.

**REGISTERED APPRENTICES**

Wage per hour:

1/2 year terms at the following hourly wage rate:

	1st	2nd	3rd	4th
07/01/2020	\$33.12	\$47.19	\$52.50	\$57.82

Supplemental benefits:

Per hour:	\$20.93	\$31.23	\$31.23	\$31.23
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9-197D/R

**Ironworker**

**01/01/2021**

**JOB DESCRIPTION** Ironworker

**DISTRICT 4**

**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

**WAGES**

Per Hour:	07/01/2020	01/01/2021
		Additional
Ornamental	\$ 45.65	\$ 1.25
Chain Link Fence	45.65	
Guide Rail	45.65	

**SUPPLEMENTAL BENEFITS**

Per hour:	
Journeyworker:	\$ 58.05

**OVERTIME PAY**

See (B, B1, Q, V) on OVERTIME PAGE

**HOLIDAY**

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6, 25) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

Apprentices hired before 8/31/2018:

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

5th Term	80%
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Supplemental Benefits per hour:

5th Term	52.38
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Apprentices Hired after 9/1/18:

1 year terms

1st Term	\$ 21.13
2nd Term	24.77
3rd Term	36.32
4th Term	TBD

Supplemental Benefits per hour:

1st Term	\$ 17.61
2nd Term	18.86

3rd Term 52.58  
 4th Term TBD

4-580-Or

**Ironworker** **01/01/2021**

**JOB DESCRIPTION** Ironworker **DISTRICT 4**

**ENTIRE COUNTIES**  
 Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

**WAGES**  
 PER HOUR:

	07/01/2020	01/01/2021
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Ironworker:		Additional
Structural	\$ 52.70	\$1.75/Hr.
Bridges		
Machinery		

**SUPPLEMENTAL BENEFITS**  
 PER HOUR:

Journeyman	\$ 81.35	
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**OVERTIME PAY**  
 See (B, B1, Q) on OVERTIME PAGE

**HOLIDAY**  
 Paid: See (1) on HOLIDAY PAGE  
 Overtime: See (5, 6, 18, 19) on HOLIDAY PAGE

**REGISTERED APPRENTICES**  
 WAGES PER HOUR:

6 month terms at the following rate:

1st	\$27.45	
2nd	\$28.05	
3rd - 6th	\$28.66	

Supplemental Benefits  
 PER HOUR:

All Terms	\$56.15	
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4-40/361-Str

**Ironworker** **01/01/2021**

**JOB DESCRIPTION** Ironworker **DISTRICT 4**

**ENTIRE COUNTIES**  
 Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

**PARTIAL COUNTIES**  
 Rockland: Southern section - south of Convent Road and east of Blue Hills Road.

**WAGES**  
 Per hour: 07/01/2020

Reinforcing & Metal Lathing	\$ 56.25	
"Base" Wage	\$ 54.70 plus \$ 1.55	

"Base" Wage is used to calculate overtime hours only.

**SUPPLEMENTAL BENEFITS**  
 Per hour:

Reinforcing & Metal Lathing	\$ 38.30	
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**OVERTIME PAY**  
 See (B, E, Q, \*X) on OVERTIME PAGE

\*Only \$22.00 per Hour for non worked hours

Supplemental Benefit Premiums for Overtime Hours worked:

Time & One Half \$ 45.08  
 Double Time \$ 51.33

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE  
 Overtime: See (5, 6, 11, 13, 18, 19, 25) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

(1) year terms at the following wage rates:

Wages Per Hour:

1st term	2nd term	3rd term	4th Term
\$ 22.55	\$ 28.38	\$ 34.68	\$ 37.18

**SUPPLEMENTAL BENIFITS**

Per Hour:

1st term	2nd term	3rd term	4th Term
\$ 18.17	\$ 21.34	\$ 22.00	\$ 20.50

4-46Reinf

**Laborer - Building**

**01/01/2021**

**JOB DESCRIPTION** Laborer - Building

**DISTRICT 4**

**ENTIRE COUNTIES**

Nassau, Suffolk

**WAGES**

Per Hour: 07/01/2020

Building Laborer \$ 40.80

Asbestos Abatement Workers 38.05  
 (Re-Roofing Removal see Roofer)

**SUPPLEMENTAL BENEFITS**

Per Hour:

Building Laborer \$ 30.40  
 Asbestos Abatement Worker 17.75

**OVERTIME PAY**

See (B, E, Q) on OVERTIME PAGE  
 See also(H)for Fire Watch on OVERTIME PAGE  
 Asbestos Worker See (B, H)

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE  
 Overtime: See (5, 6, 25) on HOLIDAY PAGE  
 Asbestos Worker see (5,6,8 & 28)

**REGISTERED APPRENTICES**

Regular Hours Work Terms

Term #1 1 hr to 1000hrs  
 Term #2 1001hrs to 2000hrs  
 Term #3 2001hrs to 3000hrs  
 Term #4 3001hrs to 4000hrs

Wages per hour:

1st Term	\$ 17.75
2nd Term	21.75
3rd Term	26.80
4th Term	31.40

Benifits per hour

1st Term	\$ 20.75
2nd Term	22.69
3rd Term	22.69
4th Term	22.69

**Laborer - Heavy&Highway** **01/01/2021**

**JOB DESCRIPTION** Laborer - Heavy&Highway

**DISTRICT 4**

**ENTIRE COUNTIES**

Nassau, Suffolk

**WAGES**

Laborer (Heavy/Highway):

GROUP # 1: Asphalt Rakers, Concrete Curb Formsetters.

GROUP # 2: Asphalt Shovelers, Roller Boys and Tampers.

GROUP # 3: Basic Laborer, Power Tool(Jackhammer), Landscape Construction, Traffic Control Personnel(flaggers)

**WAGES PER HOUR:**

	07/01/2020	06/01/2021
GROUP # 1		
Total Wage Paid	\$ 54.66	Additional
"Base Wage"	47.06	\$ 3.50
GROUP # 2		
Total Wage Paid	\$ 53.25	Additional
"Base Wage"	45.65	\$ 3.44
GROUP # 3		
Total Wage Paid	\$ 48.95	Additional
"Base Wage"	41.35	\$ 3.27

NOTE: "Base Wage" for Premium/Overtime calculation Only. \$7.60 is difference between "Base" and "Total".  
 Additional 30% to "Base Wage" for all hours worked on New York State D.O.T. and/or other Government Mandated Off-Shift Work.  
 Hazardous Material Work add an Additional 10% of base wage.

**SUPPLEMENTAL BENEFITS**

Per Hour:

ALL GROUPS \$ 32.45

After Forty (40)paid hours in a work week

OVERTIME PAY \$ 20.30

**OVERTIME PAY**

OVERTIME PAY

See (B, E2, F) on OVERTIME PAGE

NOTES: Premium/Overtime Pay to be calculated on "Base Wage" ONLY

Example Group# 3: \$41.35 X Time and One Half = \$62.02 + \$7.60 = \$69.62

**HOLIDAY**

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (1) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

1000 hour(s) Terms at the following Percentage of the "Base Wage" except  
 4th Term calculate at Total Wage Paid.

1st 0-1000/Hrs.	60%
2nd 1001-2000/Hrs.	70%
3rd 2001-3000/Hrs.	80%
4th 3001-4000/Hrs.	90%

Supplemental Benefits per hour:

All APPRENTICES \$ 32.45

After Forty(40) paid hours in a work Week

\$ 20.30

4-1298

**Mason** **01/01/2021**

**JOB DESCRIPTION** Mason

**DISTRICT 4**

**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

**WAGES**

Per Hour: 07/01/2020

Brick/Blocklayer \$ 62.29

Base Wage for OT Calculation \$ 52.56

**SUPPLEMENTAL BENEFITS**

Per Hour:

Brick/Block Layer \$ 28.55

**OVERTIME PAY**

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

Note: OT Calculated on Base Wage plus \$ 9.73/hr.

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE

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

**REGISTERED APPRENTICES**

(800 hour) Terms at the following Percentage of Journeyworkers "Base Wage" plus \$ 5.83/hr.:

1st	2nd	3rd	4th	5th
50%	60%	70%	80%	90%

Supplemental Benefits per hour:

All Apprentices \$ 19.70

4-1Brk

**Mason - Building**

**01/01/2021**

**JOB DESCRIPTION** Mason - Building

**DISTRICT 9**

**ENTIRE COUNTIES**

Nassau, Rockland, Suffolk, Westchester

**WAGES**

Per hour: 07/01/2020 12/07/2020

Tile Setters \$ 60.09 \$ 60.86

**SUPPLEMENTAL BENEFITS**

Per Hour: \$ 24.81\* + \$9.72 \$ 24.91\* + \$9.73

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

**OVERTIME PAY**

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

Work beyond 10 hours on Saturday shall be paid at double the hourly wage rate.

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE

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

**REGISTERED APPRENTICES**

Wage per hour:

Tile Setters:  
 (750 hour) term at the following wage rate:

Term:	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	1-750	751-1500	1501-2250	2251-3000	3001-3750	3751-4500	4501-5250	5251-6000	6001-6750	6501-7000
07/01/2020	\$20.35	\$25.11	\$32.09	\$36.83	\$40.25	\$43.50	\$46.95	\$51.69	\$54.34	\$58.19

Supplemental Benefits per hour:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$12.55*	\$12.55*	\$15.06*	\$15.06*	\$16.06*	\$17.56*	\$18.56*	\$18.56*	\$16.56*	\$21.81*
+\$0.66	+\$0.70	+\$0.80	+\$0.85	+\$1.23	+\$1.27	+\$1.62	+\$1.67	+\$5.82	+\$6.31

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

9-7/52A

**Mason - Building** **01/01/2021**

**JOB DESCRIPTION** Mason - Building **DISTRICT 9**

**ENTIRE COUNTIES**  
 Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

**WAGES**

Building	07/01/2020	01/01/2021
Wages per hour:		

Mosaic & Terrazzo Mechanic	\$57.42	\$ 57.92
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Mosaic & Terrazzo Finisher	\$55.82	\$ 56.32
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**SUPPLEMENTAL BENEFITS**

Per hour:		
Mosaic & Terrazzo Mechanic	\$ 25.61* + \$11.47	\$ 25.81* + \$11.72
Mosaic & Terrazzo Finisher	\$ 25.61* + \$11.45	\$ 25.81* + \$ 11.70

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

**OVERTIME PAY**

See (A, E, Q) on OVERTIME PAGE  
 Deduct \$6.60 from hourly wages before calculating overtime.

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE  
 Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE  
 Easter Sunday is an observed holiday. Holidays falling on a Saturday will be observed on that Saturday. Holidays falling on a Sunday will be celebrated on the Monday.

**REGISTERED APPRENTICES**

Wages per hour:  
 (750 Hour) terms at the following wage rate.

	1st	2nd	3rd	4th	5th	6th	7th	8th
07/01/2020	\$25.40	\$27.94	\$30.49	\$33.03	\$35.57	\$38.11	\$43.20	\$48.28
01/01/2021	\$25.65	\$28.22	\$30.79	\$33.36	\$35.92	\$38.48	\$43.62	\$48.95

Supplemental benefits per hour:

07/01/2020	\$12.81* +\$9.04	\$14.09* +\$9.94	\$15.37* +\$10.84	\$16.65* +\$11.75	\$17.93* +\$12.65	\$19.21* +\$13.55	\$21.77* +\$15.36	\$24.33* +\$17.16
01/01/2021	\$12.91* +\$9.16	\$14.20* +\$10.08	\$15.49* +\$11.00	\$16.78* +\$11.90	\$18.07* +\$12.82	\$19.36* +\$13.74	\$21.94* +\$15.58	\$24.52* +\$17.40

Apprentices hired after 07/01/2017:  
 Wages Per hour:

	1st 0- 1500	2nd 1501- 3000	3rd 3001- 3750	4th 3751- 4500	5th 4501- 5250	6th 5251- 6000
07/01/2020	\$22.20	\$22.88	\$30.49	\$35.57	\$40.65	\$45.73

01/01/2021	\$22.44	\$28.85	\$30.79	\$35.92	\$41.05	\$46.18
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Supplemental Benefits per hour:

	1st	2nd	3rd	4th	5th	6th
07/01/2020	\$4.55*	\$11.52*	\$15.37*	\$17.93*	\$20.49*	\$23.05*
	+\$6.32	+\$8.13	+\$10.84	+\$12.65	+\$14.46	+\$16.22
01/01/2021	\$4.55*	\$5.85*	\$15.49*	\$18.07*	\$20.65*	\$23.23*
	+\$6.42	+\$8.24	+\$11.00	+\$12.82	+\$14.66	+\$16.48

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

9-7/3

**Mason - Building** **01/01/2021**

**JOB DESCRIPTION** Mason - Building **DISTRICT 9**

**ENTIRE COUNTIES**  
 Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

**WAGES**  
 Per hour: 07/01/2020 01/01/2021

Building-Marble Restoration:  
 Marble, Stone & Terrazzo Polisher, etc  
\$ 44.66 \$ 45.37

**SUPPLEMENTAL BENEFITS**  
 Per Hour:  
 Journeyworker:  
  
 Building-Marble Restoration:  
 Marble, Stone & Polisher  
\$ 28.41 \$ 28.80

**OVERTIME PAY**  
 See (B, \*E, Q, V) on OVERTIME PAGE  
 \*ON SATURDAYS, 8TH HOUR AND SUCCESSIVE HOURS PAID AT DOUBLE HOURLY RATE.

**HOLIDAY**  
 Paid: See (1) on HOLIDAY PAGE  
 Overtime: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE  
 1ST TERM APPRENTICE GETS PAID FOR ALL OBSERVED HOLIDAYS.

**REGISTERED APPRENTICES**  
 WAGES per hour:

900 hour term at the following wage:

	1st 1- 900	2nd 901- 1800	3rd 1801- 2700	4th 2701
07/01/2020	\$31.19	\$35.68	\$40.16	\$44.66
01/01/2021	\$31.74	\$36.30	\$40.82	\$45.37

Supplemental Benefits Per Hour:  
 07/01/2020 \$25.78 \$26.66 \$27.54 \$28.41  
 01/01/2021 \$26.10 \$26.99 \$27.91 \$28.80

9-7/24-MP

**Mason - Building** **01/01/2021**

**JOB DESCRIPTION** Mason - Building **DISTRICT 9**

**ENTIRE COUNTIES**  
 Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

**WAGES**  
 Wages: 07/01/2020 01/14/2021



Marble Cutters & Setters \$ 60.35 \$ 60.89

**SUPPLEMENTAL BENEFITS**

Per Hour:

Journeyworker \$ 37.24 \$ 37.65

**OVERTIME PAY**

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

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

Wage Per Hour:

750 hour terms at the following wage.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	
1-750	751-1500	1501-2250	2251-3000	3001-3750	3751-4500	4501-5250	5251-6000	6001-6751	6751-7500	
07/01/2020	\$24.15	\$27.15	\$30.16	\$33.19	\$36.20	\$39.20	\$42.15	\$45.26	\$51.28	\$57.34
01/14/2021	\$24.36	\$27.38	\$30.43	\$33.48	\$36.53	\$39.56	\$42.61	\$45.66	\$51.74	\$57.83

Supplemental Benefits per hour:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	
07/01/2020	\$20.14	\$21.58	\$23.02	\$24.42	\$25.85	\$27.29	\$28.72	\$30.12	\$32.98	\$35.81
01/14/2021	\$20.31	\$21.77	\$23.22	\$24.66	\$26.09	\$27.55	\$28.99	\$30.44	\$33.33	\$36.22 9-7/4

**Mason - Building** **01/01/2021**

**JOB DESCRIPTION** Mason - Building

**DISTRICT** 9

**ENTIRE COUNTIES**

Nassau, Rockland, Suffolk, Westchester

**WAGES**

Per hour: 07/01/2020 12/07/2020

Tile Finisher \$ 46.21 \$ 46.69

**SUPPLEMENTAL BENEFITS**

Per Hour:

\$ 21.56\* \$ 21.91  
 + \$9.65 + \$9.55

\*This portion of benefits subject to same premium rate as shown for overtime wages

**OVERTIME PAY**

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

Work beyond 10 hours on a Saturday shall be paid at double the hourly wage rate.

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE

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

9-7/88A-tf

**Mason - Building** **01/01/2021**

**JOB DESCRIPTION** Mason - Building

**DISTRICT** 9

**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

**WAGES**

Per hour:	07/01/2020	01/01/2021
Marble, Stone, etc. Maintenance Finishers:	\$ 25.53	\$ 26.10

Note 1: An additional \$2.00 per hour for time spent grinding floor using "60 grit" and below.

Note 2: Flaming equipment operator shall be paid an additional \$25.00 per day.

**SUPPLEMENTAL BENEFITS**

Per Hour:

Marble, Stone, etc Maintenance Finishers:	\$ 13.85	\$ 13.96
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**OVERTIME PAY**

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

\*Double hourly rate after 8 hours on Saturday

**HOLIDAY**

Paid: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE

1st term apprentice gets paid for all observed holidays.

**REGISTERED APPRENTICES**

WAGES per hour:

	07/01/2020	01/01/2021
0-750	\$17.87	\$20.99
751-1500	\$18.89	\$21.67
1501-2250	\$19.92	\$22.36
2251-3000	\$20.93	\$23.03
3001-3750	\$22.47	\$24.06
3751-4500	\$24.51	\$25.42
4501+	\$25.53	\$26.10

Supplemental Benefits:

Per hour:

0-750	\$ 13.73	\$11.12
751-1500	\$ 13.75	\$11.50
1501-2250	\$ 13.76	\$11.87
2251-3000	\$ 13.78	\$12.26
3001-3750	\$ 13.80	\$12.82
3751-4500	\$ 13.83	\$13.58
4501+	\$ 13.85	\$13.96

9-7/24M-MF

**Mason - Building / Heavy&Highway**

**01/01/2021**

**JOB DESCRIPTION** Mason - Building / Heavy&Highway

**DISTRICT 9**

**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

**WAGES**

Per hour:	07/01/2020	01/14/2021
Marble-Finisher	\$ 47.92	\$ 48.27

**SUPPLEMENTAL BENEFITS**

Journeyworker:  
per hour

Marble- Finisher	\$ 34.99	\$ 35.25
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**OVERTIME PAY**

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

**HOLIDAY**

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

\* Work beyond 8 hours on a Saturday shall be paid at double the rate.  
\*\* When an observed holiday falls on a Sunday, it will be observed the next day.

9-7/20-MF

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**Mason - Building / Heavy&Highway** **01/01/2021**

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**JOB DESCRIPTION** Mason - Building / Heavy&Highway **DISTRICT 4**

**ENTIRE COUNTIES**  
Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

**WAGES**  
Per Hour: 07/01/2020  
Cement Mason \$ 51.97

**SUPPLEMENTAL BENEFITS**  
Per Hour:

Cement Mason \$ 33.71  
Overtime Rate\* \$ 54.42

**OVERTIME PAY**  
See (\*B1, Q, V) on OVERTIME PAGE  
\* Applies to 9th and 10th hours and up to the 10th hour on Saturday

**HOLIDAY**  
Paid: See (1) on HOLIDAY PAGE  
Overtime: See (5, 6, 8, 11, 13, 25) on HOLIDAY PAGE

**REGISTERED APPRENTICES**  
( 1 ) year terms at the following Percentage of Journeyworkers Wage.

1st Term 50%  
2nd Term 60%  
3rd Term 70%

Supplement Benefits per hour paid:

1st Term \$ 16.86 OT Rate \$ 27.22  
2nd Term \$ 20.23 OT Rate \$ 32.66  
3rd Term \$ 23.60 OT Rate \$ 38.10

4-780

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**Mason - Building / Heavy&Highway** **01/01/2021**

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**JOB DESCRIPTION** Mason - Building / Heavy&Highway **DISTRICT 4**

**ENTIRE COUNTIES**  
Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

**WAGES**  
NOTE: Shall include but not limited to Precast concrete slabs (London Walks)Marble and Granite pavers 2'x 2' or larger.  
Per Hour: 07/01/2020

Stone Setter \$ 64.42  
Stone Tender \$ 44.89

**SUPPLEMENTAL BENEFITS**  
Per Hour:

Stone Setter \$ 33.30  
Stone Tender \$ 19.40

**OVERTIME PAY**  
See (\*C, \*\*E, Q) on OVERTIME PAGE  
\* On weekdays the eighth (8th) and ninth (9th) hours are time and one-half all work thereafter is paid at double the hourly rate.  
\*\* The first nine (9) hours on Saturday is paid at time and one-half all work thereafter is paid at double the hourly rate.

**HOLIDAY**  
Paid: See (\*18) on HOLIDAY PAGE  
Overtime: See (5, 6, 10) on HOLIDAY PAGE

Paid: \*Must work first 1/2.

**REGISTERED APPRENTICES**

Per Hour:

Stone Setter(800 hour) terms at the following Percentage of Stone Setters wage rate per hour:

1st	2nd	3rd	4th	5th	6th
50%	60%	70%	80%	90%	100%

Supplemental Benefits:

All Apprentices \$ 20.44

4-1Stn

**Mason - Heavy&Highway**

**01/01/2021**

**JOB DESCRIPTION** Mason - Heavy&Highway

**DISTRICT 4**

**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

**WAGES**

Per Hour: 07/01/2020

Pointer, Caulkers & Cleaners \$ 53.67

**SUPPLEMENTAL BENEFITS**

Per Hour:

Pointer, Cleaners & Caulkers \$ 27.14

**OVERTIME PAY**

See (B, E2, H) on OVERTIME PAGE

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 25, 26) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

Wages per hour:

One (1) year terms at the following wage rates.

1st	2nd	3rd	4th
\$ 26.36	\$ 29.42	\$ 34.80	\$ 41.93

Apprentices Supplemental Benefits:

(per hour paid)

\$ 14.30	\$ 18.24	\$ 20.99	\$ 21.99
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4-1PCC

**Operating Engineer - Building**

**01/01/2021**

**JOB DESCRIPTION** Operating Engineer - Building

**DISTRICT 4**

**ENTIRE COUNTIES**

Nassau, Suffolk

**WAGES**

BUILDING CATEGORIES:

CLASS " AA "CRANES:

ABI Machine (150,000lbs and over or 149,999lbs and under when driving steel sheet piles),Crane, Truck Crane, Derrick, Dragline, Dredge, Crawler Crane, Tower Crane & Pile Driver, Vertical Drill Rig (115,000lbs and over and 114,999lbs and under).

CLASS "A":

ABI Machine (149,999 and under used for augering and drilling), Asphalt Spreader, Backhoe Crawler(360 swing), Barrier Machine, CAP (ice machine), Cherrypicker CAP (over 70 tons), CMI or Maxim Spreader, Concrete Pump, Directional Boring, GradAll, Grader, Hydraulic Cherrypicker/Crane (2seats), Hoist (3drum or multi platform), Laser Screed, Loading Machine (Bucket/CAP 10yrds or more), Milling Machine (Large), Pipeline Welder, Plant Engineer, Power Winch (stone setting/structural steel), Powerhouse, Scoop Carry-All Scraper (in tandem), Sideboom Tractor (includes tank work), Track Alignment Machine, Stone Spreader (self propelled), Striping Machine (long line/truck mounted), Tree Grapple, Zamboni.

**CLASS "B":**

Backhoe (other than 360), Belt Screte, Boom Truck, Bulldozer, Boring Machine/Auger, Cherry Picker(under 70 Tons), Conveyor-Multi, Curb Machine (asphalt or concrete), Dinky Locomotive, Drill Rig (dowels)Fork Lift, Hoist (2 Drum), Loading Machine & Front End Loader, Mechanical Compactors (machine drawn), Mulch Machine(Machine Fed), Post Hole/Auger, Power Wincher (Not Included in Class "A"), Asphalt Roller, Hydraulic Pump with Boring Machine, Scoop, Carryall/Scaper, Skid Loader/Skid Steer/Bobcat, Trenching Machine, Vermeer Cutter, Work Boat, Inspection/Safety Boat.

**CLASS "C":**

Concrete Finish/Saw/Spreader, Dirt Roller, Hoist (1 drum), Interior Hoist, Milling Machine (small), Oiler Truck Crane (pile work), Power Broom, Vactor Truck, VacAll.

**CLASS "D":**

Boiler (thermoplastic), Concrete Breaker, Conveyer, Curing Machine, Fork Lift or Walk Behind (power operated), Generator, Hydra Hammer, Compactors (mechanical or hand operated), Maintenance Engineer (small equipment/well point/welding & burning), Mechanic (field man), Micro-Trap with Compressor, Oiler (Truck Crane Boom 100ft or more) Power Winch Truck Mounted (Stone Setter/Struct.Steel), Pin Puller, Portable Heaters, Power Buggies, Pump (double action diaphragm), Pump (4 inch or over), Pump (hydraulic/submersible) Jet Pump, Pulvi-Mixer, Ridge Cutter, Shot Blaster.

**CLASS "E":**

Batching Plant, Compressor (structural steel/2 or more battery), Generator (small), Grinder, Ground Heater, Power Grinder, Mixer with Skip, Mulching Machine (hand fed), Oiler, Pipeline Welder Helper, Power Washer, Pumps (up to 3 inch/single action 1 to 3 inches), Pump (gypsum), Root Cutter, Stump Chipper, Track Tamper, Tractor (caterpillar or wheel), Trenching Machine (hand), Welding Machine (pile work/structural steel), Deckhand on Work/Inspection/Safety Boat.

	07/01/2020	6/01/2021 Additional
Class "AA"	\$ 81.82	\$ 3.50
Cranes: Boom length over 100 feet add \$ 1.00		
" " " 150 " " \$ 1.50 " "		
" " " 250 " " \$ 2.00 " "		
" " " 350 " " \$ 3.00 " "		
Class "A"	68.17	3.10
Add \$3.50 for Hazardous Waste Work		
Class "B"	64.71	2.99
Add \$2.50 for Hazardous Waste Work		
Class "C"	62.41	2.93
Add \$1.50 for Hazardous Waste Work		
Class "D"	47.44	2.50
Add \$1.00 for Hazardous Waste Work		
Class "E"	45.39	2.44

**SUPPLEMENTAL BENEFITS**

Per Hour:

All Classes	\$ 38.20
Overtime Rate	32.60

**OVERTIME PAY**

See (D, O) on OVERTIME PAGE

**HOLIDAY**

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

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

"NOTE" Employee must be Employed day before and day after Holiday to receive Holiday Pay.

**REGISTERED APPRENTICES**

One(1) Year Terms at the following Rate:

1st Term	\$ 28.00	\$1.13
2nd Term	29.00	1.15
3rd Term	30.00	1.17

Supplemental Benefits per hour:

All Apprentices	\$ 15.64
Overtime Rate	5.60

4-138

**Operating Engineer - Building / Heavy&Highway** **01/01/2021**

**JOB DESCRIPTION** Operating Engineer - Building / Heavy&Highway

**DISTRICT 4**

**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

**WAGES**

Per Hour: 07/01/2020 08/01/2020

Well Driller \$ 38.40 \$ 39.30

Well Driller Helper 33.42 34.17

**Hazardous Waste Differential  
 Added to Hourly Wage:**

Level A	\$ 3.00	\$3.00
Level B	2.00	2.00
Level C	1.00	1.00

**Monitoring Well Work  
 Add to Hourly Wage:**

Level A	\$ 3.00	\$3.00
Level B	2.00	2.00

**SUPPLEMENTAL BENEFITS**

Per Hour: 07/01/2020 08/01/2020

Well Driller & Helper 10% of straight time rate plus \$ 12.50 10% of straight time rate plus \$ 12.50

Additional \$ 4.00 for Premium Time Hours Worked

**OVERTIME PAY**

See (B2, P, S) on OVERTIME PAGE

**HOLIDAY**

Paid: See (5, 6, 16, 23) on HOLIDAY PAGE  
 Overtime: See (5, 6, 16, 23) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

Apprentices at 12 Month Terms

Wages Per Hour: 07/01/2020 08/01/2020

1st Term	\$ 21.94	\$ 28.00
2nd Term	22.80	29.00
3rd Term	23.48	30.00

**SUPPLEMENTAL BENIFITS**

Per Hour:

1st Term	10% of Wage + \$ 12.50
2nd Term	10% of Wage + \$ 12.50
3rd Term	10% of Wage + \$ 12.50

Additional \$4.00/Hr. on all Overtime Hours.

4-138well

**Operating Engineer - Heavy&Highway** **01/01/2021**

**JOB DESCRIPTION** Operating Engineer - Heavy&Highway

**DISTRICT 4**

**ENTIRE COUNTIES**

Nassau, Suffolk

**WAGES**

HEAVY and HIGHWAY CATEGORIES:

**CLASS "AA" CRANES:**

ABI Machine (150,000lbs and over), ABI Machine (149,000lbs and under driving steel sheets), Crane, Truck Crane, Derrick, Dragline, Dredge, Crawler Crane, Tower Crane, Pile Driver.

**CLASS "A":**

ABI Machine (149,000lbs and under for Augering or Drilling), Asphalt Spreader, Backhoe Crawler (360 Swing & over 150,000lbs), Backhoe Crawler (360 Swing & under 149,000lbs), Barrier Machine, Cherrypicker Cap (over 70 tons), CMI or Maxim Spreader, Concrete Pump, Directional Boring, Grader, Gradall, Hoist (3 drum or multi-platform), Hydraulic Cherrypicker/crane (2 seats), Loading Machine (bucket 10 yds. or more), Laser Screed, Milling Machine (Large), Pipeline Welder, Plant Engineer. Power Winch-Stone Setting/Structural Steel or Truck Mounted, Powerhouse, Scoop-Carryall-Scaper in Tandem, Side Boom Tractor, Side Boom Tractor (Tank Work), Stone Spreader(self propelled), Striping Machine (long line/truck mounted), Tree Grapple, Tank Work, Track Alignment Machine.

**CLASS "B":**

Backhoe (other than 360), Belt Screte, Boom Truck, Bulldozer, Boring Machine/Auger, Cherry Picker (under 70 tons), Conveter-Multi, Curb Machine Asphalt/Concrete, Dinky Locomotive, Drill Rig for Dowels, Field Mechanic, Fork Lift, Hoist (2 Drum), Loading Machine, Loading Machine (Front End), Mechanical Compactors (Machine Drawn), Mulching Machine (Machine Fed), Post Hole/Auger, Power Winch (other than structural steel), Pump Hydraulic (with boring machine), Asphalt Roller, Scoop (carry-all, scraper), Skid Loader/Steer, Vermeer Cutter, Work Boat, Inspection & Safety Boat.

**CLASS "C":**

Concrete Finish/Saw/Spreader Machines, Dirt Roller, Hoist (1 drum), Interior Hoist, Oiler Truck Crane(Pile work), Power Broom, Small Milling Machine, Vactor Truck/VacAll Truck.

**CLASS "D":**

Boiler (Thermoplastic), Concrete Breaker, Conveyor, Curing Machine, Fireman, Fork lift (walk behind), Generator, Hydra Hammer, Maintenance Engineer (small equipment/Well Point/Welding & Burning), Compactors (hand operated), Pin Puller, Portable Heaters, Power Buggies, Pulvi Mixer, Pumps (double action/4 inch and over/Hydraulic/Submersible & Jet), Ridge Cutter, Robotic Unit Operator(Trenchless Pipe Rehab-Cleaning & Television of Sewers/CCTV Inspection), Shotblaster.

**CLASS "E":**

Batching Plant (On Job Site), Compressor (structural steel/2 or more in battery), Generator(small), Grinder, Ground Heater(boilers), Power Grinder, Mixer (with skip), Mulching Machine (hand feed), Oiler, Pipeline Welder Helper, Power Washer, Pump(up to 3 inches/Gypsum/Single action 1 to 3 inches), Root Cutter, Stump Grinder, Track Tamper, Tractor (caterpillar or wheel), Trenching Machine (hand), Welding Machine (Pile Work/Structural Steel), Deckhand (on Work/Inspection/Safety Boat).

	07/01/2020	6/01/2021 Additional
Class "AA"	\$ 81.07	\$ 3.48
Cranes: Boom Length over 100 feet add \$ 1.00 per hour		
" " " 150 " " \$ 1.50 " "		
" " " 250 " " \$ 2.00 " "		
" " " 350 " " \$ 3.00 " "		
Class "A"	71.86*	3.22
*Add \$3.50 for Hazardous Waste Work.		
Class "B"	67.20*	3.07
*Add \$2.50 for Hazardous Waste Work.		
Class "C"	64.83*	3.01
*Add \$1.50 for Hazardous Waste Work		
Class "D"	49.48*	2.56
*Add \$1.00 for Hazardous Waste Work		
Class "E"	47.40	2.50

"NOTE": ADD 30% to straight time hourly wage for NEW YORK STATE D.O.T. and other GOVERNMENTAL MANDATED off-shift work.

**SUPPLEMENTAL BENEFITS**

Per Hour:

ALL CLASSES \$ 38.45

Note: OVERTIME AMOUNT 32.60

**OVERTIME PAY**

See (D, O) on OVERTIME PAGE

**HOLIDAY**

Paid: See (5, 8, 15, 20, 22, 25, 26) on HOLIDAY PAGE

Overtime: See (5, 8, 15, 20, 22, 25, 26) on HOLIDAY PAGE

"Note" Employee must be employed day before and day after a holiday to receive holiday pay.

**REGISTERED APPRENTICES**

Wage per hour:

REGISTERED APPRENTICES

One(1) Year Terms at the following Rate:

		Additional
1st Term	\$ 28.00	\$ 1.31
2nd Term	29.00	1.34
3rd Term	30.00	1.37

**SUPPLEMENTAL BENEFITS:**

APPRENTICES 15.64

Note: Overtime Amount 5.60

4-138

**Operating Engineer - Heavy&Highway**

**01/01/2021**

**JOB DESCRIPTION** Operating Engineer - Heavy&Highway

**DISTRICT 4**

**ENTIRE COUNTIES**

Nassau, Suffolk

**WAGES**

Party Chief - One who directs a survey party

Instrument Man - One who runs the instrument and assists Party Chief

Rodman - One who holds the rod and in general, assists the survey party

Categories cover GPS & Under Ground Surveying

Per Hour: 07/01/2020  
 Heavy Highway/Building

Party Chief	\$ 67.76
Instrument Man	51.66
Rodman	44.30

**SUPPLEMENTAL BENEFITS**

Per Hour:

Heavy Highway/Building \$ 34.23

Premium\*:  
 Heavy Highway/Building \$ 43.40

Premium\*\*:  
 Heavy Highway/Building \$ 52.56

\* Applies to instances where 1-1/2 regular rate are paid

\*\*Applies to instances where 2 times the rate are paid.

**OVERTIME PAY**

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

\* Doubletime paid on the 9th hour on Saturday.

**HOLIDAY**

Paid: See (5, 6, 9, 11, 12, 15, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 9, 11, 12, 15, 25) on HOLIDAY PAGE

4-15D-N/S co.



**Operating Engineer - Marine Dredging**

**01/01/2021**

**JOB DESCRIPTION** Operating Engineer - Marine Dredging

**DISTRICT 4**

**ENTIRE COUNTIES**

Albany, Bronx, Cayuga, Chautauqua, Clinton, Columbia, Dutchess, Erie, Essex, Franklin, Greene, Jefferson, Kings, Monroe, Nassau, New York, Niagara, Orange, Orleans, Oswego, Putnam, Queens, Rensselaer, Richmond, Rockland, St. Lawrence, Suffolk, Ulster, Washington, Wayne, Westchester

**WAGES**

These wages do not apply to Operating Engineers on land based construction projects. For those projects, please see the Operating Engineer Heavy/Highway Rates. The wage rates below for all equipment and operators are only for marine dredging work in navigable waters found in the counties listed above.

Per Hour:	07/01/2020	10/01/2020
CLASS A1 Deck Captain, Leverman Mechanical Dredge Operator Licensed Tug Operator 1000HP or more.	\$ 40.31	\$ 41.42
CLASS A2 Crane Operator (360 swing)	35.92	36.91
CLASS B Dozer, Front Loader Operator on Land	To conform to Operating Engineer Prevailing Wage in locality where work is being performed including benefits.	
CLASS B1 Derrick Operator (180 swing) Spider/Spill Barge Operator Operator II, Fill Placer, Engineer, Chief Mate, Electrician, Chief Welder, Maintenance Engineer Licensed Boat, Crew Boat Operator	34.86	35.82
CLASS B2 Certified Welder	32.82	33.72
CLASS C1 Drag Barge Operator, Steward, Mate, Assistant Fill Placer	31.92	32.80
CLASS C2 Boat Operator	30.89	31.74
CLASS D Shoreman, Deckhand, Oiler, Rodman, Scowman, Cook, Messman, Porter/Janitor	25.66	26.37

**SUPPLEMENTAL BENEFITS**

Per Hour:

THE FOLLOWING SUPPLEMENTAL BENEFITS APPLY TO ALL CATEGORIES

	07/01/2020	10/01/2020
All Classes A & B	\$11.58 plus 7.5% of straight time wage, Overtime hours add \$ 0.63	\$11.98 plus 8% of straight time wage, Overtime hours add \$ 0.63
All Class C	\$11.28 plus 7.5% of straight time wage, Overtime hours add \$ 0.48	11.68 plus 8% of straight time wage, Overtime hours add \$ 0.48
All Class D	\$10.98 plus 7.5%	11.38 plus 8%

of straight time  
wage, Overtime hours  
add \$ 0.33

of straight time  
wage, Overtime hours  
add \$ 0.33

**OVERTIME PAY**

See (B2, F, R) on OVERTIME PAGE

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE  
Overtime: See (5, 6, 8, 15, 26) on HOLIDAY PAGE

4-25a-MarDredge

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**Operating Engineer - Survey Crew - Consulting Engineer**

**01/01/2021**

**JOB DESCRIPTION** Operating Engineer - Survey Crew - Consulting Engineer

**DISTRICT 9**

**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Suffolk, Westchester

**PARTIAL COUNTIES**

Dutchess: That part in Dutchess County lying South of the North City line of Poughkeepsie.

**WAGES**

Feasibility and preliminary design surveying, any line and grade surveying for inspection or supervision of construction.

Per hour: 07/01/2020  
Survey Classifications

Party Chief \$ 45.32  
Instrument Man 37.85  
Rodman 33.14

**SUPPLEMENTAL BENEFITS**

Per Hour:

All Crew Members: \$ 19.50

**OVERTIME PAY**

OVERTIME:.... See ( B, E\*, Q, V ) ON OVERTIME PAGE.

\*Doubletime paid on the 9th hour on Saturday.

**HOLIDAY**

Paid: See (5, 6, 7, 11, 16) on HOLIDAY PAGE  
Overtime: See (5, 6, 7, 11, 16) on HOLIDAY PAGE

9-15dconsult

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**Operating Engineer - Trenchless Pipe Rehab**

**01/01/2021**

**JOB DESCRIPTION** Operating Engineer - Trenchless Pipe Rehab

**DISTRICT 4**

**ENTIRE COUNTIES**

Nassau, Suffolk

**WAGES**

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IMPORTANT NOTE: This Category & Classifications are now located in  
Operating Engineers/Heavy Highway & Laborers/ Heavy Highway.

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Per Hour: 07/01/2020  
(SEE)

Robotic Unit Operator Operator(class D)  
Technician/Boiler, Generator Operator(class D)  
AM Liner/Hydra Seal Laborer(Grp#3)  
Hobas Pipe, Polyethylene Pipe or  
Pull and Inflate Liner Laborer(Grp#3)

**OVERTIME PAY**

**HOLIDAY**

4-138TrchPReh

**Painter**

**01/01/2021**

**JOB DESCRIPTION** Painter

**DISTRICT 8**

**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Suffolk, Westchester

**WAGES**

Per hour: 07/01/2020

Brush \$ 49.20\*

Abatement/Removal of lead based or lead containing paint on materials to be repainted. 49.20\*

Spray & Scaffold \$ 52.20\*

Fire Escape 52.20\*

Decorator 52.20\*

Paperhanger/Wall Coverer 51.96\*

\*Subtract \$ 0.10 to calculate premium rate.

**SUPPLEMENTAL BENEFITS**

Per hour: 07/01/2020

Paperhanger \$ 30.70

All others 28.81

Premium 32.10\*\*

\*\*Applies only to "All others" category, not paperhanger journeyworker.

**OVERTIME PAY**

See (A, H) on OVERTIME PAGE

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE

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

**REGISTERED APPRENTICES**

One ( 1 ) year terms at the following wage rate.

Per hour: 07/01/2020

Appr 1st term... \$ 19.12\*

Appr 2nd term... 24.52\*

Appr 3rd term... 29.72\*

Appr 4th term... 39.75\*

\*Subtract \$ 0.10 to calculate premium rate.

Supplemental benefits:

Per Hour: 07/01/2020

Appr 1st term... \$ 14.32

Appr 2nd term... 17.78

Appr 3rd term... 20.50

Appr 4th term... 25.89

8-NYDC9-B/S

**Painter**

**01/01/2021**

**JOB DESCRIPTION** Painter

**DISTRICT 8**

**ENTIRE COUNTIES**

Putnam, Suffolk, Westchester

**PARTIAL COUNTIES**

Nassau: All of Nassau except the areas described below: Atlantic Beach, Ceaderhurst, East Rockaway, Gibson, Hewlett, Hewlett Bay, Hewlett Neck, Hewlett Park, Inwood, Lawrence, Lido Beach, Long Beach, parts of Lynbrook, parts of Oceanside, parts of Valley Stream, and Woodmere. Starting on the South side of Sunrise Hwy in Valley Stream running east to Windsor and Rockaway Ave., Rockville Centre is the boundary line up to Lawson Blvd. turn right going west all the above territory. Starting at Union Turnpike and Lakeville Rd. going north to Northern Blvd. the west side of Lakeville road to Northern blvd. At Northern blvd. going east the district north of Northern blvd. to Port Washington Blvd. West of Port Washington blvd.to St.Francis Hospital then north of first traffic light to Port Washington and Sands Point, Manor HAven, Harbour Acres.

**WAGES**

Per hour: 07/01/2020  
Drywall Taper \$ 49.20\*

\*Subtract \$ 0.10 to calculate premium rate.

**SUPPLEMENTAL BENEFITS**

Per hour: 07/01/2020  
Journeyman \$ 28.81

**OVERTIME PAY**

See (A, H) on OVERTIME PAGE

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE  
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

Wages - Per Hour: 07/01/2020

1500 hour terms at the following wage rate:

1st term \$ 19.12\*  
2nd term 24.52\*  
3rd term 29.72\*  
4th term 39.75\*

\*Subtract \$ 0.10 to calculate premium rate.

Supplemental Benefits - Per hour:

One year term (1500 hours) at the following dollar amount.

1st year \$ 14.32  
2nd year 17.78  
3rd year 20.40  
4th year 25.89

8-NYDCT9-DWT

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**Painter**

**01/01/2021**

**JOB DESCRIPTION** Painter

**DISTRICT 8**

**ENTIRE COUNTIES**

Bronx, Kings, New York, Queens, Richmond

**PARTIAL COUNTIES**

Nassau: Atlantic Beach, Ceaderhurst, East Rockaway, Hewlett, Hewlett Bay, Hewlett Neck, Hewlett Park, Inwood, Lawrence, Lido Beach, Long Beach, parts of Lynbrook, parts of Oceanside, parts of Valley Stream, and Woodmere. Starting on South side of Sunrise Hwy in Valley Stream running east to Windsor and Rockaway Ave, Rockville is the boundary line up to Lawson Blvd, turning right going west all the above territory. Starting at Union Turnpike & Lakeville Rd going north to northern Blvd. the west side of Lakeville Rd to Northern Blvd. At Northern Blvd doing east the district north of Northern blvd to Port Washington blvd. West of Port Washington blvd to St.Francis Hospital then north of first traffic light to Port Washington & Sands Point, Manor Haven, & Harbour Acres.

**WAGES**

Per hour: 07/01/2020  
Drywall Taper \$ 54.03

**SUPPLEMENTAL BENEFITS**

Per Hour:  
Journeyworker: \$ 21.70

**OVERTIME PAY**

See (A, H) on OVERTIME PAGE

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE  
Overtime: See (4, 6, 8, 11, 18, 19, 25, 26) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

This applies to all apprentices who were enrolled in the program prior to December 27, 2017

Wage per hour:

12 month terms (year consists of 1500 hours).

	07/01/2020
1st year	\$ 20.86
2nd year	32.48
3rd year	43.26

Supplemental Benefits per hour:

One (1) year term at the following dollar amount:

1st term	\$ 12.25
2nd term	17.12
3rd term	19.41

This applies to all apprentices who were enrolled in the program after December 27, 2017

1st term	\$ 20.86
2nd term	27.09
3rd term	32.48
4th term	43.26

Supplemental Benefits per hour:

1st term	\$ 12.25
2nd term	15.98
3rd term	17.12
4th term	19.41

8-NYC9-1974-DWT

**Painter - Bridge & Structural Steel**

**01/01/2021**

**JOB DESCRIPTION** Painter - Bridge & Structural Steel

**DISTRICT 8**

**ENTIRE COUNTIES**

Albany, Bronx, Clinton, Columbia, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Kings, Montgomery, Nassau, New York, Orange, Putnam, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Suffolk, Sullivan, Ulster, Warren, Washington, Westchester

**WAGES**

Per Hour:

STEEL:

Bridge Painting:	07/01/2020	10/01/2020	10/01/2021
	\$ 50.25	\$ 51.50	\$ 53.00
	+ 7.88*	+ 8.63*	+ 9.63*

ADDITIONAL \$6.00 per hour for POWER TOOL/SPRAY, whether straight time or overtime.

NOTE: All premium wages are to be calculated on base rate per hour only.

\* For the period of May 1st to November 15th, this amount is payable up to 40 hours. For the period of Nov 16th to April 30th, this amount is payable up to 50 hours. EXCEPTION: First and last week of employment, and for the weeks of Memorial Day, Independence Day and Labor Day, where the amount is paid for the actual number of hours worked (no cap).

NOTE: Generally, 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.

**SHIFT WORK:**

When directly specified in public agency or authority contract documents for an employer to work a second shift and works the second shift with employees other than from the first shift, all employees who work the second shift will be paid 10% of the base wage shift differential in lieu of overtime for the first eight (8) hours worked after which the employees shall be paid at time and one half of the regular wage rate. When a single irregular work shift is mandated in the job specifications or by the contracting agency, wages shall be paid at time and one half for single shifts between the hours of 3pm-11pm or 11pm-7am.

**SUPPLEMENTAL BENEFITS**

Per Hour:

Journeyworker:	07/01/2020	10/01/2020	10/01/2021
	\$ 10.20	\$ 10.90	\$ 10.90
	+ 29.65*	+ 30.00*	+ 30.60*

\* For the period of May 1st to November 15th, this amount is payable up to 40 hours. For the period of Nov 16th to April 30th, this amount is payable up to 50 hours. EXCEPTION: First and last week of employment, and for the weeks of Memorial Day, Independence Day and Labor Day, where the amount is paid for the actual number of hours worked (no cap).

**OVERTIME PAY**

See (B, F, R) on OVERTIME PAGE

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE  
 Overtime: See (4, 6) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

Wage - Per hour:

Apprentices: (1) year terms

	07/01/2020	10/01/2020	10/01/2021
1st year	\$ 20.10 + 3.15*	\$ 20.60 + 3.45*	\$ 21.20 + 3.86*
2nd year	\$ 30.15 + 4.73*	\$ 30.90 + 5.18*	\$ 31.80 + 5.78*
3rd year	\$ 40.20 + 6.30*	\$ 41.20 + 6.90*	\$ 42.40 + 7.71*

Supplemental Benefits - Per hour:

1st year	\$ .25 + 11.86*	\$ .25 + 12.00*	\$ .25 + 12.24*
2nd year	\$ 10.20 + 17.79*	\$ 10.90 + 18.00*	\$ 10.90 + 18.36*
3rd year	\$ 10.20 + 23.72*	\$ 10.90 + 24.00*	\$ 10.90 + 24.48*

NOTE: All premium wages are to be calculated on base rate per hour only.

8-DC-9/806/155-BrSS

**Painter - Line Striping**

**01/01/2021**

**JOB DESCRIPTION** Painter - Line Striping

**DISTRICT 8**

**ENTIRE COUNTIES**

Albany, Bronx, Clinton, Columbia, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Kings, Montgomery, Nassau, New York, Orange, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Suffolk, Sullivan, Ulster, Warren, Washington, Westchester

**WAGES**

Per hour:

	07/01/2020	07/01/2021	07/01/2022
Painter (Striping-Highway):			
Striping-Machine Operator*	\$ 30.10	\$ 30.32	\$ 31.53
Linerman Thermoplastic	\$ 36.53	\$ 36.93	\$ 38.34

Note: \* Includes but is not limited to: Positioning of cones and directing of traffic using hand held devices. Excludes the Driver/Operator of equipment used in the maintenance and protection of traffic safety.

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 paid:	07/01/2020	07/01/2021	07/01/2022
Journeyworker:			
Striping Machine Operator:	\$ 9.16	\$ 10.03	\$ 10.03
Linerman Thermoplastic:	\$ 9.16	\$ 10.03	\$ 10.03

**OVERTIME PAY**

See (B, B2, E2, F, S) on OVERTIME PAGE

**HOLIDAY**

Paid: See (5, 20) on HOLIDAY PAGE  
 Overtime: See (5, 20) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

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

	07/01/2020	12/31/2020
1st Term:	\$ 12.04	\$ 12.50
2nd Term:	\$ 18.06	\$ 18.19
3rd Term:	\$ 24.08	\$ 24.26

Supplemental Benefits per hour:

1st term:	\$ 9.16	\$ 10.03
2nd Term:	\$ 9.16	\$ 10.03
3rd Term:	\$ 9.16	\$ 10.03

8-1456-LS

**Painter - Metal Polisher**

**01/01/2021**

**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**

	07/01/2020
Metal Polisher	\$ 36.33
Metal Polisher*	37.43
Metal Polisher**	40.33

\*Note: Applies on New Construction & complete renovation

\*\* Note: Applies when working on scaffolds over 34 feet.

**SUPPLEMENTAL BENEFITS**

Per Hour: 07/01/2020

Journeyworker:  
 All classification \$ 9.94

**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:

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

	07/01/2020
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  
 \*\* Note: Applies when working on scaffolds over 34 feet.

Supplemental benefits:  
 Per hour:

1st year	\$ 6.69
2nd year	6.69
3rd year	6.69

8-8A/28A-MP

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**Plasterer** **01/01/2021**

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**JOB DESCRIPTION** Plasterer **DISTRICT 9**

**ENTIRE COUNTIES**  
 Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

**WAGES**  
 Per hour:  
07/01/2020

Building:  
 Plasterer/Traditional & \$ 50.73\*  
 Spraying Fireproofing

**SUPPLEMENTAL BENEFITS**  
 Per hour:  
 Journeyworker \$ 22.37

**OVERTIME PAY**  
 See (B, E, Q) on OVERTIME PAGE  
 \*When calculating overtime pay, subtract \$5.00 from wages.

**HOLIDAY**  
 Paid: See (1) on HOLIDAY PAGE  
 Overtime: See (5, 6, 25) on HOLIDAY PAGE

**REGISTERED APPRENTICES**  
 Wages:  
 (per hour)  
 800 hours term:  
07/01/2020

1st term	\$28.04
2nd term	\$30.59
3rd term	\$35.69
4th term	\$38.23

Supplemental Benefits:  
 (per hour):  
 (800) hours term:  
07/01/2020

1st term	\$ 14.27
2nd term	\$ 15.14
3rd term	\$ 16.89
4th term	\$ 17.76

9-262

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**Plumber** **01/01/2021**

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**JOB DESCRIPTION** Plumber **DISTRICT 4**

**ENTIRE COUNTIES**  
 Nassau, Suffolk



**WAGES**

Per Hour: 07/01/2020 5/01/2021

Plumber/  
 PUMP & TANK \$ 45.49 \$45.74

**SUPPLEMENTAL BENEFITS**

Per Hour:

Plumber \$ 30.64 \$ 31.89

**OVERTIME PAY**

See (B, B2, E2, Q, \*V) on OVERTIME PAGE  
 (V) For Sundays & Holidays if Worked Only

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE  
 Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

One(1) Year Terms at the Following  
 Percentage of Journeymans wage:

1st Term 30%  
 2nd Term 40%  
 3rd Term 50%  
 4th Term 60%  
 5th Term 70%

Supplemental Benefits Per Hour:

1st Term \$18.72 \$19.97  
 2nd Term \$19.36 \$20.61  
 3rd Term \$20.18 \$21.43  
 4th Term \$20.56 \$21.81  
 5th Term \$23.79 \$25.04

4-200 Pump & Tank

**Plumber**

**01/01/2021**

**JOB DESCRIPTION** Plumber

**DISTRICT 4**

**ENTIRE COUNTIES**

Nassau, Suffolk

**WAGES**

Per Hour: 07/01/2020 11/01/2020

Plumber \$ 52.48 \$ 53.48

**SUPPLEMENTAL BENEFITS**

Per Hour:

Plumber \$ 43.98 \$ 45.98

**OVERTIME PAY**

See (A, E, Q, \*V) on OVERTIME PAGE  
 CODE "V" is only for SUNDAYS and HOLIDAYS THAT ARE WORKED

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE  
 Overtime: See (5, 6, 15, 16, 25) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

One(1) Year Terms at the following percentage of Plumbers Rate:

1st Term 2nd Term 3rd Term 4th Term 5th Term  
 30% 40% 50% 60% 70%

Supplemental Benefits per hour:

07/01/2020 11/01/2020  
 1st Term \$ 31.96 \$ 32.46  
 2nd Term 34.27 34.77

3rd Term	35.64	36.14
4th Term	37.13	37.63
5th Term	38.71	39.21

4-200

**Plumber** **01/01/2021**

**JOB DESCRIPTION** Plumber **DISTRICT 4**

**ENTIRE COUNTIES**

Nassau, Suffolk

**WAGES**

Per Hour:	07/01/2020	5/01/2021
Plumber		
MAINTENANCE ONLY	\$ 34.74	\$ 33.05

Maintenance: Correction of problem(s)with the existing fixture or group of fixtures, preventive repairs or servicing of said fixtures

**SUPPLEMENTAL BENEFITS**

SUPPLEMENTAL BENEFITS

Per Hour:		
Plumber		
Maintenance	\$ 22.36	\$ 19.30

**OVERTIME PAY**

See (B, B2, J) on OVERTIME PAGE

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE  
 Overtime: See (5, 6, 15, 16) on HOLIDAY PAGE

4-200 Maintance

**Roofer** **01/01/2021**

**JOB DESCRIPTION** Roofer **DISTRICT 4**

**ENTIRE COUNTIES**

Nassau, Suffolk

**WAGES**

Per Hour	07/01/2020	05/01/2021
ROOFER/Waterproofer		
Total Wage to be Paid	\$ 49.25	Additional \$2.50/Hr.

"Base" Wage \$ 44.25\*\*

**SUPPLEMENTAL BENEFITS**

Per Hour:	
ROOFER/Waterproofer	\$ 33.86

**OVERTIME PAY**

Per Hour:  
 NEW ROOF SEE (B,E,Q)  
 RE-ROOF SEE (B,E,E2,Q)  
 NOTE:\*\* Overtime Pay to be calculated on "BASE" Wage then add \$5.00.  
 (Example: \$44.25 x time and one half = \$66.37 + \$5.00 = \$71.37)

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE  
 Overtime: See (5, 6, 13, 16, 25) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

(1) Year terms at the following Percentage of Roofers/Waterproofers Wage.

1st	2nd	3rd	4th
40%	50%	70%	80%

Supplemental Benefits per hour:  
 07/01/2020

1st Term	\$ 9.48
2nd Term	11.71
3rd Term	23.87
4th Term	31.20

4-154

**Sheetmetal Worker** **01/01/2021**

**JOB DESCRIPTION** Sheetmetal Worker **DISTRICT 4**

**ENTIRE COUNTIES**  
 Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

**WAGES**

Per Hour:	07/01/2020	8/01/2020
Sign Erector	\$ 50.79	\$ 52.29

NOTE: Structurally Supported Overhead Highway Signs(See STRUCTURAL IRON WORKER CLASS)

**SUPPLEMENTAL BENEFITS**

Per Hour:	07/01/2020	8/01/2020
Sign Erector	\$ 49.82	\$ 51.26

**OVERTIME PAY**  
 See (A, F, S) on OVERTIME PAGE

**HOLIDAY**  
 Paid: See (5, 6, 10, 11, 12, 16, 25) on HOLIDAY PAGE  
 Overtime: See (5, 6, 10, 11, 12, 16, 25) on HOLIDAY PAGE

**REGISTERED APPRENTICES**  
 Per Hour:  
 6 month Terms at the following percentage of Sign Erectors wage rate:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
35%	40%	45%	50%	55%	60%	65%	70%	75%	80%

**SUPPLEMENTAL BENEFITS**  
 Per Hour:

07/01/2020									
1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 13.96	\$ 15.81	\$ 17.68	\$ 19.56	\$ 27.26	\$ 29.65	\$ 32.80	\$ 35.26	\$ 37.71	\$ 40.15

8/01/2020									
1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 14.34	\$ 16.26	\$ 18.17	\$ 20.10	\$ 28.02	\$ 30.47	\$ 33.72	\$ 36.27	\$ 38.77	\$ 41.29

4-137-SE

**Sheetmetal Worker** **01/01/2021**

**JOB DESCRIPTION** Sheetmetal Worker **DISTRICT 4**

**ENTIRE COUNTIES**  
 Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

**WAGES**

Per Hour:	07/01/2020
Sheetmetal Worker	\$ 56.61
Temporary Operation or Maintenance of Fans	46.49

**SUPPLEMENTAL BENEFITS**

Per Hour:	
Sheetmetal Worker	\$ 47.90
Maintenance Worker	47.90

**OVERTIME PAY**

See (B, E, E2, Q, V) on OVERTIME PAGE  
 For Maintenance See Codes B,E, Q & V

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE  
 Overtime: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

Per Hour:Wages

Six(6) Month Terms As Follows:

1st & 2nd Term	\$ 19.85
3rd & 4th Term	25.51
5th & 6th Term	31.17
7th & 8th Term	36.66
9th Term	45.31

Per Hour: Supplemental Benefits

1st & 2nd Term	\$ 17.63
3rd & 4th Term	24.19
5th & 6th Term	28.51
7th & 8th Term	34.97
9th Term	39.30

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**Steamfitter**

**01/01/2021**

**JOB DESCRIPTION** Steamfitter

**DISTRICT 4**

**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

**WAGES**

Per Hour:	07/01/2020	01/01/2021
AC Service/Heat Service	\$ 42.85	Additional \$0.75/Hr.

Refrigeration, A/C, Oil Burner and Stoker Service and Repair.  
 Refrigeration Compressor installation. (Not to exceed 5 Hp.)  
 Air Condition / Heating Compressor installation up to 15hp (Not to exceed 15 tons on any job).

**SUPPLEMENTAL BENEFITS**

Per Hour

AC Service/Heat Service	\$ 17.96
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**OVERTIME PAY**

See (B, E, Q) on OVERTIME PAGE

**HOLIDAY**

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

**REGISTERED APPRENTICES**

1 year terms  
 Wages per hour:

1st Term	\$ 20.75
2nd Term	25.04
3rd Term	29.17
4th Term	35.22

Benefits per hour:

1st Term	\$ 12.55
2nd Term	13.73
3rd Term	14.97
4th Term	16.65

4-638B-StmFtrRef

**Steamfitter** **01/01/2021**

**JOB DESCRIPTION** Steamfitter **DISTRICT 4**

**ENTIRE COUNTIES**  
 Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

**WAGES**  
 Per Hour: 07/01/2020

Sprinkler/Steam Fitter \$ 65.01

Temporary Heat & AC Fitter \$ 49.42

Note: Add 15% to Hourly Wage for "Contracting Agency" Mandated Off Shift Work.

**SUPPLEMENTAL BENEFITS**

Per Hour:  
 Sprinkler/Steam Fitter \$ 50.98

Temporary Heat & AC Fitter 41.83

Note: Add 15% to Hourly Benefit for "Contracting Agency" Mandated Off Shift Work.

**OVERTIME PAY**

All overtime which is defined as work after 7 hours a day plus Saturday, Sunday and Holidays are subject to the amounts below\*:

\*Note: The posted overtime rates are applicable after 8 hours plus Saturday, Sunday and Holidays for Temporary Heat & AC Fitter on Fire Protection/Sprinkler contracts under \$3,000,000.00 and HVAC/Mechanical contracts under \$30,000,000.00:

Sprinkler/Steam	Wages \$ 129.96	Benefit \$ 108.08
Temp Heat/AC	Wages \$ 98.78	Benefit \$ 82.78

**HOLIDAY**  
 Paid: See (1) on HOLIDAY PAGE  
 Overtime: See (5, 6, 11, 16, 25) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

1 year Terms at the Following:

WAGES per hour:				
1st Term	2nd Term	3rd Term	4th Term	5th Term
\$ 26.04	\$ 32.54	\$ 42.28	\$ 52.02	\$ 55.27
Enrolled After 07/01/2017		\$ 39.03	\$ 45.53	\$ 52.02

SUPPLEMENTAL BENEFIT per hour:				
1st Term	2nd Term	3rd Term	4th Term	5th Term
\$ 20.92	\$ 25.95	\$ 33.45	\$ 40.96	\$ 43.47
Enrolled After 07/01/2017		\$ 30.94	\$ 35.97	\$ 40.96

Premium Time Amounts:				
\$ 40.96	\$ 51.02	\$ 66.02	\$ 81.04	\$ 86.06
Enrolled After 07/01/2017		\$ 61.00	\$ 71.06	\$ 81.04

4-638A-StmSpFtr

**Teamster - Asphalt Delivery** **01/01/2021**

**JOB DESCRIPTION** Teamster - Asphalt Delivery **DISTRICT 4**

**ENTIRE COUNTIES**  
 Nassau, Suffolk

**WAGES**

Per Hour:

Heavy Construction Work:

Shall include the supply of Asphalt for construction, improvement and modification of all or any part of Streets, Highways, Bridges, Tunnels, Railroads, Canals, Dams, Airports, Schools, Power Generation Plants, where distance between project and asphalt plant is not more than 50 miles.

TRUCK DRIVER  
07/01/2020  
Asphalt Delivery \$ 37.545

Light Construction Work:  
Shall include the supply of Asphalt for construction of Single & Multi Family Homes, Town Houses, Apartment Buildings, including Driveways, Streets and Curbs within those projects. Parking Lots, Office Buildings, where distance between project and asphalt plant is not more than 50 miles.

TRUCK DRIVER  
07/01/2020  
Asphalt Delivery \$ 32.16

**SUPPLEMENTAL BENEFITS**

Per Hour:

Heavy Construction Work

TRUCK DRIVER  
07/01/2020  
Asphalt Delivery \$ 46.6825

Light Construction Work

TRUCK DRIVER  
07/01/2020  
Asphalt Delivery \$ 13.05

**OVERTIME PAY**

See (B, \*B2, E, \*\*I, P, \*\*\*R, \*\*\*\*U) on OVERTIME PAGE

(NOTE) PREMIUM PAY of 25% on straight time hours for New York State D.O.T. and or other GOVERNMENTAL MANDATED off shift work.

Note: (B,E,P,T&\*U) Apply to Heavy Construction.

Note: (B2,I,T&\*U) Apply to Light Construction.

Note: (\*U) Only applies after 8 hours worked on holiday.

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, \*16, \*\*25) on HOLIDAY PAGE

NOTE: (\*16) Paid at Double if Worked; (\*\*25) Paid at Double if Worked.

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**Teamster - Building**

**01/01/2021**

**JOB DESCRIPTION** Teamster - Building

**DISTRICT 4**

**ENTIRE COUNTIES**

Nassau, Suffolk

**WAGES**

Per Hour:

Truck Driver (Building Demolition & Debris)

07/01/2020

Trailers \$ 34.61

Straight Jobs \$ 34.31

**SUPPLEMENTAL BENEFITS**

Per Hour:

All Classifications

07/01/2020

\$ 34.34

**OVERTIME PAY**

See (B, E, S1) on OVERTIME PAGE

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 12, 15, 25, 26) on HOLIDAY PAGE

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**Teamster - Delivery of Concrete** **01/01/2021**

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**JOB DESCRIPTION** Teamster - Delivery of Concrete

**DISTRICT 4**

**ENTIRE COUNTIES**

Nassau, Suffolk

**WAGES**

Per Hour:

Heavy Construction Work:

Shall include the supply of Ready-Mix Concrete for construction, improvement and modification of all or any part of Streets, Highways, Bridges, Tunnels, Railroads, Canals, Dams, Airports, Schools & Power Generation Plants, where distance between project and asphalt plant is not more than 50 miles.

TRUCK DRIVER

	07/01/2020
Concrete Delivery	\$ 40.005

Light Construction Work:

Shall include the supply of Ready-Mix Concrete for construction of Single & Multi Family Homes, Town Houses, Apartment Buildings, including Driveways, Streets and Curbs within those projects. Parking Lots and Office Buildings, where distance between project and asphalt plant is not more than 50 miles.

TRUCK DRIVER

	07/01/2020
Concrete Delivery	\$ 36.815

**SUPPLEMENTAL BENEFITS**

Per Hour:

Heavy Construction Work	07/01/2020
Concrete Delivery	\$ 45.475

Light Construction Work	07/01/2020
Concrete Delivery	\$ 15.355

**OVERTIME PAY**

NOTE: Heavy Construction: B2, I  
Light Construction: B, E, P

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE  
Overtime: See (5, 6, \*16, \*\*25) on HOLIDAY PAGE  
NOTE: (\*16) Paid at Double if Worked. (\*\*25) Paid at Double if Worked.

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**Teamster - Heavy&Highway** **01/01/2021**

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**JOB DESCRIPTION** Teamster - Heavy&Highway

**DISTRICT 4**

**ENTIRE COUNTIES**

Nassau, Suffolk

**WAGES**

Per Hour:

Heavy Construction Work:

Shall include the construction, improvement or modification of all or any part of Streets, Highways, Bridges, Tunnels, Railroads, Canals, Dams, Airports, Schools, Power Generation Plants.

	07/01/2020
Site Excavating (Chauffeurs)	\$ 37.545

Light Construction Work:

Shall include the construction, improvement and modification of Single & Multi Family Homes, Town Houses, Apartment Buildings, including Driveways, Streets and Curbs within those projects. Parking Lots and Office Buildings.

Site Excavating (Chauffeurs)	32.16
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**SUPPLEMENTAL BENEFITS**

Per Hour: 07/01/2020

Heavy Construction Work  
Chauffeurs \$ 46.6825

Light Construction Work  
Chauffeurs 13.05

**OVERTIME PAY**

See (B, \*B2, E, \*\*I, P, \*\*\*R, \*\*\*\*U) on OVERTIME PAGE

(NOTE) PREMIUM PAY of 25% on straight time hours for NEW YORK STATE D.O.T. and or other GOVERNMENTAL MANDATED off shift work.

Note: (B,E,P,T & \*U) Apply to Heavy Construction.

Note: (B2,I,T & \*U) Apply to Light Construction.

Note: (\*U) Only applies after 8 hours work on holiday

**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, \*16, \*\*25) on HOLIDAY PAGE

NOTE:(\*16) Paid at Double if Worked. (\*\*25) Paid at Double if Worked.

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**Welder**

**01/01/2021**

**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**

Per hour 07/01/2020

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
- ( I ) 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.)

## 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



**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) 485-1870 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 Firm     Public Work District Office    Date: \_\_\_\_\_

**A. Public Work Contract to be let by:** (Enter Data Pertaining to Contracting/Public Agency)

1. Name and complete address  (Check if new or change)

Telephone: (    )

Fax: (    )

E-Mail: \_\_\_\_\_

2. NY State Units (see Item 5)

- |   |  |
|---|--|
| <input type="checkbox"/> 01 DOT                                   | <input type="checkbox"/> 07 City   |
| <input type="checkbox"/> 02 OGS                                   | <input type="checkbox"/> 08 Local School District  |
| <input type="checkbox"/> 03 Dormitory Authority                   | <input type="checkbox"/> 09 Special Local District, i.e.,<br>Fire, Sewer, Water District |
| <input type="checkbox"/> 04 State University<br>Construction Fund | <input type="checkbox"/> 10 Village  |
| <input type="checkbox"/> 05 Mental Hygiene<br>Facilities Corp.    | <input type="checkbox"/> 11 Town   |
| <input type="checkbox"/> 06 OTHER N.Y. STATE UNIT                 | <input type="checkbox"/> 12 County   |
|   | <input type="checkbox"/> 13 Other Non-N.Y. State<br>(Describe)                           |

3. SEND REPLY TO  check if new or change)  
Name and complete address: \_\_\_\_\_

Telephone:(    )

Fax: (    )

E-Mail: \_\_\_\_\_

4. SERVICE REQUIRED. Check appropriate box and provide project information.

New Schedule of Wages and Supplements.

APPROXIMATE BID DATE : \_\_\_\_\_

Additional Occupation and/or Redetermination

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 :

- |   |  |
|---|--|
| <input type="checkbox"/> Construction (Building, Heavy Highway/Sewer/Water) | <input type="checkbox"/> Guards, Watchmen                                |
| <input type="checkbox"/> Tunnel   | <input type="checkbox"/> Janitors, Porters, Cleaners, Elevator Operators |
| <input type="checkbox"/> Residential  | <input type="checkbox"/> Moving furniture and equipment                  |
| <input type="checkbox"/> Landscape Maintenance                              | <input type="checkbox"/> Trash and refuse removal                        |
| <input type="checkbox"/> Elevator maintenance                               | <input type="checkbox"/> Window cleaners                                 |
| <input type="checkbox"/> Exterminators, Fumigators                          | <input type="checkbox"/> Other (Describe)                                |
| <input type="checkbox"/> Fire Safety Director, NYC Only                     |  |

9. Has this project been reviewed for compliance with the Wicks 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.

**Debarment Database:** 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, or 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**



**NYS DOL Bureau of Public Work Debarment List 01/13/2021**

**Article 8**

AGENCY	Fiscal Officer	FEIN	EMPLOYER NAME	EMPLOYER DBA NAME	ADDRESS	DEBARMENT START DATE	DEBARMENT END DATE
DOL	NYC	****9839	A.J.S. PROJECT MANAGEMENT, INC.		149 FIFTH AVENUE NEW YORK NY 10010	12/29/2016	12/29/2021
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	****6775	ADVENTURE MASONRY CORP.		1535 RICHMOND AVENUE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	NYC		AGOSTINHO TOME		405 BARRETTO ST BRONX NY 10474	05/31/2018	05/31/2023
DOL	DOL		AJ TORCHIA		10153 ROBERTS RD SAUQUOIT NY 13456	08/09/2016	08/09/2021
DOL	DOL		AMADEO J TORCHIA	TORCHIA'S HOME IMPROVEMENT	10153 ROBERTS RD SAUQUOIT NY 13456	08/09/2016	08/09/2021
DOL	NYC		AMJAD NAZIR		2366 61ST ST BROOKLYN NY 11204	12/15/2016	12/15/2021
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		ANITA SALERNO		158 SOLAR ST SYRACUSE NY 13204	01/07/2019	01/07/2024
DOL	NYC		ANTHONY J SCLAFANI		149 FIFTH AVE NEW YORK NY 10010	12/29/2016	12/29/2021
DOL	DOL		ANTHONY PERGOLA		3 WEST MAIN ST/SUITE 208 ELMSFORD NY 10323	01/23/2017	01/23/2022
DOL	DOL		ANTONIO ESTIVEZ		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
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	DOL		ARVINDER ATWAL		65 KENNETH PLACE NEW HYDE PARK NY 11040	07/19/2017	07/19/2022
DOL	NYC	****6683	ATLAS RESTORATION CORP.		35-12 19TH AVENUE ASTORIA NY 11105	08/02/2017	08/02/2022
DOL	NYC	****5532	ATWAL MECHANICALS, INC		65 KENNETH PLACE NEW HYDE PARK NY 11040	07/19/2017	07/19/2022
DOL	NYC	****2591	AVI 212 INC.		260 CROPSEY AVENUE APT 11GBROOKLYN NY 11214	10/30/2018	10/30/2023
DOL	NYC		AZIDABEGUM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	NYC		BALWINDER SINGH		421 HUDSON ST SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	NYC	****3915	BEACON RESTORATION INC		SUITE B-8 782 PELHAM PARKWAY SOUTHBRONX NY 10462	04/21/2016	04/21/2021
DOL	NYC	****8416	BEAM CONSTRUCTION, INC.		50 MAIN ST WHITE PLAINS NY 10606	01/04/2019	01/04/2024
DOL	DOL		BIAGIO CANTISANI			06/12/2018	06/12/2023
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	****8551	BRANDY'S MASONRY		216 WESTBROOK STREET P O BOX 304SAYRE PA 18840	08/09/2016	08/09/2021
DOL	DOL	****1449	BRRESTORATION NY INC		140 ARCADIA AVENUE OSWEGO NY 13126	09/12/2016	09/12/2021
DOL	DOL		BRUCE MORSEY		C/O KENT HOLLOW SIDING LL 29A BRIDGE STREETNEW MILFORD CT 06776	01/15/2016	01/15/2021
DOL	DOL		BRUCE P. NASH JR.		5841 BUTTERNUT ROAD EAST SYRACUSE NY 13057	09/12/2018	09/12/2023
DOL	DOL	****0225	C&D LAFACE CONSTRUCTION, INC.		8531 OSWEGO RD BALDWINVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	****8809	C.B.E. CONTRACTING CORPORATION		310 MCGUINNESS BLVD GREENPOINT NY 11222	03/07/2017	03/07/2022

**NYSDOL Bureau of Public Work Debarment List 01/13/2021**

**Article 8**

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	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 KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CANTISANI HOLDING LLC			06/12/2018	06/12/2023
DOL	DOL		CARIBBEAN POOLS		C/O DOUGLAS L MALARKEY 64 VICTORIA DRIVEBINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	DOL		CARMEN RACHETTA		8531 OSWEGO RD BALDWINVILLE NY 13027	02/03/2020	02/03/2025
DOL	DOL		CARMENA RACHETTA		8531 OSWEGO ROAD BALDWINVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	****3812	CARMODY "2" INC			06/12/2018	06/12/2023
DOL	DOL	****1143	CARMODY BUILDING CORP	CARMODY CONTRACTING AND CARMODY CONTRACTING 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	DOL	****8809	CBE CONTRACTING CORP		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	AG		CESAR J. AGUDELO		81-06 34TH AVENUE APT. 6EJACKSON HEIGHTS NY 11372	02/07/2018	02/07/2023
DOL	DOL		CHARLES ZIMMER JR		216 WESTBROOK STREET P O BOX 304SAYRE PA 18840	08/09/2016	08/09/2021
DOL	DOL		CHRISTOPHER J MAINI		19 CAITLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	DOL		CHRISTOPHER PAPASTEFANO A/K/A CHRIS PAPASTEFANO		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	NYC	****2164	CREATIVE TRUCKING INC		58-83 54TH STREET MASPETH NY 11378	02/26/2016	02/26/2021
DOL	DOL	****2524	CSI ELECTRICAL & MECHANICAL INC		42-32 235TH ST DOUGLSTON NY 11363	01/14/2019	01/14/2024
DOL	DOL	****7761	D L MALARKEY CONSTRUCTION		64 VICTORIA DRIVE BINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	DOL	****7888	D L MALARKEY CONSTRUCTION INC		64 VICTORIA DRIVE BINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	DOL	****5629	DAKA PLUMBING AND HEATING LLC		2561 ROUTE 55 POUGHQUAG NY 12570	02/19/2016	02/19/2021
DOL	NYC		DALJIT KAUR BOPARAI		185-06 56TH AVE FRESH MEADOW NY 11365	10/17/2017	10/17/2022
DOL	DOL		DANICA IVANOSKI		61 WILLETT ST. PASSAIC NJ 07503	10/26/2016	10/26/2021
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	DOL		DAVID MARTINEZ		C/O EMPIRE TILE INC 6 TREMONT COURTHUNTINGTON STATION NY 11746	03/08/2016	03/08/2021
DOL	NYC		DAVID WEINER		14 NEW DROP LANE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024



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DOL	DOL		DEBBIE STURDEVANT		29 MAPLEWOOD DRIVE BINGHAMTON NY 13901	02/21/2017	02/21/2022
DOL	AG		DEBRA MARTINEZ		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL		DEDA GAZIVODAN		C/O DAKA PLUMBING AND H 2561 ROUTE 55POUGHQUAG NY 12570	02/19/2016	02/19/2021
DOL	DOL		DELPHI PAINTING & DECORATING CO INC		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL		DENNIS SCHWANDTNER		C/O YES SERVICE AND REPAI 145 LODGE AVEHUNTINGTON STATION NY 11476	08/09/2016	08/09/2021
DOL	DOL		DF CONTRACTORS OF ROCHESTER, INC.		1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	DOL		DF CONTRACTORS, INC.		1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	NYC		DIMITRIOS TSOUMAS		35-12 19TH AVENUE ASTORIA NY 11105	08/02/2017	08/02/2022
DOL	DOL		DOMENICO LAFACE		8531 OSWEGO RD BALDWINVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	****3242	DONALD R. FORSAY	DF LAWN SERVICE	1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	DOL		DONALD R. FORSAY		1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	NYC	****7404	DOSANJH CONSTRUCTION CORP		9439 212TH STREET QUEENS VILLAGE NY 11428	02/25/2016	02/25/2021
DOL	DOL		DOUGLAS L MALARKEY	MALARKEY CONSTRUCTI ON	64 VICTORIA DRIVE B INGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	NYC		DUARTE LOPES		66-05 WOODHAVEN BLVD. STE 2REGO PARK NY 11374	04/20/2017	04/20/2022
DOL	DOL	****5175	EAGLE MECHANICAL AND GENERAL CONSTRUCTION LLC		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
DOL	DOL		EAST COAST PAVING		2238 BAKER RD GILLET PA 16923	03/12/2018	03/12/2023
DOL	NYC	****4269	EAST PORT EXCAVATION & UTILITIES		601 PORTION RD RONKONKOMA NY 11779	11/18/2016	11/18/2021
DOL	DOL	****0780	EMES HEATING & PLUMBING CONTR		5 EMES LANE MONSEY NY 10952	01/20/2002	01/20/3002
DOL	DOL	****3270	EMPIRE TILE INC		6 TREMONT COURT HUNTINGTON STATION NY 11746	03/08/2016	03/08/2021
DOL	NYC	****5917	EPOCH ELECTRICAL, INC		97-18 50TH AVE CORONA NY 11368	04/19/2018	04/19/2024
DOL	DOL	****7403	F & B PAINTING CONTRACTING INC		2 PARKVIEW AVENUE HARRISON NY 10604	09/26/2016	09/26/2021
DOL	DOL		FAIGY LOWINGER		11 MOUNTAIN RD 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		FRANK BENEDETTO		C/O F & B PAINTING CONTRA 2 PARKVIEW AVENUEHARRISON NY 10604	09/26/2016	09/26/2021
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	NYC		FRANK MAINI		1766 FRONT ST YORKTOWN HEIGHTS NY 10598	01/17/2018	01/17/2023
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	DOL		GALINDA ROTENBERG		C/O GMDV TRANS INC 67-48 182ND STREETFRESH MEADOWS NY 11365	06/24/2016	06/24/2021
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	DOL		GIOVANNI LAFACE		8531 OSWEGO RD BALDWINVILLE NY 13027	02/03/2020	01/09/2023

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DOL	NYC	****3164	GLOBE GATES INC	GLOBAL OVERHEAD DOORS	405 BARRETTO ST BRONX NY 10474	05/31/2018	05/31/2023
DOL	DOL	****5674	GMDV TRANS INC		67-48 182ND STREET FRESH MEADOWS NY 11365	06/24/2016	06/24/2021
DOL	NYC		GREAT ESTATE CONSTRUCTION, INC.		327 STAGG ST BROOKLYN NY 11206	10/10/2017	10/10/2022
DOL	DOL		GREGORY S. OLSON		P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		HANS RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	NYC		HARMEL SINGH		15 CLINTON LANE HICKSVILLE NY 11801	02/25/2016	02/25/2021
DOL	NYC		HAROLD KUEMMEL		58-83 54TH STREET MASPETH NY 11378	02/26/2016	02/26/2021
DOL	NYC	****3228	HEIGHTS ELEVATOR CORP.		1766 FRONT ST YORKTOWN HEIGHTS NY 10598	01/17/2018	01/17/2023
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	AG		J A M CONSTRUCTION CORP		SUITE 125 265 SUNRISE HIGHWAYROCKVILLE CENTRE NY 10457	04/07/2016	04/07/2021
DOL	DOL		J.A. HIRES CADWALLADER		P O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		JAMES C. DELGIACCO		722 8TH AVE WATERVLIET NY 12189	06/05/2018	06/05/2023
DOL	AG		JAMES FALCONE		SUITE 125 265 SUNRISE HIGHWAYROCKVILLE CENTRE NY 10457	04/07/2016	04/07/2021
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 W MILLIMAN		C/O ROCHESTER ACOUSTICAL P O BOX 799HILTON NY 14468	02/19/2016	02/19/2021
DOL	DOL	****5368	JCH MASONRY & LANDSCAPING INC.		35 CLINTON AVE OSSINING NY 10562	09/12/2018	09/12/2023
DOL	NYC		JENNIFER GUERRERO		1936 HEMPSTEAD TURNPIKE EAST MEADOW NY 11554	11/29/2019	11/29/2024
DOL	DOL		JESSICA WHITESIDE		C/O BRRESTORATION NY INC 140 ARCADIA AVENUEOSWEGO NY 13126	09/12/2016	09/12/2021
DOL	AG		JOHN ANTHONY MASSINO		36-49 204TH STREET BAYSIDE NY 11372	02/07/2018	02/07/2023
DOL	DOL		JOHN F. CADWALLADER		200 LATTA BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL	****4612	JOHN F. CADWALLADER, INC.	THE GLASS COMPANY	P O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		JOHN GOCEK		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	AG	****0600	JOHNCO CONTRACTING, INC.		36-49 204TH STREET BAYSIDE NY 11372	02/07/2018	02/07/2023
DOL	DOL		JON E DEYOUNG		261 MILL RD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
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	AG		JOSEPH FALCONE		SUITE 125 265 SUNRISE HIGHWAYROCKVILLE CENTRE NY 10457	04/07/2016	04/07/2021
DOL	NYC		JOSEPH FOLEY		66-05 WOODHAVEN BLVD. STE 2REGO PARK NY 11374	04/20/2017	04/20/2022
DOL	DOL	****9273	JOSEPH M LOVETRO		P O BOX 812 BUFFALO NY 14220	08/09/2016	08/09/2021

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DOL	NYC		JOSEPH MARTINO		1535 RICHMOND AVENUE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	DOL		JOY MARTIN		2404 DELAWARE AVE NIGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL		JULIUS AND GITA BEHREND		5 EMES LANE MONSEY NY 10952	11/20/2002	11/20/3002
DOL	DOL	*****5062	K R F SITE DEVELOPMENT INC		375 LAKE SHORE DRIVE PUTNAM VALLEY NY 10579	01/23/2017	01/23/2022
DOL	NYC		K.S. CONTRACTING CORP.		29 PHILLIP DRIVE PARSIPPANY NJ 07054	02/13/2017	02/13/2022
DOL	DOL		KARIN MANGIN		796 PHELPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
DOL	DOL		KATIE BURDICK		2238 BAKER RD GILLETT PA 16923	03/12/2018	03/12/2023
DOL	DOL		KENNETH FIORENTINO		375 LAKE SHORE DRIVE PUTNAM VALLEY NY 10579	01/23/2017	01/23/2022
DOL	DOL	*****9732	KENT HOLLOW SIDING LLC		29A BRIDGE STREET NEW MILFORD CT 06776	01/15/2016	01/15/2021
DOL	DOL	*****3490	L & M CONSTRUCTION/DRYWALL INC.		1079 YONKERS AVE YONKERS NY 10704	08/07/2018	08/07/2023
DOL	DA	*****8816	LAKE CONSTRUCTION AND DEVELOPMENT CORPORATION		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	AG	*****4643	LALO DRYWALL, INC.		221 OLD FORD ROAD NEW PLATZ NY 12561	05/20/2016	05/20/2021
DOL	DOL	*****4505	LARAPINTA ASSOCIATES INC		29 MAPLEWOOD DRIVE BINGHAMTON NY 13901	02/21/2017	02/21/2022
DOL	DOL		LAVERN GLAVE		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	06/24/2016	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	06/24/2016	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	01/17/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	08/14/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	08/14/2017	08/14/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	01/17/2017	09/19/2022
DOL	DA	*****4460	LONG ISLAND GLASS & STOREFRONTS, LLC		4 MANHASSET TRL RIDGE NY 11961	09/06/2018	09/06/2023
DOL	AG	*****4216	LOTUS-C CORP.		81-06 34TH AVENUE APT. 6EJACKSON HEIGHTS NY 11372	02/07/2018	02/07/2023
DOL	NYC		LUBOMIR PETER SVOBODA		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	AG		LUIS MARTINEZ	LALO DRYWALL	211 MAIN ST. NEW PLATZ NY 12561	05/20/2016	05/20/2021
DOL	NYC		M & L STEEL & ORNAMENTAL IRON CORP.		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	DOL		M ANVER BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	DOL		M. ANVER BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	DOL	*****1784	MADISON AVE CONSTRUCTION CORP		39 PENNY STREET WEST ISLIP NY 11795	11/02/2016	11/02/2021

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DOL	DOL		MALARKEY'S BAR & GRILL LLC		64 VICTORIA DRIVE BINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	DOL	****0705	MALARKEY'S PUB & GRUB LLC		64 VICTORIA DRIVE BINGHAMTON NY 13904	02/04/2016	02/04/2021
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	DOL		MARIACHI'S PIZZERIA		C/O DOUGLAS L MALARKEY 64 VICTORIA DRIVEBINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	NYC		MARTINE ALTER		1010 NORTHERN BLVD. GREAT NECK NY 11021	03/09/2017	03/09/2022
DOL	DOL		MARVIN A STURDEVANT		29 MAPLEWOOD DRIVE BINGHAMTON NY 13901	02/21/2017	02/21/2022
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	NYC		MATINA KARAGIANNIS		97-18 50TH AVE CORONA NY 11368	04/19/2018	04/19/2023
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	****6416	MCCALL MASONRY		P O BOX 304 SAYRE PA 18840	08/09/2016	08/09/2021
DOL	DOL		MCLEAN "MIKKI BEANE"		1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL		MCLEAN "MIKKI" DRAKE		1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL		MCLEAN M DRAKE-BEANE		1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL	****9445	MCLEAN M WALSH	ELITE PROFESSION AL PAINTING OF CNY	1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL	****9445	MCLEAN M WALSH	ELITE PROFESSION AL PAINTING OF CNY	1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	NYC		MICHAEL HIRSCH		C/O MZM CORP 163 S MAIN STREETNEW CITY NY 10956	01/28/2016	01/28/2021
DOL	DOL		MICHAEL LENIHAN		1079 YONKERS AVE UNIT 4YONKERS NY 10704	08/07/2018	08/07/2023
DOL	AG		MICHAEL RIGLIETTI		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
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	NYC	****3826	MOVING MAVEN OF NY, INC.		1010 NORTHERN BLVD. GREAT NECK NY 11021	03/09/2017	03/09/2022
DOL	NYC	****3550	MOVING MAVEN, INC		1010 NORTHERN BLVD. GREAT NECK NY 11021	03/09/2017	03/09/2022
DOL	AG		MSR ELECTRICAL CONSTRUCTION CORP.		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL		MUHAMMAD BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	DOL		MUHAMMAD BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	NYC		MUHAMMED A. HASHEM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	NYC	****3613	MZM CORP		163 S MAIN STREET NEW CITY NY 10956	01/28/2016	01/28/2021
DOL	DA	****9786	NATIONAL INSULATION & GC CORP		180 MILLER PLACE HICKSVILLE NY 11801	12/12/2018	12/12/2023

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DOL	NYC	****4839	NEW YORK RIGGING CORP		58-83 54TH STREET MASPETH NY 11378	02/26/2016	02/26/2021
DOL	NYC		NICHOLAS FILIPAKIS		7113 FORT HAMILTON PARKWA BROOKLYN NY 11228	12/09/2016	12/09/2021
DOL	DOL	****7429	NICOLAE I. BARBIR	BESTUCCO CONSTRUCTI ON, INC.	444 SCHANTZ ROAD ALLENTOWN PA 18104	09/17/2020	09/17/2025
DOL	DOL	****6966	NORTH COUNTRY DRYWALL AND PAINT		23167 COUNTY ROUTE 59 DEXTER NY 13634	10/24/2016	10/24/2021
DOL	DOL	****0065	NORTHEAST LANDSCAPE AND MASONRY ASSOC		3 WEST MAIN ST/SUITE 208 ELMSFORD NY 10523	01/23/2017	01/23/2022
DOL	DOL	****1845	OC ERECTERS, LLC A/K/A OC ERECTERS OF NY INC.		1207 SW 48TH TERRACE DEERFIELD BEACH FL 33442	01/16/2018	01/16/2023
DOL	NYC	****0818	ONE TEN RESTORATION, INC.		2366 61ST ST BROOKLYN NY 11204	12/15/2016	12/15/2021
DOL	NYC		PARESH SHAH		29 PHILLIP DRIVE PARSIPPANY NJ 07054	02/13/2017	02/13/2022
DOL	NYC	****9422	PELIUM CONSTRUCTION, INC.		22-33 35TH ST. ASTORIA NY 11105	12/30/2016	12/30/2021
DOL	DOL		PETER M PERGOLA		3 WEST MAIN ST/SUITE 208 ELMSFORD NY 10523	01/23/2017	01/23/2022
DOL	DOL		PIERRE LAPORT		224 COUNTY HIGHWAY 138 BROADALBIN NY 12025	03/07/2017	03/07/2022
DOL	DOL	****1543	PJ LAPORT FLOORING INC		224 COUNTY HIGHWAY 138 BROADALBIN NY 12025	03/07/2017	03/07/2022
DOL	NYC	****5771	PMJ ELECTRICAL CORP		7113 FORT HAMILTON PARKWA BROOKLYN NY 11228	12/09/2016	12/09/2021
DOL	DOL	****0466	PRECISION BUILT FENCES, INC.		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	NYC	****4532	PROFESSIONAL PAVERS CORP.		66-05 WOODHAVEN BLVD. REGO PARK NY 11374	04/20/2017	04/20/2022
DOL	DA	****6817	QUADRANT METAL BUILDINGS LLC		2740 SW MARTIN DOWNS BLVD PALM CITY FL 34990	08/25/2016	08/25/2021
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	01/30/2018	01/30/2023
DOL	AG	****7015	RCM PAINTING INC.		69-06 GRAND AVENUE 2ND FLOORMASPETH NY 11378	02/07/2018	02/07/2023
DOL	DOL		REGINALD WARREN		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DA		RIANN MULLER		2740 SW MARTIN DOWNS BLVD PALM CITY FL 34990	08/25/2016	08/25/2021
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		3 GAYLORD ST AUBURN NY 13021	11/15/2016	11/15/2021
DOL	DOL		ROBERT BRUNO		5 MORNINGSIDE DRIVE AUBURN NY 13021	05/28/2019	05/28/2024
DOL	NYC		ROBERT HOHMAN		149 FIFTH AVE NEW YORK NY 10010	12/29/2016	12/29/2021
DOL	DOL	****3859	ROCHESTER ACOUSTICAL CORP		P O BOX 799 HILTON NY 14468	02/19/2016	02/19/2021

**NYSDOL Bureau of Public Work Debarment List 01/13/2021**

**Article 8**

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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	01/30/2018	01/30/2023
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		RYAN ALBIE		21 S HOWELLS POINT ROAD BELLPORT NY 11713	02/21/2017	02/21/2022
DOL	DOL	****3347	RYAN ALBIE CONTRACTING INC		21 S HOWELLS POINT ROAD BELLPORT NY 11713	02/21/2017	02/21/2022
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	NYC		SABIR MUHAMMED		SUITE B-8 782 PELHAM PARKWAY SOUTHBRONX NY 10462	04/21/2016	04/21/2021
DOL	DOL		SALVATORE A FRESINA			08/26/2016	08/26/2021
DOL	DOL		SAM FRESINA			08/26/2016	08/26/2021
DOL	NYC	****0349	SAM WATERPROOFING INC		168-42 88TH AVENUE APT.1 AJAMAICA NY 11432	11/20/2019	11/20/2024
DOL	NYC		SANDEEP BOPARAI		185-06 56TH AVE FRESH MEADOW NY 11365	10/17/2017	10/17/2022
DOL	DOL	****9751	SCW CONSTRUCTION		544 OLD ROUTE 23 ACRE NY 12405	02/14/2017	02/14/2022
DOL	AG		SERGIO RAYMUNDO		109 DUBOIS RD. NEW PALTZ NY 12561	05/20/2016	05/20/2021
DOL	NYC	****6597	SHAIRA CONSTRUCTION CORP.		421 HUDSON STREET SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	DOL	****1961	SHANE BURDICK	CENTRAL TRAFFIC CONTROL, LLC.	2238 BAKER ROAD GILLET PA 16923	03/12/2018	03/12/2023
DOL	DOL		SHANE BURDICK		2238 BAKER ROAD GILLET PA 16923	03/12/2018	03/12/2023
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, LLC		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL	****2221	SOUTH BUFFALO ELECTRIC, INC.		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
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		STEFANOS PAPASTEFANO, JR. A/K/A STEVE PAPASTEFANO, JR.		256 WEST SADDLE RIVER RD UPPER SADDLE RIVER NJ 07458	05/30/2019	05/30/2024
DOL	DOL	****9751	STEPHEN C WAGAR		544 OLD ROUTE 23 ACRE NY 12405	02/14/2017	02/14/2022
DOL	DOL		STEVE TATE		415 FLAGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	NYC		STEVEN GOVERNALE		601 PORTION RD RONKONKOMA NY 11779	11/18/2016	11/18/2021
DOL	DOL		STEVEN MARTIN		2404 DELWARE AVE NIAGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL		STEVEN P SUCATO		15-68 208TH STREET BAYSIDE NY 11360	06/23/2016	06/23/2021
DOL	DOL		STEVEN TESTA		50 SALEM STREET - BLDG B LYNNFIELD MA 01940	01/23/2017	01/23/2022
DOL	NYC	****5863	SUKHMANY CONSTRUCTION, INC.		185-06 56TH AVE FRESH MEADOW NY 11365	10/17/2017	10/17/2022

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DOL	DOL	****1060	SUNN ENTERPRISES GROUP, LLC		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024
DOL	DOL	****8209	SYRACUSE SCALES, INC.		158 SOLAR ST SYRACUSE NY 13204	01/07/2019	01/07/2024
DOL	DOL		TALAILA OCAMPA		1207 SW 48TH TERRACE DEERFIELD BEACH FL 33442	01/16/2018	01/16/2023
DOL	DOL	****9852	TAP STEEL INC		ROUTE 26 3101 P O BOX 457CONSTABLEVILLE NY 13325	01/28/2016	01/28/2021
DOL	DOL		TERRY THOMPSON		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
DOL	DOL		TEST		P.O BOX 123 ALBANY NY 12204	05/20/2020	05/20/2025
DOL	DOL	****5570	TESTA CORP		50 SALEM STREET - BLDG B LYNNFIELD MA 01940	01/23/2017	01/23/2022
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	DOL		TIMOTHY A PALUCK		C/O TAP STEEL INC RTE 26 3101/ P O BOX 457CONSTABLEVILLE NY 13325	01/28/2016	01/28/2021
DOL	DOL	****3453	TORCHIA'S HOME IMPROVEMENT		10153 ROBERTS RD SAUQUOIT NY 13456	08/09/2016	08/09/2021
DOL	DOL	****8311	TRIPLE B FABRICATING, INC.		61 WILLETT ST. PASSAIC NJ 07503	10/26/2016	10/26/2021
DOL	DOL	****9407	TURBO GROUP INC		15-68 208TH STREET BAYSIDE NY 11360	06/23/2016	06/23/2021
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 PHELEPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
DOL	NYC	****7361	VIABLE HOLDINGS, INC.	MOVING MAVEN	1010 NORTHERN BLVD. GREAT NECK NY 11021	03/09/2017	03/09/2022
DOL	DOL		VICTOR ALICANTI		42-32 235TH ST DOUGLSTON NY 11363	01/14/2019	01/14/2024
DOL	DOL		VICTOR ROTENBERG		C/O GMDV TRANS INC 67048 182ND STREETFRESH MEADOWS NY 11365	06/24/2016	06/24/2021
DOL	NYC		VIKTAR PATONICH		2630 CROPSY 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		VITO GARGANO		1535 RICHMOND AVE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	NYC	****3673	WALTERS AND WALTERS, INC.		465 EAST AND THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL		WAYNE LIVINGSTON JR	NORTH COUNTRY DRYWALL AND PAINT	23167 COUNTY ROUTE 59 DEXTER NY 13634	10/24/2016	10/24/2021
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 C WATKINS		1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL		WILLIAM DEAK		C/O MADISON AVE CONSTR CO 39 PENNY STREETWEST ISLIP NY 11795	11/02/2016	11/02/2021
DOL	DOL	****4043	WINDSHIELD INSTALLATION NETWORK, INC.		200 LATTA BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL	****4730	XGD SYSTEMS, LLC	TDI GOLF	415 GLAGE AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DOL	****7345	YES SERVICE AND REPAIRS CORPORATION		145 LODGE AVE HUNTINGTON STATION NY 11476	08/09/2016	08/09/2021
DOL	NYC		ZAKIR NASEEM		30 MEADOW ST BROOKLYN NY 11206	10/10/2017	10/10/2022
DOL	NYC	****8277	ZHN CONTRACTING CORP		30 MEADOW ST BROOKLYN NY 11206	10/10/2017	10/10/2022

**TOWN OF NORTH HEMPSTEAD**  
**SOLID WASTE MANAGEMENT AUTHORITY**

**SUPPLEMENTARY GENERAL CONDITIONS**

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**TOWN OF NORTH HEMPSTEAD  
SOLID WASTE MANAGEMENT AUTHORITY  
SUPPLEMENTARY GENERAL CONDITIONS**

**SGC-1 Right Of The Owner To Terminate Work**

A. The Executive Director may terminate this Contract whenever, in his judgment, the public interest so requires by delivering to the Contractor a Notice of Termination specifying the extent to which performance of work under the Contract is terminated and the date upon which such termination becomes effective. Upon receipt of the Notice of Termination, the Contractor shall notify all subcontractors and material suppliers of the termination and shall act promptly to minimize the expenses resulting from such termination. The Owner shall pay the Contractor the sum of:

- (a) the costs actually incurred up to the effective date of such termination, plus
- (b) the cost of settling and paying claims arising out of the termination of work under subcontractors or orders exclusive of the amounts paid or payable on account of supplies or materials delivered or services furnished by the subcontractor prior to the effective date of the Notice of Termination of Work under this Contract, which amounts shall be included in the cost on account of which payment is made under (a) above.
- (c) the rate of profit and overhead on (a) and (b) as prescribed by this Contract for orders on Contract provided, however, that, if in the opinion of the Owner it appears that the Contractor would have sustained a loss on the entire Contract had it been completed, no profit shall be included or allowed under this subdivision (c) and an appropriate adjustment shall be made reducing the amount of the settlement to reflect the indicated rate of loss. The rate of profit and overhead on (a) and (b) shall be limited to profit and overhead as stated in paragraph GC-29 of this Contract "Changes in Work".

G. If the Executive Director shall be of the opinion that the work or any part thereof is unnecessarily delayed, or that the Contractor is willfully violating any of the conditions or covenants of this Contract, or is executing the same in bad faith, or, if the work be not fully completed within the time mentioned in this Contract for its completion, then the Executive Director, after giving the Contractor an opportunity to be heard, shall have the right to notify the Contractor to discontinue all work or any part thereof under this Contract. Any such notification shall be in the form of a written notice served upon the Contractor and Surety. The Contractor shall discontinue said work or such part thereof, and the Owner shall have the right to call upon the Surety to complete the Contract, or the Owner may complete the Contract, or such part thereof, and use such materials, equipment and tools for the completion of the same, and to charge the total expenses incurred to the Contractor and/or the Surety. In case of such discontinuance of the employment of the Contractor, he shall not be entitled to receive any further payment under this Contract until the said work shall be wholly finished. If the unpaid balance of the amount to be paid under this Contract shall exceed the expense incurred by the Owner in finishing the work, such excess shall be paid by the Owner to the Contractor, and if such expense shall exceed such unpaid balance, the Contractor or his Surety shall pay the difference to the Owner. The Contractor shall have no claim for damages or otherwise whatsoever against the Owner by reason of any exercise of the right granted herein, and this provision shall be a complete defense and release by the Contractor in any action or proceeding which may be instituted by the Contractor against the Owner arising out of or based upon any exercise by the Owner of the right hereby granted. If the right of the Contractor to proceed with the work is so terminated, the Owner may take possession of and utilize in completing the work such materials, appliances, supplies, plant and equipment as may be on the site of the work. None of the above may be removed by anyone without the consent of the Owner.

**SGC-2 Liquidated Damages**

In case the Contractor shall have failed to complete the work hereunder in accordance

with the Plans and Specifications and within the time limit of this Contract to the full and complete satisfaction of the Engineer and the Owner, the Contractor shall pay to the Owner the sum of     **\$1,000.00**    **(ONE THOUSAND DOLLARS)** for each calendar day thereafter (excluding Sundays and Legal Holidays) that the said work shall remain so unfinished. Said sum, in view of the difficulty of ascertaining the loss and expense which the Owner will suffer by reason of delays in the performance of the work hereunder (such as added Engineering costs because of additional Engineering and inspection costs, etc.) is hereby agreed upon, fixed and determined by the parties hereto as the liquidated damages that the Owner will suffer by reason of such failures and default and not as a penalty, unless such failure shall have been caused by some act or omission on the part of the said Owner or for some other reason entirely beyond the control of the Contractor.

The Owner shall have the right and is hereby authorized to deduct and retain the amount or amounts of such liquidated damages as may accrue hereunder out of the monies which may be due or become due to the Contractor under this Agreement, or if such monies are not sufficient to meet said expenses, the amount of the deficiency shall be paid to the Owner by the Contractor or his Surety.

**SGC-3 Engineer (Architect)**

The Authority's designated Engineer (Architect) for this project is:

Dirk L. Anderson, P.E., Lizardos Engineering Assoc. P.C.

200 Old Country Road Suite 670

Mineola, New York 11501

**SGC-4 DISPOSAL OF DEMOLITION AND SPOIL**

The Contractor shall be responsible for the removal of broken concrete and/or excavated materials resulting from this contract and must dispose of this material. Demolition, debris or excavated materials shall not be left on the site overnight, but properly disposed of by the end of each working day. Such material becomes the property of the Contractor upon excavation or demolition, until such time as said material is properly disposed of.

Furthermore, the Contractor shall be responsible for the removal and legal disposal of any other type of waste material resulting from this contract as well as for any and all costs associated with such proper and legal disposal of these materials. No separate payment will be made for this disposal. Any costs thereof shall be included within the unit price costs for the Contract Items.

#### **SGC-5 CERTIFIED PAYROLL AND PAYMENT OF SUBCONTRACTORS**

In accordance with Article 8, Section 220, of the NYS Labor Law, the Contractor and each of his Subcontractors shall submit certified transcripts of the original payroll record to the Authority of North Hempstead. These records shall be subscribed and affirmed as true, under penalties of perjury under New York State Law. These payroll records will be provided as part of the Contractors monthly payment requisition and shall be provided in a format acceptable to the Authority of North Hempstead and New York State Department of Labor.

Additionally, the Contractor shall provide an affidavit that all laborers, subcontractors, materials and material dealers have been paid that amount of money owed them in full. This affidavit shall be attached with each monthly payment requisition in a format acceptable to the Authority of North Hempstead.

#### **SGC-6 APPRENTICESHIP TRAINING PROGRAMS**

The Authority hereby requires any contractor, prior to entering into a construction contract with the Authority of North Hempstead in excess of \$500,000.00, or any sub-contractor entering into

a sub-contract with a Contractor who has a construction contract with the Authority of North Hempstead, to have in-place a current apprenticeship agreement appropriate for the type and nature of work to be performed which have been registered with and approved by the New York State Commission of Labor, pursuant to §816-b of the New York State Labor Law, any provision contained in §103 of the General Municipal Law to the contractor notwithstanding.

A sub-contractor entitled to receive less than \$250,000 from a construction sub-contract is exempt from the requirement set forth herein.

**SGC-7 STORM WATER MANAGEMENT PROGRAM CERTIFICATION**

The Authority of North Hempstead is required by the New York State Department of Environmental Conservation and the United States Environmental Protection Agency to require that third party contractors comply with the Authority's Storm Water Management Program and the terms and conditions of the New York State Pollutant Discharge Elimination System (SPDES) general permit for storm water discharges from the Municipal Separate Storm Sewer Systems (MS4's). As such, all bidders are required to make the certification contained in the Proposal pertaining to compliance with the Authority's SWPM and the SPDES general permit for MS4's.

**AUTHORITY OF NORTH HEMPSTEAD  
DEPARTMENT OF PUBLIC WORKS**

**TECHNICAL SPECIFICATIONS**

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**GENERAL REQUIREMENTS**  
**BID NO. SWMA-0010-2021**

1. **SCOPE OF WORK**

The scope of this project includes installation of a new 125KW, 277/480V, 3 phase, 4 wire natural gas-fired engine Generator with associated 260A transfer switch and emergency distribution board located in the Pump and Treat Building electrical room. The existing PSE&G Long Island electrical services will be consolidated. The Blower Building service will be removed in its entirety. A new emergency distribution board will be provided to serve Blower Building loads, fed from the Pump and Treat Building emergency distribution. The Pump and Treat Building electrical service will remain. Existing MCC will be removed and a new MDP will be provided located in the same footprint of the MCC. All demolition work and new work is illustrated on contract documents E-101 and E-102.

2. **WORK AND PAYMENT LIMITS**

Where payment limit lines are shown on the plans or specified, the Contractor shall not do any work beyond those limits unless directed by the Engineer. The Contractor shall restore at this own expense and shall receive no payment for any work performed beyond payment limit lines unless such work was specifically authorized by the Engineer.

Hedges, trees, curbs, shrubs, walks, walls, sprinkler systems, etc., adjacent to the proposed work shall be carefully protected and maintained at the Contractors expense unless otherwise specified.

3. **EXCESS MATERIALS**

All excess waste materials, except for stone block and castings from demolished catch basins or manholes, not required to be used under the contract, shall become the property of the Contractor and shall be legally disposed of at his expense. See Supplementary General Condition # 4 for special disposal requirements. Stone block and castings not re-used, shall be stored at one location and shall become the property of the Authority at the time of pickup by the Authority. If not required by the Authority, the Contractor shall legally dispose of the excess stone block and/or castings in accordance with Supplementary General Condition # 4 as applicable.

Excavated pavement, concrete curb, sidewalk and debris are to be removed and disposed as materials are produced. Removal shall be via dump truck. Use of dumpsters is not permitted. Overnight storage on site of materials to be removed is not permitted. No excess material shall be stored or stock piled in the sidewalk area. The excavated sidewalk, aprons and curbing will not be permitted to be laid on the road and broken by hammering either mechanically or manually. All debris must be removed immediately.



#### 4. **MEASUREMENT PROCEDURES**

The Contractor and the Engineer will measure all payment quantities and make quantity calculations independently. At the end of each payment period, the Contractor and the Engineer will review payment quantities and resolve any discrepancies that are found, prior to the Engineer preparing the Engineer's Certificate for Payment.

#### 5. **MONTHLY ESTIMATE PROCEDURES**

At the end of each payment period, the Engineer and the Contractor will meet to agree upon quantities installed to date. The Contractor will prepare his claim based on the Engineer's decision, on an Authority claim form.

The Contractor will submit to the Engineer:

- a. 1 Original and 2 Copies of the Claim
- b. 1 Original and 2 Copies of Labor Affidavits (on forms provided)
- c. 1 Original and 2 Copies of Certified Payroll

The Engineer will review the Claim and submit one (1) original and one (1) copy of the Claim and the original Engineer's Certificate to the Executive Director for approval and payment. Additionally, a certified payroll record will be submitted with the claim for the Authority's review and approval. See Supplementary General Condition #5 for requirements specific to certified payroll records.

#### 6. **NOTICE TO ENGINEER**

The Contractor will give the Engineer at least 48 hours notice before beginning construction at the start of the project or after a suspension of work. Notice will be provided in both written and verbal form.

#### 7. **NOTICE TO RESIDENTS**

At least twenty-four (24) hours and no more than three (3) days prior to beginning work at any location that will affect access by residents to their property, the Contractor will distribute a form letter on his business letterhead notifying all affected property owners of the impending work. The Contractor will provide the Authority with a copy of the letter for review, comment and approval, prior to distribution in the community. The form of the letter will be as follows:

Dear Property Owner:

We are sorry to inconvenience you, but in order to (describe work) we will be restricting access to your property for a short period of time.

The restricted access will occur (date, time) and (date, time).

During this period you (will/will not) have access to your driveway and (will/will not) be able to park on the street in front of your property.

Thank you for your patience.

8. **NOTICE TO POLICE, FIRE AND SCHOOLS**

The Contractor will establish contacts with the police departments, fire departments, and school districts that have jurisdiction in the project area. These agencies shall be notified on a daily basis of work planned for the following day that will restrict access in the project area.

9. **EMERGENCY PHONE NUMBERS**

Prior to the start of any construction the Contractor will provide the Engineer and the Executive Director with the phone numbers of three (3) persons who have the authority to act for the Contractor in the event of an emergency during non-working hours.

10. **SPECIFICATION CROSS REFERENCES**

The cost of work required under the following item specifications is included in the prices bid for the various items in the proposal.

Item 4B	-	Cement Concrete Breaking (Structures)
Item 6	-	Trucking
Item 10A	-	Temporary Sheeting and Bracing
Item 33	-	Bar Reinforcement For Structures
Item 39SS	-	Dust Palliative (Calcium Chloride)

11. **SPECIAL PROCEDURES FOR CONCRETE CONSTRUCTION**

Removal and replacement of sidewalk, curbs and aprons are to be performed on one side of the street only. No work will be permitted on opposite side of street until first side is complete and Engineer has given approval.

Concrete forms shall be removed, and areas adjacent to concrete construction shall be backfilled and graded within two work days of the installation of concrete at a particular location. The contractor shall install wood ramps to provide safe pedestrian access over the construction at every property and at such locations as directed by the Engineer.

All concrete on the project will use Type II Portland Cement.

The cost of preparation and testing of concrete design mixes shall be borne by the Contractor.

Design mixes shall be submitted to the Engineer on a form, for his review. The form will be provided by the Engineer prior to the start of construction.

Each truckload of concrete delivered to the job must be accompanied by a computerized batch tape that indicates batching time, and the amounts of water, cement, sand, aggregate, and admixtures in the mix. Trucks that arrive without the batching tapes, or with loads that do not conform to the design mix, will be rejected.

No white concrete will be permitted. Any white concrete installed under this contract will be immediately removed. New grey concrete will be installed in its place, forthwith.

All concrete from a truck must be poured within 90 minutes of the time that water is added to the mix.

No concrete will be poured on wet or frozen ground, or at ambient temperatures of less than 32 degrees. It is anticipated that the ambient temperature will drop below 32 degrees during the curing period, the concrete will be protected from freezing by insulated blankets or other methods proposed by the Contractor and accepted by the Engineer.

The Contractor is solely responsible for the protection of fresh concrete from damage from the elements, pedestrian and vehicular traffic, as well as vandalism. Any and all work damaged, due to the Contractor's negligence in protection of work, shall be removed and replaced at no cost to the Authority.

The addition of calcium chloride, antifreeze, etc. to concrete is not permitted and work below freezing, 35° F, is not allowed. When temperatures are expected to fall to 35° and/or below, the Contractor shall protect the concrete in advance of such event.

## 12. **PRE-CONSTRUCTION MEETING**

Within seven (7) calendar days after the execution of the contract the Contractor will be required to attend a preconstruction meeting to be arranged by the Engineer. The purpose of the meeting will be to review the General Requirements of the contract.

The Engineer will prepare and distribute minutes of this meeting.

## 13. **UTILITY COORDINATION MEETING**

At least one (1) week prior to the start of construction the Contractor will arrange a meeting with the Authority and all of the utility companies.

The agenda for the meeting will be:

Review of the Contractor's proposed schedule and plan of work.  
Review of anticipated conflicts with existing utilities.

Review of any proposed work by the utility companies.

The Contractor will prepare and distribute minutes of the meeting and a list of the names, phone numbers, and affiliations of all attendees.

14. **PROGRESS MEETINGS**

During the procession of the work, the Contractor, and the Authority will hold regular meetings at the site to review progress and resolve any problems with the work. The Authority will prepare and distribute any minutes of the meeting.

15. **PHOTOGRAPHS**

Before starting work in any area, it is strongly recommended that the Contractor take photographs or video, in the presence of the Authority of the condition of all property adjacent to the work, with particular attention to damage that exists prior to the start of construction. The cost of such work is included in the prices bid for the various items in the proposal. Should the Contractor fail to do this work, he will have no claim for extra work that is required due to apparent negligence on his part. Should photos or video prove that damage existed prior to construction, the Contractor will not be held liable for repair of such damage.

16. **PROJECT SCHEDULE**

Prior to the start of construction the contractor shall submit:

A project schedule in bar chart format showing the major operations and their anticipated start dates and durations.

A work plan describing the order in which the work will be done geographically.

The Authority will review the Project Schedule and Work Plan and submit to the Executive Director for approval. No work is to be done until the Schedule and Work Plan are approved.

17. **SUBCONTRACTORS AND SUPPLIERS**

The Contractor shall submit for approval the name, contract person, address, phone and fax number of all proposed subcontractors and suppliers. No subcontractor shall be employed, nor material ordered from a supplier who has not been approved by the Authority.

18. **MATERIAL INVOICES**

All deliveries to the job site must be accompanied by an extra copy of the material invoices, which shall be given to the Engineer. Failure to provide such invoices shall be considered cause for

rejection of the materials.

19. **TESTING LABORATORIES**

Unless otherwise specified, the cost of all laboratory testing will be borne by the Contractor. The Contractor will provide the testing laboratory personnel with free access to the work and shall assist the laboratory personnel as necessary to obtain test samples.

20. **USE OF MUNICIPAL WATER SUPPLY**

The Contractor shall obtain and pay for all permits necessary for the use of the public water supply. A copy of permits shall be posted on site. If water is not available from the water company, water tank trucks shall be used.

21. **SAFETY PROVISIONS**

The Contractor shall temporarily fence all unattended excavations over two (2) feet in depth with properly supported snow fence having a minimum heights of four (4) feet.

The drawings and specifications do not include all of the necessary components for construction safety. It is the Contractor's responsibility to provide all construction safety measures.

The safety provisions in the specifications are primarily to protect Authority property and the public against unsafe acts of the Contractor. The Occupational Safety and Health Act of 1970 requires that the employer:

Shall furnish to each of his employees employment and place of employment which area free from recognized hazards that are causing or likely to cause death or serious physical harm to his employees.

Shall comply with the Occupational Safety and Health Standards promulgated under this Act.

The regulations in the Act may be more stringent than are required by the plans and specifications. The Contractor must conform to OSHA regulations. Sheeting shall conform strictly to the requirements of the OSHA Regulations for Construction Subpart C, Excavation, Trenching, and Shoring; 1926.650 General Protection Requirements; 1926.651 Specific Excavation Requirements; 1926.652 Specific Trenching Requirements; 1926.653 Definitions Applicable to the Subpart.

All work performed under this contract shall comply with the requirements of the Industrial Code of the State of New York, Rule No. 23 and Rule No. 53, as currently amended.

22. **WELLS, ROAD MARKERS & CONTROL MONUMENTS**

On this project there may be observation water wells, property monuments, and survey control

monuments. If they are encountered, the Contractor shall clearly mark them and contact the owning agency on requirements for protecting them. If they are disturbed, the owning agency shall be notified immediately. Any damage to facilities shall be corrected as directed by the owner or the Authority, at the Contractor's expense.

The Authority will provide control, both vertically and horizontal, as well as profiles of roads showing both existing and new lines and grades for the Contractors use in constructing the new curb.

The Contractor will procure the services of a licensed land surveyor or professional engineer to stake out and provide the Contractor with cut sheets for the actual construction of the new curb. Prior to the installation of said curbs and walks the Contractor will submit his Surveyor's cut sheets for the Authority's review.

The Contractor shall remove and replace all highway markers to the new lines and grades where ordered to by the Engineer. The Contractor shall be totally responsible for maintaining and repositioning all highway markers, for continuous information, protection and safety of the public. New foundations shall match existing. The entire cost of this work shall be included in the prices bid for this work.

### 23. **SIGNS**

Prior to construction the Contractor and the Authority shall make an inventory of all signs within the project area on a form to be provided by the Engineer.

The Contractor will maintain all signs throughout the construction period.

The Contractor shall furnish and install a 3" diameter P.V.C. sleeve at those locations where existing signs are located within existing concrete sidewalks, ramps, or as ordered by the Engineer. The sleeve shall be installed within the sidewalk so that no edges protrude beyond the walkway surface.

Any excess pipe material or abrasions will be removed by whatsoever means is required to create a smooth unhazardous condition. The sleeve shall be constructed of SDR35 P.V.C. piping, having a 3" interior diameter and a length of twelve (12") inches. Costs for these services, including all labor and material shall be cost included in Item 27X.

### 24. **DUST CONTROL AND CONCRETE SPATTER**

Dust conditions that develop shall be immediately allayed by the use of calcium chloride or an approved dust palliative. The cost of allaying dust conditions will be included in the prices bid for other proposal items.

During saw cutting of concrete sidewalk, Contractor will wash off any concrete paste caused by concrete dust mixing with water. It is the intention of this requirement to minimize pedestrian traffic from tracking concrete paste into shops or homes.

During the concrete pouring operations Contractor will provide protection against concrete spatter to store front facades and entrance ways adjacent to new sidewalk work. This protection may be in the form of plastic tarpaulin, plywood shields or any other means approved by the Engineer. In the event spatter occurs, Contractor will use appropriate means to remove same.

The cost for providing dust control and concrete spatter protection shall be included in the unit price for Items 58RPC and Items 27X respectively.

25. **QUANTITIES**

The total quantities of bid items are estimated only and actual quantities may be much greater or much less than those indicated.

26. **UNIT PRICES**

Unit prices are deemed to be all-inclusive of the necessary cost to complete the work and, unless specific authorization in writing from the Executive Director is received by the Contractor, no additional payment for extra items of work will be made. The determination of the Executive Director in this regard shall be final and binding.

27. **REPAIR OF UNDERGROUND ELECTRICAL CABLE**

The Contractor is advised that underground electrical feeders for street lighting may exist in some areas in which he will be working. The Contractor shall be responsible for damage to underground cables and shall locate these lines before proceeding with his operations, especially root cutting.

If it is determined that damage to the street lighting facilities are unavoidable, the Town of North Hempstead's Street Lighting Maintenance Contractor shall be notified to relocate the existing cables, and/or conduit, prior to the start of construction efforts in the area of relocation. Cost for said relocation shall be borne by the Authority.

If damage to the underground cables occurs, the Contractor shall immediately notify the Town of North Hempstead's Street Lighting Maintenance Contractor. The Street Lighting Maintenance Contractor has forty-eight (48) hours to make the required repairs. The Contractor for this project shall provide the Street Lighting Maintenance Contractor access and room to perform his operations. No work will be permitted in the immediate area where repairs are required until the repairs are complete.

If it is determined that damage to the street lighting facilities are due to the Contractors negligence, the Authority will have the necessary repairs made and back charge the Contractor for said repairs.

28. **UNDERGROUND SPRINKLER SYSTEMS**

In addition to the underground utilities discussed in GC-12, the Contractor shall make himself aware of underground lawn sprinkling systems, installed by the homeowners, and shall be responsible for all damage caused to these systems by his operations. The Contractor shall make repairs within forty-eight (48) hours. If repairs are not forthcoming within the specified period, the Authority reserves the option of having the repair work performed by others and back-charging the Contractor for the cost of said repairs.

29. **RESTORATION OF GRASSED AREAS**

Where possible, the Contractor shall peel back the strip of lawn adjacent to the concrete sidewalk to be removed and replaced. The intent of this is to minimize disturbance of grassed areas. After removal of the forms, the void shall be filled with topsoil and the lawn folded back to its original position. If this method is not possible, or where the end result is unacceptable, the disturbed area shall be restored with topsoil and sod.

Cost for peeling and folding back lawn, as well as the replacement of topsoil after stripping the forms, shall be included in the unit bid price for the adjacent concrete item. Topsoil shall conform to the referenced specification 9, as stipulated under Section 10 of these General Requirements. Cost for the restoration of lawns with sod shall be paid for under Item 200SS-2.

30. **RESTORATION OF ROAD PAVEMENT**

Wherever curb work is required, or where road pavement is disturbed due to construction operations at the curb or aprons, or where ordered by the Authority, the road pavement shall be restored. The cost for restoration shall be included in the Contractors price bid for the project.

The pavement restoration shall include saw cutting of said pavement eighteen (18") inches parallel to the curb line. All edges shall be sawcut. All asphalt restoration shall provide six (6") inches of Dense Graded Aggregate or Recycled Crushed Concrete Aggregate Base Course with a top course of three (3") inches of Type 1A Asphalt Concrete placed in two-one and one half (2-1½") inch lifts. All materials, workmanship and placement shall be in conformance with Nassau County Standard Specifications for items 36D and 121 and shall be approved by the Authority prior to their placement. All pavement restoration shall have a minimum compacted thickness shall be three (3") inches.

31. **CONCRETE DEMOLITION AND REMOVAL**

The method used for demolition and removal of concrete will be subject to the approval of the Authority. All methods and equipment to be used must be such that the exact limits of the items to be removed can be accurately controlled. At a minimum, the Contractor shall use a backhoe front end loader, with a working mechanical thumb, during removal and demolition operations. Failure to provide and use this equipment during construction will result in the rejection of the Contractor from this Contract.



All work damaged or removed beyond the payment limit lines shall be restored at the Contractors own expense, except where authorized by the Authority in writing. All broken concrete shall be removed from within the contract limits the same day that it is demolished.

32. **CONCRETE FORMS**

If the Authority determines that the forms used to construct curb or sidewalk are insufficient to insure a straight and true edge line, they will be rejected. The Contractor will be directed to provide form work of a size acceptable to the Authority. Any concrete work completed using insufficient formwork and resulting in non-straight, untrue edges shall be rejected by the Authority and replaced by the Contractor to the satisfaction of the Authority.

The gaps resulting from the removal of the forms of concrete sidewalk and curbs shall be filled at the areas adjacent to the concrete restored within twenty-four (24) hours after removal of the forms. Adequate protection measures shall be maintained during the time the gaps are open, to prevent accidents to pedestrians. No separate payment will be made for the measures required hereunder but the cost thereof shall be included in the unit prices bid for the various Contract items.

33. **PRIVATE WORK**

The Contractor shall inform his employees, and his subcontractors are to inform their employees, that they are not to engage in the construction or reconstruction of sidewalks, aprons, driveway or any similar structure for the owners or lessees of property immediately abutting the Authority Highway right-of-ways within the areas of the Authority where Contract work is being performed. The Contractor shall construe violation to be a breach of Contract.

34. **CRACKED CONCRETE**

All constructed concrete that cracks within the duration of the Contract, including the one year maintenance period, shall be replaced by the Contractor when so directed by the Authority, at no cost to the Authority. Patching of concrete will not be permitted.

35. **CONCRETE FINISHING**

Concrete finish is to be a broom finish. Contractor is to prepare three (3) test panels to permit the owner to select the desired finish. Finished concrete work that does not match the selected test panel may be rejected at the Contractors expense.

Improper or unsatisfactory finishing of concrete shall be grounds for rejection. Any concrete curbs, aprons, ramps or sidewalks which are found to have stains, marks or other imperfections due to improper protection from weather, pedestrians, vehicular traffic, or any other reason will be rejected by the Authority. Edges which are not true and straight shall be additional grounds for rejection. Rejected concrete work will be removed and constructed to the satisfaction of, and at no cost to, the

Authority.

36. **UTILITIES**

The Contractors attention is directed to General Condition - 12, LIVE UTILITIES.

37. **CONCRETE AGGREGATE**

The coarse aggregate for all exposed poured in place concrete used on this project shall consist of crushed stone or crushed gravel as specifies under “Part Two, Materials of Construction, Section B” of the Standard Specification. The use of other materials for coarse aggregates will not be permitted without written authorization by the Engineer.

38. **ACCURACY OF PLANS AND SPECIFICATIONS**

The detail plans and specifications for this Contract have been prepared with care and are intended to show as clearly as is practicable the work required to be done. The Contractor must realize, however, that the construction details cannot always be accurately anticipated and that in executing this work, field conditions may require reasonable modifications in the details of plans and quantities of work involved. Work under all items in the Contract must be carried out to meet these field conditions to the satisfaction of the Engineer and in accordance with his instructions and the Contract Specifications.

39. **TRAFFIC MAINTENANCE**

Before starting work on this Contract, the Contractor shall submit to the Commissioner for his approval his plans for the maintenance of traffic shall be maintained. This plan, after being approved, shall not be modified in any way unless so approved in writing.

40. **SEQUENCE OF WORK**

The Contractor shall schedule his operations during the construction work on this project to conform to an approved progress schedule. Before starting work the Contractor shall submit to the Engineer for approval his proposed progress schedule, which shall indicate the proposed sequence of operations. After approval, this schedule will be strictly enforced and any deviation must have prior approval of the Engineer. Any variation from the approved sequence may result in the Engineer stopping all work until the Contractor resumes work in the required sequence. The Contractor shall have no claim for additional compensation due to lost time, etc., because of his failure to comply with this requirement. The following are some of the requirements with which the Contractor shall be required to comply:

- a) No concrete removal or other excavation shall be performed between October 15th and April 1st unless authorized in writing by the Executive Director.

- b) No new trench excavation shall begin on a street until trenches previously excavated on other streets have been backfilled and paved. At no time shall the length of continuous open trench exceed one hundred fifty (150') linear feet. All pipe trenches and drainage structure excavations shall be backfilled and paved with temporary pavement as necessary upon installation of the required items.
- c) Curb and apron removal shall be performed concurrently with curb and apron construction unless otherwise approved by the engineer in writing. The cleanup of excess earth and debris shall be performed concurrently with the removal of curb and apron. No curb and apron removal and reconstruction shall be performed prior to the completion of the installation of all drainage items for the entire project area.
- d) At no time shall curb removal and reconstruction be performed on more than two streets at a time. Curb may be constructed on only one side of a street at a time.
- e) The driveway apron construction, debris clean up, trimming shoulders and slopes, and topsoil and sod installation must be completely done on one side of the street before work may commence on the other side. Apron installation shall be completed within three working days after the curb has been constructed. Access to driveways shall be maintained to the greatest possible extent.
- f) Trimming shoulders and slopes and topsoil and sod installation shall be completed within three working days after completion of aprons at each property.
- g) The required curbs, driveway aprons, trimming shoulders and slopes, and topsoil and sod installation on a particular street shall be completed before roadway paving may begin on a street.
- h) Throughout the course of the job, access shall be maintained to all driveways. During adverse weather, suitable temporary pavement shall be used to maintain access to and egress from the driveways and to stabilize the shoulder area. The cost of this work shall be included in the price bid for Item 102X.
- i) No removal of existing roadway pavement shall be performed prior to the removal and reconstruction of all curbs and aprons for the entire project area.
- j) The Contractor shall not remove more than 1,500 linear feet of existing pavement, nor the amount of pavement contained within any one particular street, prior to the placement of the base course material.
- k) The asphalt base course shall be placed within five working days after the removal of the existing roadway pavement.
- l) Stockpiling of materials between the curbs will not be permitted.

- m) Stacking and/or breaking of concrete within the road is not permitted unless called for on plans and shall be in accordance with Item 4A.

41. **RESTORATION PRIOR TO WORK SUSPENSION**

Wherever curb and gutter is installed prior to October 15 that the restoration behind the curb line, pavement base repair and resurfacing be completed prior to suspending work due to the winter weather conditions.

42. **RODENT CONTROL**

The Contractor shall provide rodent and pest control as necessary to eliminate infestation of the construction and/or staging area. The methods and materials used shall not adversely affect conditions at the site or surrounding areas. The cost of this work shall be included in the prices bid for the contract.

43. **PUNCH LIST**

The Contractor shall complete all punch list items within thirty (30) working days after the final inspection (walk through) by the Authority, engineer and contractor.

44. **NASSAU COUNTY SEWER STRUCTURES**

The Contractor shall be responsible for the cleaning and painting of Nassau County sewer structures within the project. Costs thereof shall be included within the unit price costs of the contract items. The Contractor will provide the Authority with written approval for all work done to County structures, prior to release of the Contract.

45. **ASPHALT REPAIRS**

Asphalt repairs shall be performed by the Contractor with an infra-red box, unless otherwise authorized by the Commissioner.

46. **STREET SWEEPING, LEAVES AND SNOW REMOVAL**

The Contractor is responsible to maintain clean streets on those roads within the project limits. The Contractor will insure that all streets are swept once a week, where no construction is occurring. Where construction is underway, the Contractor will have the streets swept a minimum of two (2) times per week, one of those times being the end of the work week (presumably Friday), or as ordered by the Engineer. The cost of a self-propelled street sweeper, complete with operator, shall be included

within the unit price costs of the contract items.

The Contractor shall remove leaves and snow during construction. Costs thereof shall be included within the unit price costs of the contract items.

47. **EMERGENCY TREE REMOVAL**

During the course of construction the Contractor will be responsible for tree removal due to construction or emergency needs. If a tree falls during off hours the tree shall be removed by Authority forces and the costs back-charged to the Contractor.

48. **HOURS OF OPERATION**

The Contractor shall confine his operations to occur between the hours of 8:00 am and 4:00 pm. No work shall occur on weekends or holidays (as stipulated by the Authority of North Hempstead). Work outside of these limits will only be permitted when approved in writing from the Executive Director.

If work occurs outside of the stipulated time period, because of emergency or other reason based on the Contractors negligence, the Contractor will reimburse the Authority those costs associated with keeping its personnel on site to review the work.

**DIVISION 1**

**GENERAL REQUIREMENTS**

**DIVISION 1 - GENERAL REQUIREMENTS**

<u>SECTION NO.</u>	<u>TITLE</u>	<u>PAGE</u>
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**011000 SUMMARY OF WORK**

**PART 1 - GENERAL**

- 1.01** The requirements of the Instructions to Bidders, General Conditions, Supplementary Conditions, Agreement between Town and Contractor, all Specification Divisions herein, and the accompanying Contract Drawings govern the work of this project.

Where articles of the above documents are repeated in this Division, it is intended to elaborate or qualify such articles. It is not intended that other articles of the above documents shall be omitted or that additional requirements set forth in the above documents and noted herein shall be excluded from Contract requirements unless specifically noted as such hereinafter.

**1.02 PRIME CONTRACTS**

- A. This entire project is to be constructed under a single Prime Contract. The work shall be the responsibility of a Prime Contractor skilled in the installation of the systems as described within each division. The Prime Contractor may subcontract such work as requires mechanics other than those he normally employs, but the entire responsibility for complete performance of the Prime Contract shall remain with the Prime Contractor.

**1.03 DESCRIPTION OF WORK COVERED BY CONTRACT DOCUMENTS**

- A. The work of this project covers the installation of upgrades (removing and installation) of electrical service and distribution equipment, installation of mechanical equipment, and installation of an onsite back-up generator for the North Hempstead Solid Waste Management Authority at Port Washington landfill as more fully set forth in the Contract Documents.

**1.04 DRAWINGS**

- A. This project includes work indicated in the Contract Drawings listed herein below:

E-001	Electrical Symbol List, Abbreviations, Drawing List and Notes
E-101	Electrical One Line Diagrams- Existing Pump & Treat and Blower Buildings-Demolition
E-102	Electrical One Line Diagram-Pump and Treat and Blower Buildings
E-201	Electrical Site Plan-Existing Conditions/Demolition Work
E-202	Electrical Site Plan-New Work
E-301	Electrical Part Plans- Pump & Treat and Blower Buildings-Existing and Demolition
E-302	Electrical Part Plans-New Work
E-401	Electrical Details Sheet 1
E-402	Electrical Details Sheet 2
E-403	Electrical Details Sheet 3



E-501	125KW Generator Detail
E-502	125KW Generator Enclosure Detail
P-001	Plumbing Legends, Notes, Riser Diagram and Specifications
P-002	Plumbing New Work Site Plan
P-201	Plumbing Treatment Building-Gas New Work Plan
S-001	Structural Foundation Plans and Notes

## 1.05 SPECIFICATIONS

- A. Construct all project work as shown and described in the Contract Documents, under a single contract.
- B. This project includes work indicated in the Contract Specification Divisions listed below:
1. Division 1: General Requirements
  2. Division 3: Concrete
  3. Division 22: Plumbing
  4. Division 26: Electrical
  5. Divisions 31-33: Sitework and Restoration

## 1.06 STANDARD SPECIFICATIONS AND ABBREVIATIONS

- A. The following abbreviations used in the Drawings and Specifications refer to organizations publishing specifications and standards. These shall be construed to mean the latest standard adopted and published at the date of advertisement for Bids and such specifications are made part of the Contract Documents to the same extent as if written out in full.

AAMA	-	Architectural Aluminum Manufacturers Association
ACI	-	American Concrete Institute
AGA	-	American Gas Association
AHDGA	-	American Hot Dip Galvanizing Association
AISC	-	American Institute of Steel Construction
ANSI	-	American National Standards Institute
ASME	-	American Society of Mechanical Engineers
ASTM	-	American Society of Testing Materials
AWS	-	American Welding Society
AWWA	-	American Water Works Association
CRSI	-	Concrete Reinforcing Steel Institute
EPA	-	Environmental Protection Agency
ETL	-	Electrical Testing Laboratories
IEEE	-	Institute of Electrical and Electronics Engineers
IPCEA	-	Insulated Power Cable Engineers Association
IRI	-	Industrial Risk Insurers
ISA	-	Instrument Society of America
MCAA	-	Mechanical Contractors Association of America

MSS	-	Manufacturers Standardization Society of Valve and Fittings Industry
NBFU	-	National Board of Fire Underwriters
NEC	-	National Electrical Code
NEMA	-	National Electrical Manufacturers Association
NFPA	-	National Fire Protection Association
NIST	-	National Institute of Standards and Technology
NPT	-	National Pipe Thread
NYSDEC	-	New York State Department of Environmental Conservation
OSHA	-	Occupational Safety Health Act
SSPC	-	Steel Structures Painting Council
STI	-	Steel Tank Institute
UL	-	Underwriters Laboratories, Inc.

### 1.07 STANDARD DEFINITIONS

A. The following definitions apply to key words and phrases used in the Drawings and Specifications. Whenever these words appear on the Drawings or in the Specifications, they shall be construed to have the meaning as defined in this Section.

Amount	-	Used in reference to money.
Approval	-	Final approval remains with the Owner. Engineer can approve submittals, applications and other Contractor requests within the conditions of the Contract.
Balance	-	Refers to money left over or owed.
Both	-	Means two, or requires two.
Building	-	Individual or office responsible for Manager operation, maintenance and use of a facility.
But Not Limited to	-	Other elements may be included.
Clean	-	Means broom clean unless otherwise specified (e.g. vacuum, wipe, polish).
Cooperate	-	Work well with others (especially other prime contractors).
Coordinate	-	Bring the work of others together with your own.
Direct	-	Only the Owner has the authority to direct the Contractor. The Owner may delegate some of this direction to the Engineer.

- Either - Implies a choice (one of two).
- Engineer - Whenever the term "Engineer", or "Engineers", or a pronoun used in place thereof appears, it shall mean the Consulting Engineer retained by The Town of Islip for the preparation of the Plans and Specifications for the Town of Islip, Permanent Generators Project and designated by the Owner to act with the powers and duties of the Engineer as defined in the Contract Documents.
- Equipment - Furnishings, equipment and other items which have individual identity such as doors, pumps, cabinets, tools and machines necessary to do the work.
- Equipment - Contractor's property after the project is Construction completed.
- Etc. - A collective term which means: and other similar items.
- Fabricate - To manufacture or assemble a component off-the-project site, usually at the Contractor's or supplier's shop.
- Furnish - To supply and deliver new supplies, materials and equipment.
- Herein - Located within this Specification.
- Hereinafter - As stated after this point in this Specification.
- Hereinbefore - As stated before in this Specification.
- Including - To enclose as part of the whole. Use in the inclusive sense.
- Install - Operation at the project site including handling, storage, unpacking, assembly, erection, placing, anchoring, applying connecting, working to dimensions, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.
- Materials - Components, other than equipment, required to do the project. Includes items such as sand, steel, sheet rock, nails, pipe.
- Or - Refers to an alternate means. Use in the exclusive sense.
- Owner - Wherever the term "Owner" appears it shall mean the Town of Islip.

Prepare	- Make ready.
Products	- Includes supplies, materials and equipment needed to do the job.
Provide	- Furnish new materials or equipment and install them.
Quantity	- Used in connection with Volume such as pounds, gallons, cubic yards, pieces.
Remainder	- That which is left (e.g., work, materials).
Replace	- Reinstallation of material or equipment removed with refurbished or new material or equipment.
Restore	- To repair or alter the original form.
Shall	- Used when directing Contractor's work. Identifies mandatory work by Contractor.
Suitable	- Means reasonable, proper, correct, safe and necessary for the purpose intended as required by the Contract Documents.
Supply	- Furnish supplies, materials or equipment.
Supplies	- Items other than materials and equipment required to do the job. These include items such as water, construction paper, burlap.
Town	Town of Islip, or their representatives.
Will	- Used when describing activities of Owner and Engineer.

## **PART 2 - PRODUCTS**

Not used.

## **PART 3 - EXECUTION**

Not used.

**END OF SECTION**

**013150 PROGRESS MEETINGS**

**PART 1 - GENERAL**

- 1.01** Engineer shall schedule and administer progress meetings.
- A. Prepare agenda.
  - B. Distribute written notice and agenda of regular and special meetings four working days in advance of scheduled date.
  - C. Make physical arrangements for meetings.
  - D. Preside at meetings.
  - E. Record minutes; include significant proceedings and decisions.
  - F. Distribute copies of minutes to participants, within four days after meetings.
- 1.02** Owner may attend all meetings to ascertain that work is expedited consistent with Construction Schedule and with Contract Documents.
- 1.03 **PRECONSTRUCTION MEETING****
- A. Engineer to schedule within 15 days after date of Notice to Proceed.
  - B. Plan for the following attendance by others:
    - 1. Owner.
    - 2. Owner's consultants.
    - 3. Contractor and major subcontractors.
    - 4. Representatives of governmental or other regulatory agencies having jurisdiction.
  - C. The Engineer shall prepare agenda which should have at least the following items:
    - 1. Tentative Construction Schedule.
    - 2. List of major subcontractors.
    - 3. Critical work sequencing.
    - 4. Designation of responsible personnel.

5. Processing of field decisions and Change Orders.
6. Adequacy of distribution of Contract Documents.
7. Submittal of shop drawings, project data and samples.
8. Procedures for maintaining record documents.
9. Use of premises:
  - a. Office and storage areas.
  - b. Owner's requirements.
  - c. Limitations and restrictions.
10. Major equipment deliveries and priorities.
11. Safety and first aid procedures.
12. Security procedures.
13. Housekeeping procedures.

#### **1.04    PROGRESS MEETINGS**

- A. The Engineer shall schedule special meetings as progress of work requires.
- B. Specify location of meetings.
- C. Include in attendance list:
  1. Owner and his consultants.
  2. Subcontractors, as pertinent to agenda.
  3. Representatives of governmental or other regulatory agencies.
- E. Include the following minimum agenda for each meeting:
  1. Review and approve minutes of previous meeting.
  2. Review work progress since last meeting.
  3. Note field observations, problems, Change Orders and decisions.
  4. Identify problems which impede planned progress.
  5. Review off site fabrication problems.
  6. Develop corrective measures and procedures to regain planned schedule.

7. Revise Construction Schedule as indicated.
  8. Plan progress during next work period.
  9. Coordinate projected progress with sub-Contractors.
  10. Review submittal schedules, expedite as required to maintain Construction Schedule.
  11. Review maintaining of quality and work standards.
  12. Review changes proposed by Owner for:
    - a. Effect on Construction Schedule.
    - b. Effect on completion date.
    - c. Effect on cost.
  13. Complete other current business.
- F. The Engineer shall maintain minutes of all meetings on file and provide Owner, Contractor, attendants and other interested parties with a copy of all minutes.

**PART 2 - PRODUCTS**

Not used.

**PART 3 - EXECUTION**

Not used.

**END OF SECTION**

**013200 PROJECT SCHEDULING AND PROGRESS DOCUMENTATION - SINGLE PRIME CONTRACT**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The Contract Documents, including but not limited to, the Drawings and individual Specification Sections and Bid Milestone Schedule, apply to this Section.

**1.02 SUMMARY**

- A. This is a single prime contract therefore the Contractor is responsible for the scheduling and documentation requirements as outlined in this section 013200.
- B. Section includes administrative and procedural requirements to plan, schedule and document the progress of construction during the performance of the Work, including the following:
  - 1. Critical Path Method (CPM) schedule and reports.
  - 2. Material location reports.
  - 3. Field condition reports.
  - 4. Special reports.
- C. Related Sections:
  - 1. Section 011200 – Contract Summary of Work, for preparing a combined CPM Schedule.
  - 2. Section 013300 – Submittal Procedure, for submitting schedules and reports.
  - 3. Section 014000 – Quality and Code Requirements, for submitting a schedule of tests and inspections.

**1.03 DEFINITIONS**

- A. Project: Work at the Site carried out pursuant to one or more Contracts.
- B. Activity: A discrete part of the Contract that can be identified for planning, scheduling, monitoring, and controlling the Project. Activities included in a CPM schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that has no total float.



2. Predecessor Activity: An activity that precedes another activity in the network.
  3. Successor Activity: An activity that follows another activity in the network.
- C. Bid Milestone Schedule: Interim milestones, included in the Contract Documents, which the Contractor utilizes to formulate the Baseline Schedule.
- D. Baseline Schedule: Initial schedule, prepared by the Contractor, to complete the Work of the Contract in accordance with the Contract duration and starting point to which schedule updates are compared.
- E. CPM: Critical Path Method is a scheduling method used to plan and schedule construction projects where activities are arranged based on activity relationships creating a time scaled network diagram.
- F. PDM: Precedence Diagram Method follows the standard CPM calculations and allows for special logic relationships creating an interdependent relationship throughout the network.
- G. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no total float.
- H. Data Date: The date when the status of the CPM schedule is determined, showing the calendar start date for the update period.
- I. Float: The measure of leeway in starting and completing an activity.
1. Float time is not for the exclusive use or benefit of either the Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Substantial Completion date.
  2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
  3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Substantial Completion date.

#### **1.04 INFORMATIONAL SUBMITTALS**

- A. Format for Submittals: Submit required submittals in both electronic (PDF) file format and as electronic backup file in native software format.
- B. CPM Schedule: Schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (baseline or updated) and date on label.
- C. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain; activity ID number, activity description, original duration, remaining duration, actual duration, early and late start and finish dates and total float in calendar days.
1. Activity Report: List of all activities sorted by early or actual start date in each phase, area and level following the physical divisions of the Work.
  2. Short Term Activity Report: Lists all activities occurring from the update data date in a two month forward and one month back window.
  3. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by early or actual start date. Include activity ID number and float path(s).
  4. Total Float Report: Provide a cumulative list of total float from each update period with comments associated to any and all variances.
  5. Procurement Report: List all procurement activities sorted in order of the item being procured.
  6. Narrative Report: The project scheduler shall describe the nature of the submission, interpretation of calculations, issues affecting progress and a milestone analysis comparing progress against the baseline and update schedules.
- D. Material Location Reports: Submit at monthly intervals.
- E. Field Condition Reports: Submit at time of discovery of differing conditions.
- F. Special Reports: Submit at time of unusual event.
- G. Qualification Data: For project scheduler.

#### **1.05 QUALITY ASSURANCE**

- A. Project Scheduler Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within timeframes requested by the Owner. The project scheduler shall have or be able to obtain certification as a Planning and Scheduling Professional (PSP) or have a minimum of five years of demonstrated experience scheduling large capital projects.
- B. Prescheduling Conference: The Owner may conduct conference at the Project site to comply with requirements in Section 013100 - Project Management and Coordination. Review methods and procedures related to

the Baseline Schedule and the CPM schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss coordination, including phasing, work stages, area separations, interim milestones and Beneficial Occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review time required for review of submittals and resubmittals.
7. Review requirements for tests and inspections by independent testing and inspecting agencies.
8. Review time required for completion and startup procedures.
9. Review and finalize list of construction activities to be included in schedule.
10. Review submittal requirements and procedures.
11. Review procedures for updating schedule.

#### **1.06 COORDINATION**

- A. Coordinate preparation and processing of CPM schedules and reports with the performance of the Work and with CPM scheduling and reporting of separate Contractors.
  1. Coordinate new Baseline Schedules and CPM schedule updates with separate Contractor's when additional Contracts are executed during the entire duration of the Project.
- B. Coordinate CPM schedule with the Contractor's Submission Schedule, progress reports, and other required schedules and reports.
  1. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

### **PART 2 - PRODUCTS**

#### **2.01 CRITICAL PATH METHOD SCHEDULE, GENERAL**

- A. Bid Milestone Schedule: The Owner shall provide a Bid Milestone Schedule, which is attached to this section as a template for the Baseline Schedule. Nothing in the Bid Milestone Schedule, Baseline Schedule or CPM schedule shall preclude the Contractor from advancing the Work of the Contract.

1. Include milestones indicated in the Contract Documents in Baseline Schedule, including, but not limited to, the Notice to Proceed, interim milestones, Substantial Completion, and Contract close-out.
  2. Substantial Completion date shall not be changed by submission of a schedule that shows an early completion date, unless approved by the Owner.
  3. No time for weather will be apportioned for foreseeable occurrences in a specific regional area. The Contractor shall be responsible to determine reasonable averages and make allowances in the performance of the Work.
- B. Activities: Treat each numbered activity as a consumable resource for each principal element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than 15 days, unless specifically allowed by the Owner.
  2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
  3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 - Submittal Procedures in schedule. Coordinate submittal review times in the CPM schedule with dates entered in the Contractor's Submission Schedule.
  4. Startup and Testing Time: Include not less than 15 days for startup and testing.
  5. Substantial Completion: Indicate completion on the date established for Substantial Completion, and allow time for the Owner's administrative procedures necessary to execute the Notice of Substantial Completion (NOSC).
  6. Incomplete Work items and Contract Closeout: Include not more than 60 days for incomplete Work items and Contract Closeout Requirements.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents, or approved by the Owner prior to use and show how date constraints affect the sequence of the Work.
1. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities.
- D. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
  2. Unanswered RFIs.
  3. Rejected or unreturned submittals.
  4. Notations on returned submittals.
- E. Recovery CPM Schedule: When periodic update indicates the Work is 15 or more calendar days behind the current approved CPM schedule, submit a separate recovery CPM schedule indicating means by which the Contractor intends to regain compliance with the CPM schedule. Indicate changes to working hours, working days, crew sizes, and equipment required achieving compliance, and dating by which recovery will be accomplished, subject to Owner's approval.
- F. Computer Scheduling Software: Prepare CPM schedules using current version of a program that has been developed specifically to manage CPM schedules and interface with the Owner's electronic file of the Bid Milestone Schedule.
1. Utilize Primavera P6 or P3 Primavera Project Planner operating system.

## **2.02 CRITICAL PATH METHOD SCHEDULE (CPM SCHEDULE)**

- A. Baseline Schedule: Prepare schedule using a time-scaled PDM network diagram representing the Work of the Contract. Total float time shall be equal to or greater than zero in the Baseline Schedule.
1. Submit Baseline Schedule within 15 days of the date established for the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work based on indicated activities.
  2. Develop network diagram in sufficient time to submit Baseline Schedule so it can be accepted for use no later than 30 days after date established for the Notice to Proceed.
    - a. Failure to include any work item required for the performance of the Work shall not excuse the Contractor from completing the Work of the Contract within applicable completion dates, regardless of the Owner's approval of the schedule.
- B. CPM Schedule: Prepare contemporaneous schedules using a time-scaled PDM network for sequencing the Work and showing the progress of the Work.
1. Establish procedures for monitoring and updating the CPM schedule and for reporting progress. Coordinate procedures with the progress meeting and payment request date.
  2. Coordinate the Work occurring concurrently through the integration of other Contractors Baseline Schedules into the CPM schedule.

3. Conduct educational workshops to train and inform the Contractor's key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
  4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to correlate with Contract durations.
- C. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work of the Contract. At minimum, each individual specification section, including General Requirement sections, as indicated in the Project Manual, shall be listed as an activity.
1. Activities ID: Provide a unique identifier to each activity. No activity ID shall be recycled or reused.
  2. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
    - a. Preparation and processing of submittals.
    - b. Mobilization and demobilization.
    - c. Purchase of materials.
    - d. Delivery.
    - e. Fabrication.
    - f. Utility interruptions.
    - g. Installation.
    - h. Work by Owner that may affect or be affected by the Contractor's activities.
    - i. Testing and commissioning.
    - j. Incomplete Work items and Contract closeout.
  3. Actual Activity Dates: Once an activity has been assigned an actual date of occurrence, the status of that activity shall not change. Any change to actual dates must be accompanied with supporting data and approved by the Owner. No actual start date shall occur ahead of the data date.
  4. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with the Bid Milestone Schedule dates.
  5. Processing: Process data to produce output data status on a computer-drawn, PDM network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract duration.
  6. Calculations: The schedule network shall be calculated allowing activities to retain their original logic. Progress override shall not be used when calculating the network status.
  7. Logic: Leads and lags will not be used when the creation of an activity will perform the same function. Lag durations contained in the schedule

shall not have negative value. Lead and lag durations shall not exceed the durations of the activity they are assigned.

- a. There shall be only two open ended activities; (1) Notice to Proceed, with no predecessor logic, and (2) Final Payment, with no successor logic. All intermediate activity logic shall be connected.
  - b. Out of sequence activities that have progressed before all preceding logic will be allowed only on a case by case basis, as approved by the Owner. The Contractor shall propose logic corrections to eliminate all out of sequence progress and correct out of sequence progress that continues for more than two update cycles by logic revisions, as approved by the Owner.
8. Float: The Owner shall reject the schedule and schedule updates for the use of float suppression techniques such as preferential sequencing, special lead lags logic constraints, zero total or zero free float constraints, extended activity times, or imposing constraint dates other than what is required by the Contract.
- a. The use of resource leveling used for the purpose of artificially adjusting activity durations to consume float and influence the critical path is prohibited.
  - b. A schedule showing work completing in less time than the Contract duration and accepted by the Owner, will be considered to have float.
  - c. Any float generated during the performance of the Work, due to efficiencies of the Owner or any Contractor is not for sole use of the party generating the float.
  - d. Negative float will not be a basis for requesting time extensions and will not be construed as a means of acceleration or schedule extension.
9. Format: Follow the applicable individual specification sections of the Work as the bases for the content of the CPM schedule. Organize the CPM schedule to provide the necessary detail for each area, level, quadrant and section as needed in the performance of the Work.
- D. Changes in the Work: For each proposed change and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall CPM schedule.
- E. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed, including the reason each adjustment was necessary.
  2. Changes in early and late finish dates.

3. Changes in activity durations in workdays.
4. Changes in the critical path.
5. Changes in total float or slack time.
6. Changes in the duration for Substantial Completion.

### **2.03 REPORTS**

- A. **Material Location Reports:** At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
- B. **Field Condition Reports:** Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

### **2.04 SPECIAL REPORTS**

- A. **General:** Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. **Reporting Unusual Events:** When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, and response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise the Owner in advance when these events are known or predictable.

## **PART 3 - EXECUTION**

### **3.01 CPM SCHEDULE**

- A. **Project Scheduler:** Engage a consultant or person skilled in construction planning and scheduling to provide planning, scheduling, evaluation, and reporting services using CPM scheduling.
  1. **In-House Option:** The Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
  2. **Meetings:** Project scheduler shall attend all meetings related to the Project progress, alleged delays, and time impact.



- B. CPM Schedule and CPM Reports Updating: Prior to each scheduled progress meeting, update schedule to reflect actual construction progress and activities. Issue schedule and reports one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the CPM reports of each such meeting. As a minimum, schedule update submissions shall occur monthly and within 30 days of the schedule Data Date.
  2. Include CPM reports with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  3. As the Work progresses, indicate final remaining duration for each activity.
- C. Distribution: Submit one electronic copy, in format specified, to the Owner and distribute copies of approved schedule and reports to the Owner, Design Professional, separate contractors, testing and inspecting agencies, and other parties identified by the Owner with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
  2. When revisions are made, distribute updated schedules and reports to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

**END OF SECTION 013200**

**013300 SHOP DRAWINGS, PROJECT DATA AND SAMPLES**

**PART 1 - GENERAL**

- 1.01** Submit to the Engineer shop drawings, project data and samples required by Specifications.
- 1.02** Prepare and submit, with Construction Schedules, a separate schedule listing dates of submission and dates of reviewed shop drawings; project data and samples will be needed for each product.
- 1.03** Do not proceed with construction or installation until shop drawings are approved.
- 1.04** Identify shop drawing with more than one issue. Successive issues shall have nothing changed that has been previously accepted on earlier issues, unless such items are flagged or noted in an accompanying letter. Checking will be done only on that basis.

**1.05 SHOP DRAWINGS**

- A. Submit within ten days after the award of the Contract, unless otherwise specified, a complete list of the manufacturers of materials and equipment to be incorporated in the work. Intention of using specified materials and equipment does not relieve submittal obligations.
- B. Review and approve shop drawings before submittal to Engineer. Include manufacturer's name and catalog number, descriptive data, cuts, diagrams, drawings and such other information as may be required, by the Owner, to judge compliance with the requirements of the Contract Documents and suitability to the application. Items submitted shall be well organized and clearly identified as to proposed application.
- C. Assume responsibility for deviations from Drawings or Specifications unless called to the Owner's attention in writing at the time of submission. Also responsible for errors of any sort in shop drawings or schedules. Owner's/Engineer's review of such drawings or schedules shall not relieve the Contractor of this responsibility.
- D. Indicate on shop drawings all changes to meet space requirements, code requirements and as necessary to resolve all space conflicts.
- E. Monitor original shop drawings, prepared by a subcontractor, supplier or distributor. Ascertain the shop drawings are prepared by a detailer qualified to illustrate, verify and/or layout applicable portions of the work showing fabrication, as well as setting or erection details to include the following:
1. Identify details by reference to sheet and detail numbers shown on Contract Drawings.

2. Draw on minimum sheet size of 8 1/2 inches x 11 inches.
  3. Prepare reproductions for submittals including reproducible transparency (sepia) with three prints.
- F. Obtain all acceptances before ordering or installing any materials and equipment. Contractor shall be liable for removal and replacement at no charge if, in opinion of Owner, material or equipment does not meet intent of the Contract Documents.
- G. Any materials or equipment submitted for review which are not in accordance with the Specification requirements will be rejected and resubmitted until approved without change in construction schedule and without additional cost to Owner.

#### **1.06 PROJECT DATA**

- A. Provide manufacturer's standard schematic drawings:
1. Modify Drawings to delete information which is not applicable to project.
  2. Supplement standard information to provide additional information applicable to project.
- B. Provide manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data:
1. Clearly mark each copy to identify pertinent materials, products or models.
  2. Non-applicable material and data shall be struck prior to submittal.
  3. Show dimensions and clearances required.
  4. Identify performance characteristics and capacities.
  5. Include wiring diagrams and controls.

#### **1.07 SAMPLES**

- A. Furnish to the Engineer, for approval, samples of all materials to be used in this work.
- B. Provide physical examples to illustrate materials, equipment or workmanship, and to establish standards by which completed work is judged.
- C. Provide office samples, of sufficient size and quantity to clearly demonstrate:
1. Functional characteristics of product or material, with integrally related

- parts and attachment devices.
- 2. Full range of color samples.
- D. Use samples, after review, in construction of project.
- E. Prepare field samples and mock-ups.
  - 1. Erect on project site at location acceptable to Owner.
  - 2. Construct each sample or mock-up complete, including work of all trades required in finished work.

#### **1.08 CONTRACTOR RESPONSIBILITIES**

- A. Review shop drawings, project data and samples prior to submission.
- B. Verify:
  - 1. Field measurements and field construction criteria.
  - 2. Catalog numbers and similar data.
- C. Coordinate each submittal with requirements of work and of Contract Documents.
- D. Responsible for deviations, errors and omissions in submittals. This responsibility is not relieved by another's review of submittals.
- E. Notify Owner, in writing at time of submission, of deviations in submittals from requirements of Contract Documents.
- F. Delay work which requires submittals, until return of approved submittals from Owner.

#### **1.09 SUBMISSION REQUIREMENTS**

- A. Schedule submissions at least seven days before dates reviewed submittals will be needed.
- B. Submit electronic copy or one sepia and three prints of structural drawings, and one-line diagrams. Partial submissions will be returned without action taken.
- C. Submit six copies of manufacturer's submittal sheets or catalog cuts. Extraneous material on product data sheets shall be struck prior to submittal.
- D. Submit number of samples specified in each of Specification Sections.
- E. Accompany submittals with transmittal letter, in duplicate, containing:

1. Date.
2. Project title and number.
3. Contractor's name and address.
4. The number of each shop drawing, project datum and sample submitted.
5. Notification of deviations from Contract Documents.
6. Other pertinent data.

F. Include the following information with submittals:

1. Date and revision dates.
2. Project title and number.
3. The names of:
  - a. Engineer.
  - b. Contractor.
  - c. Subcontractor.
  - d. Supplier.
  - e. Manufacturer.
  - f. Separate detailer, when pertinent.
4. Identification of product or material.
5. Relation to adjacent structure or materials.
6. Field dimensions, clearly identified as such.
7. Contract Specifications Section Number.
8. Applicable standards, such as ASTM number or FS number.
9. Identification of deviations from Contract Documents.
10. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with Contract Documents.

## **1.10 RESUBMISSION REQUIREMENTS**

A. Shop Drawings

1. Revise initial shop drawings as required and resubmit as specified for initial submittal.
2. Indicate on Drawings any changes which have been made other than those requested by Owner.

B. Project Data and Samples

1. Submit new datum and samples as required for initial submittal.

**1.11 DISTRIBUTION OF SUBMITTALS AFTER REVIEW**

A. Distribute copies of shop drawings and project datum which carry Owner's notation to:

1. Contractor's file.
2. Job site file.
3. Record Documents file.
4. Subcontractors.
5. Supplier.
6. Fabricator.

B. Distribute samples as directed.

**1.12 ENGINEER'S DUTIES**

A. Review submittals with reasonable promptness.

B. Review for:

1. Compliance with general design concept of project.
2. Information given in Contract Documents.

C. Review of separate item does not constitute review of an assembly in which item functions. Request assembly data from Contractor.

D. Affix stamp and initials or signature after review of submittal.

E. Return submittals to Contractor for distribution.

**PART 2 - PRODUCTS**

Not used.

**PART 3 - EXECUTION**

Not used.

**END OF SECTION**

## **013500 CONSTRUCTION SIGN**

### **PART 1 - GENERAL**

#### **1.01 Work Included**

- A. Furnish and install a construction sign to be located at the job site at the Town of North Hempstead Solid Waste Management Authority at Port Washington Landfill, in Port Washington NY 11050.

### **PART 2 - PRODUCTS**

#### **2.01 Materials**

- A. Sign
  1. Signboard: 4' x 8', 3/4" plywood, MDO B-B EXT-APA.
  2. Primer: As recommended by finish coat manufacturer for the substrate and finish material.
  3. Lettering and striping shall be uniform with sharp, neat profiles.
  4. "Optional Information" information on sign shall be visually subordinate to other information provided.
  5. Supports: Treated D.F. posts.

#### **2.02 Sign Design**

- A. The sign design layout must follow the sample layout enclosed.

### **PART 3 - EXECUTION**

#### **3.01 Installation**

- A. Install sign at the site within one week of the start of construction.
- B. Erect sign in a prominent location, secure from vandalism.

#### **3.02 Maintenance and Removal**

- A. Maintain the sign plumb and level for the duration of the work.
- B. The sign must be removed from the property 60 days after final payment or project completion, whichever is later.

**3.03** Sign Placement

- A. With respect to placement, traffic control signs, regulatory warning, and guide signs have a higher priority than facility signage.
- B. Signage should be placed where they can be easily identified with the corresponding projects.

**END OF SECTION**



## **016600 STORAGE AND PROTECTION**

### **PART 1 - GENERAL**

#### **1.01 REQUIREMENTS**

- A. Provide secure storage and protection for products to be incorporated into the work. Also provide maintenance and protection for products after installation and until completion of the work.
  - 1. Interior and exterior storage areas shall be designated by the Owner.
  - 2. Restrict storage weight and do not exceed load limitations.

#### **1.02 STORAGE**

- A. Store products immediately on delivery and protect products until installed in the work. Then protect finished work until completion of the project.
  - 1. Store in accordance with manufacturer's instructions, with seals and labels intact and legible.
  - 2. Store unpacked products on shelves, in bins or in neat piles, accessible for inspection.
- B. Store all materials under cover in a safe, dry location, and off the ground. Provide raised platform and waterproof covers to protect the materials from the weather, contamination, dirt, etc.
- C. Store products subject to damage by elements in substantial weathertight enclosures.
  - 1. Maintain temperature and humidity within ranges identified in manufacturer's instructions.
- D. Provide suitable protection for products stored outside:
  - 1. Provide substantial platforms, blocking or skids to support fabricated products above ground. Prevent soiling or staining, and cover products subject to discoloration or deterioration with impervious sheet coverings.
  - 2. Store loose granular materials on solid surfaces such as paved areas, or, provide plywood or sheet materials to prevent mixing with foreign matter.
  - 3. Provide surface drainage to prevent flow or ponding of rainwater near stored materials or products.
- E. Arrange storage in manner to provide easy access for inspection and physical inventory.

### **1.03 MAINTENANCE OF STORAGE**

- A. Maintain periodic system of inspection and maintenance of stored products on scheduled basis to assure that:
  - 1. State of storage facilities is adequate to provide required conditions and protection.
  - 2. Required environmental conditions are maintained on continuing basis.
  - 3. Surfaces of products exposed to elements are not adversely affected.
- B. Make sure mechanical and electrical equipment which require servicing during long term storage, have complete manufacturer's instructions for servicing accompanying each item. Assure notice of enclosed instructions is shown on exterior of package.
  - 1. Comply with manufacturer's instructions on scheduled basis.

### **1.04 PROTECTION DURING INSTALLATION**

- A. Take every precaution not to mar or damage finishes.
- B. Provide protection for installed products to prevent damage from subsequent operations. Remove prior to completion of work when no longer needed.
- C. Control traffic to prevent damage to equipment and surfaces.
- D. Install materials only when weather conditions ensure proper application of all materials.
- E. Provide coverings to protect finished surfaces from damage.
  - 1. Cover projections, wall corners, jambs, sills and soffits, in areas used for traffic and for passage of products in subsequent work.
  - 2. Protect finished floors and stairs from dirt and damage.
- F. Protect waterproofed and roofing surfaces.
  - 1. Prohibit use of surfaces for traffic of any kind, and for storage of any products.
  - 2. Obtain recommendations of installer, for protection of surface, when some activity must take place in order to carry out the Contract.
    - a. Install recommended protection and remove on completion of that

activity.

b. Restrict use of adjacent unprotected areas.

G. Lawns and Landscaping

1. Prohibit traffic of any kind across planted lawn and landscaped areas.

#### **1.05 REMOVALS**

A. Remove materials which are damaged or otherwise not suitable for installation from the project site and replace with acceptable materials at the Contractor's expense.

#### **PART 2 - PRODUCTS**

Not used.

#### **PART 3 - EXECUTION**

Not used.

**END OF SECTION**

**017300 CUTTING AND PATCHING**

**PART 1 - GENERAL**

**1.01 WORK INCLUDED**

A. Description

1. Provide all cutting, drilling, rough and finish patching required for the work.
2. Cut beams, floors or walls for piping or conduit, only with approval of the Engineer and in a careful manner. Use core drills, so as not to seriously impair the appearance or strength of the structure.
3. Cut finish surfaces such as masonry or plaster or metals, by methods to terminate surfaces in a straight line at a natural point of division.
4. Obtain approval from the Engineer, where the work pierces waterproofing or roofing. Furnish all necessary sleeves, caulking and flashing required to make openings absolutely watertight.
5. Provide all drilling and patching for expansion bolts, hangers and other supports for proper and safe installation of work.
6. Execute cutting (including excavating), fitting or patching of work required to:
  - a. Make several parts fit properly.
  - b. Uncover work to provide for installation of ill-timed work.
  - c. Remove and replace defective work.
  - d. Remove and replace work not conforming to requirements of Contract Documents.
  - e. Remove samples of installed work as specified for testing.
  - f. Install specified work in existing construction.
7. Perform the following work, in addition to Contract requirements, upon written instructions of Owner:
  - a. Uncover work to provide Owner's observation of covered work.
  - b. Remove samples of installed materials for testing.
  - c. Remove work to provide for alteration of existing work.
8. Avoid endangering work caused by cutting or altering any part of it.

9. Obtain written approval from Owner before cutting or altering work of another Contractor.

B. Submittals

1. Submit written notice to Owner, requesting written consent to proceed with cutting which affects structural safety of project, or work of another Contractor. Notice should include the following:
  - a. Identification of project.
  - b. Description of affected work.
  - c. Identify necessity for cutting.
  - d. List affects on other work and on structural integrity of project.
  - e. Describe proposed work, designating the following:
    - 1) Scope of cutting and patching.
    - 2) Contractor and trades to execute work.
    - 3) Products proposed to be used.
    - 4) Extent of refinishing.
  - f. Identify alternatives to cutting and patching.
  - g. Identify the party responsible for cost of cutting and patching.
2. Seek permission for cutting and patching for work executed on instructions of Owner.
3. Submit written recommendation to Owner, when conditions of work, or schedule, indicate change of materials or methods. Include the following:
  - a. Identify reasons for change.
  - b. Recommendations for alternative materials or methods.
  - c. Submittals as required for substitutions.
4. Submit written notice to Owner, designating time work will be uncovered, to provide for Owner observation.

**PART 2 - PRODUCTS**

- 2.01** Comply with Specifications for materials in replacement of work or for type of work to be done.

### **PART 3 - EXECUTION**

#### **3.01 INSPECTION**

- A. Inspect existing conditions of work, including elements subject to movement or damage during:
  - 1. Cutting and patching.
  - 2. Excavating and backfilling.
- B. Inspect conditions, after uncovering work, affecting installation of new products.

#### **3.02 MAKE PREPARATIONS PRIOR TO CUTTING**

- A. Provide shoring, bracing and support as required to maintain structural integrity of project.
- B. Provide protection for other portions of project.
- C. Provide protection from elements.

#### **3.03 PERFORMANCE**

- A. Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances and finishes.
- B. Execute cutting and demolition by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs and new work.
- C. Restore work which has been cut or removed. Install new products to provide completed work in accord with requirements of Contract Documents.
- D. Refinish entire surfaces as necessary to provide an even finish.
  - 1. Provide continuous surface to nearest intersection.
  - 2. Complete entire refinishing of each assembly.

**END OF SECTION**

**017500 STARTING OF MECHANICAL/ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.01 REQUIREMENTS**

- A. Provide material and labor required to perform start-up and test of each respective item of equipment and system. Prior to beginning of test, complete procedures for adjustment and balancing.
  - 1. Provide information and assistance as required during start-up.
  - 2. Cooperate and coordinate with Owner, manufacturer, equipment vendor, insurance underwriter and utility company.
  - 3. Provide all inspection, test, adjustment and balancing services.
- B. Comply strictly with specified procedures in starting-up mechanical/electrical systems.

**1.02 DEMONSTRATION TO OWNER**

- A. Include Owner's appropriate personnel during start-up procedures. Demonstrate methods of starting up equipment and normal operating techniques.
- B. Schedule the start-up period to accommodate Owner's personnel.
- C. Furnish and use all tools, ladders, etc. as required in starting all equipment and clean up of debris. Leave site in its original condition.
- D. Describe any required settings of equipment system gauges, dials, etc., during training of Owner's representative(s).
- E. Identify, for the Owner, the equipment/component manufacturer's service requirements. Also, indicate how to perform mechanical work procedures properly.
- F. Identify Owner's required operating and preventive maintenance tasks, e.g., weekly or monthly exercising, etc.
- G. Provide Owner, in writing within five days of the commencement of start-up procedures, a list of equipment deficiencies and corrective steps which the Owner should take. Also, provide a copy of a checklist to the Owner indicating repair/service measures to be taken. Also identify outside service agency available to do the work.
- H. Provide recommended spare parts list with accompanying unit cost and total

costs.

- I. Describe the guarantee and identify the guarantee period for each piece of equipment.
- J. At conclusion of the start-up, Owner will indicate acceptance of the components of the systems in their present physical and operating condition.

### 1.03 START-UP PROCEDURES

(Note: procedures indicated below are intended as a general guide for startup, specific procedures required by manufacturer, or as indicated in Division 26, supersede the procedures below.)

#### A. Generators

##### 1. Engines

###### a. Inspect each engine for the following:

- 1) Proper anchorage to foundation.
- 2) Proper coolant level in radiator, with correct percentage of antifreeze in coolant.
- 3) Proper oil level in crankcase.
- 4) Proper natural gas piping.
- 5) Fully-charged starting battery.
- 6) Clean oil filter.
- 7) Clean air filter.
- 8) Clean crankcase breather valve (PCV).

b. Visually inspect water and fuel pumps for proper hose and pipe connections.

c. Visually inspect radiator fans for unimpeded rotation, and tighten belts to proper tension.

##### 2. Generators

###### a. Visual and mechanical inspection

- 1) Inspect for physical damage, proper anchorage, and grounding.

###### b. Electrical and Mechanical Tests

- 1) Perform a dielectric absorption test on generator winding with respect to ground. Determine polarization index.

$$\text{Polarization Index} = \frac{\text{Ohms @ 10 Minutes}}{\text{Ohms @ 1 Minute}}$$



- 2) Test protective relay devices.
- 3) Functionally test engine shutdown for low oil pressure, over-temperature, over-speed, and other features as applicable.
- 4) Perform vibration base line test. Plot amplitude versus frequency for each main bearing cap.
- 5) Perform resistive load bank test at one hundred percent (100%) nameplate rating. Loading shall be:
  - 25% rated for 30 minutes
  - 50% rated for 30 minutes
  - 75% rated for 30 minutes
  - 100% rated for 3 hours
- 6) Record voltage, frequency, load current, oil pressure and coolant temperature at periodic intervals during test.

c. Test Values

- 1) Perform dielectric absorption at test voltage listed in below. Polarization index values shall be in accordance with IEEE Standard 43.
- 2) Load test results shall demonstrate the ability of the unit to deliver rated load for the test period.

Equipment Rating	Test Voltage (Min.)	Insulation Resistance Megohms
250 Volts	500 Volts	25
600 Volts	1000 Volts	100
5000 Volts	2500 Volts	1000
8000 Volts	2500 Volts	2000
15000 Volts	2500 Volts	5000

B. Transfer Switches

1. Visual and Mechanical Inspections
  - a. Inspect for physical damage
  - b. Check switch to ensure positive interlock between normal and alternate sources, mechanical and electrical.
  - c. Check tightness of all control and power connections.
  - d. Perform manual transfer operation with no connected load.
  - e. Ensure manual transfer warnings are attached and visible to operator.
2. Electrical Tests
  - a. Perform insulation resistance tests phase-to-phase and phase-to-ground with switch in both source positions, where possible.
  - b. Perform a contact resistance test or measure millivolt drop across all

- main contacts. As an alternate, an infrared scan may be performed for both eh normal and emergency loads.
- c. Verify settings and operation of control devices in accordance with the owner/user's electrical engineer's specifications for voltage and frequency sensing relays, all time delay relays, and engine start and shutdown relays.
  - d. Perform the following automatic transfer tests:
    - 1) Simulate loss of normal power
    - 2) Return to normal power
    - 3) Simulate loss of emergency power
    - 4) Simulate all forms of single-phase conditions
  - e. Monitor and verify correct operation and timing of the following:
    - 1) Normal voltage sensing relays
    - 2) Engine start sequence
    - 3) Time delay upon transfer
    - 4) Alternate voltage sensing relays
    - 5) Automatic transfer operation
    - 6) Interlocks and limit switch function
    - 7) Time delay and retransfer upon normal power restoration
    - 8) Engine cooldown and shutdown feature
3. Test Values
- a. Insulation resistance test voltages and minimum values to be as follows:

Equipment Rating	D.C. Test Voltage (Min.)	Minimum Insulation Resistance-Megohms
250 Volts	500 Volts	25
600 Volts	1000 Volts	100

#### 1.04 ADJUSTMENTS

- A. Provide such periodic continuing adjustment services as necessary to ensure proper functioning of mechanical systems upon occupancy of the project site and for a period of two years after date of final completion of the work.

#### PART 2 - PRODUCTS

Not used.

**PART 3 - EXECUTION**

Not used.

**END OF SECTION**

**017700 PROJECT CLOSEOUT**

**PART 1 - GENERAL**

**1.01 SUBSTANTIAL COMPLETION**

- A. Submit written certification to Owner that project, or designated portion of project, is substantially complete. Include a list of major items to be completed or corrected.
- B. Provide Owner the opportunity to make an inspection within seven days after receipt of certification.
- C. Perform the following when Owner agrees work is substantially complete:
  - 1. Prepare, and submit to Owner, a list of items to be completed or corrected, as determined by the inspection.
  - 2. Sign the Certificate of Substantial Completion. Engineer will prepare and issue a Certificate of Substantial Completion, complete with signatures of Owner and Contractor, accompanied by Contractor's list of items to be completed or corrected, as verified and amended by Owner.
  - 3. Perform final cleaning in accordance with Specifications.
  - 4. Complete work listed for completion or correction, within designated time.
- D. Perform the following, when Owner considers work is not substantially complete:
  - 1. Accept in writing, the Owner's immediate notification stating the reasons work is not substantially complete.
  - 2. Complete the work, and send a second written notice to Owner, certifying project, or designated portion of project, is substantially complete.
  - 3. Reinspect work with the Owner.
- E. Owner will occupy project premises under provisions stated in Certificate of Substantial Completion.

**1.02 FINAL INSPECTION**

- A. Submit written certification to the following:
  - 1. Review of Contract Documents is completed.
  - 2. Inspection of project for compliance with Contract Documents is completed.

3. Work is completed in accordance with Contract Documents.
  4. Test of equipment and systems in presence of Engineer are completed and they are operational.
  5. Completed project is ready for final inspection.
- B. Schedule final inspection with Owner within seven days after receipt of certification.
- C. Make project closeout submittals, at the request of the Owner, following Owner's consideration that work is finally complete in accordance with requirements of Contract Documents.
- D. Complete the following, should Owner consider that work is not finally complete:
1. Receive in writing from the Owner reasons for the work not being finally complete.
  2. Take immediate steps to remedy the stated deficiencies, and send second written notice to Owner certifying that work is complete.
  3. Make arrangements with Owner to reinspect the work.

### **1.03 REINSPECTION COSTS**

- A. Pay additional service costs. Should Owner be required to perform second inspections because of failure of work to comply with original certifications of Contractor, Owner will be compensated for additional services, and deduct amount paid from final payment to Contractor.

### **1.04 SERVICE MANUALS AND INSTRUCTIONS**

- A. Instruct Owner's personnel in operation of all systems, mechanical, electrical and other equipment.
- B. Fully instruct the Owner, upon completion of the work, as to the operation and maintenance of all material, equipment and systems.
- C. Provide three complete bound sets of instruction manuals for operating and maintaining all systems and equipment.
- D. Include the following in each manual:
1. For each item, the manufacturer's name, address and telephone number.
  2. Brief description of each equipment item and basic operating features.

3. Limiting conditions.
4. Start-up instructions.
5. Routine and normal operating instructions.
6. Regulation and control.
7. Shutdown.
8. Emergency procedures.
9. Lubrication and maintenance instructions.
10. Guide to troubleshooting.
11. Parts lists.
12. Drawings.
13. Wiring diagrams.
14. Test data and performance curves.
15. Copies of written guarantee and manufacturer's warranties.

- E. Provide complete descriptions and instructions for maintenance of the systems and equipment, including replacement parts, all labor and materials to maintain the system in proper operating condition for the guarantee period.

#### **1.05 AS-BUILT DRAWINGS**

- A. Provide Owner with a complete set of as-built drawings covering every aspect of the work. The complete set shall include a set of mylars or quality sepias capable of producing quality prints and two full sets of all as-built drawings. Provide electronic copy of all documents in Adobe PDF format.
- B. The as-built drawings will be delivered to the Owner within 30 days of completion of the work.

#### **1.06 CLOSEOUT SUBMITTALS**

- A. Submit the following to the Owner:
1. Project record documents.
  2. Operation and maintenance data.
  3. Guarantees and bonds as specified.
  4. Keys and keying schedules.
  5. Parts and materials as specified.
- B. Deliver evidence of compliance with requirements of governing authorities:
1. Certificates of Inspection
    - a. Electrical
      - 1) Underwriters Certificate
- C. Deliver Certificate of Insurance for products and completed operations.

**1.07 EVIDENCE OF PAYMENTS AND RELEASE OF LIENS**

- A. Submit Contractor's affidavit of payment of debts and claims.
- B. Submit Contractor's affidavit of release of liens. Also include:
  - 1. Consent of surety to final payment.
  - 2. Contractor's release or waiver of liens.
  - 3. Separate releases of waivers of liens for subcontractors, suppliers, and others with lien rights against property of Owner, together with list of those parties.

**1.08 FINAL ADJUSTMENT OF ACCOUNTS**

- A. Submit final statement of accounting to Owner.
- B. Reflect all adjustments in the statement including the following:
  - 1. Original Contract sum.
  - 2. Additions and deductions resulting from the following:
    - a. Previous Change Orders.
    - b. Cash allowances.
    - c. Unit prices.
    - d. Other adjustments.
    - e. Deductions for uncorrected work.
    - f. Penalties and bonuses.
    - g. Deductions for liquidated damages.
    - h. Deductions for reinspection payments.
  - 3. Total Contract sum, as adjusted.
  - 4. Previous payments.
  - 5. Sum remaining due.
- C. Owner will prepare a final Change Order reflecting the approved adjustments to the Contract sum not previously made by Change Orders.

**1.09 FINAL APPLICATION FOR PAYMENT**

- A. Submit final application in accordance with requirements of the General Conditions and the Supplemental General Conditions.

**1.10 FINAL CERTIFICATE FOR PAYMENT**

- A. Owner will issue a final certificate in accordance with provisions of the General Conditions.
- B. Should the final completion be materially delayed through no fault of the Contractor, the Owner may make payment for that portion of the work fully completed and accepted, in accordance with the provisions of the General Conditions.

**1.11 POST-CONSTRUCTION INSPECTION**

- A. Make visual inspection of the project with the Owner prior to expiration of the one-year guarantee. Determine whether correction of work is required in accordance with the provisions of the General Conditions.
- B. For guarantees beyond one year, the Owner will make inspections after notification to the Contractor.

**PART 2 - PRODUCTS**

Not used.

**PART 3 - EXECUTION**

Not used.

**END OF SECTION**



**017800 PROJECT RECORD DOCUMENTS**

**PART 1 - GENERAL**

**1.01 MAINTENANCE OF DOCUMENTS**

- A. Maintain at project site, one copy of each of the following:
  - 1. Contract Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Reviewed and approved shop drawings.
  - 5. Change Orders.
  - 6. Other modifications to Contract.
  - 7. Field test records.
  - 8. Minutes from progress meetings.
- B. Store documents in a location directed by Owner, apart from documents used for construction.
- C. Provide files and racks for storage of documents.
- D. File documents in accordance with project filing format of Specification Division and Section numbers.
- E. Maintain documents in clean, dry, legible condition.
- F. Avoid use of record documents for construction purposes.
- G. Make documents available at all times for inspection by Owner/Engineer.

**1.02 RECORDING**

- A. Label each document PROJECT RECORD in two-inch high printed letters.
- B. Keep record documents current.
- C. Avoid permanently concealing any work until required information has been recorded.
- D. Mark Contract Drawings legibly to record the following actual construction data:
  - 1. Elevations of equipment foundations.
  - 2. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.

3. Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.
  4. Field changes of dimension and detail.
  5. Changes made by Change Order.
  6. Details not on original Contract Drawings.
- E. Mark Specifications and Addenda legibly to record the following:
1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
  2. Changes made by Change Order.
  3. Other matters not originally specified.
- F. Maintain shop drawings as record documents. Legibly annotate following Drawings to record changes made after review:
1. Concrete foundations.
  2. Structural steel.
  3. Electrical one-line diagrams.

### **1.03 SUBMITTALS**

- A. At completion of the project, deliver record documents to Owner.
- B. Provide an accompanying submittal with transmittal letter, in duplicate, containing the following:
1. Date.
  2. Project title and number.
  3. Contractor's name and address.
  4. Title and number of each record document.
  5. Certification that each document as submitted is complete and accurate.
  6. Signature of Contractor, or his authorized representative.

### **PART 2 - PRODUCTS**

Not used.

**PART 3 - EXECUTION**

Not used.

**END OF SECTION**

**DIVISION 3**

**CONCRETE**

**DIVISION 3 - CONCRETE**

<u>SECTION NO.</u>	<u>TITLE</u>	<u>PAGE</u>
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030550	CONCRETE	030550-1
031000	CONCRETE FORMWORK	031000-1
032000	CONCRETE REINFORCEMENT	032000-1
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## **030100 GENERAL PROVISIONS**

### **PART 1 - GENERAL**

#### **1.01 WORK INCLUDED**

- A. Work under this Division shall include all labor, material, equipment, plant services and administrative tasks required to complete and make usable the work shown on the Drawings, listed in the schedules and specified herein. This work includes, but is not limited to the following:
1. Provide all concrete work including concrete pads for equipment to be installed under other Divisions of the work.
  2. Install all necessary concrete formwork.
  3. Provide concrete reinforcement.
  4. Provide proper concrete curing.

#### **1.02 GENERAL REQUIREMENTS**

- A. General
1. Instructions to Bidders, General Conditions, Supplementary Conditions and Division 1 govern the work of this Division.
  2. Drawings and Specifications determine general arrangement and locations of facilities, equipment and the work of various systems.
  3. Details and general provisions for concrete construction shall conform to requirements of ACI 318 and ACI 315. All ACI Code requirements specified shall be adhered to as if they were called for or shown on the Drawings.

#### **1.03 SPECIAL REQUIREMENTS**

- A. Submittals
1. Submit complete and accurate shop drawings based on the design drawings, showing dimensions, bar and mesh schedules, bending details, stirrup spacings main reinforcement, temperature reinforcement, with all the necessary accessories required and also special conditions for the approval of the Engineer.
  2. Submit setting plans and drawings or schedules showing details of fabrication of reinforcement and identifying the material for installation, conforming to the latest edition of the manual of standard practice for

detailing concrete structures, ACI 315.

3. Setting drawings shall be complete in showing and identifying by mark or otherwise all the bars to be incorporated in the work.

B. Quality Assurance

1. Examine carefully the Drawings for all other trades as to the requirements for openings for pipes, conduits, ducts, etc. Each Contractor shall set in place the necessary sleeves or boxing required for his work. All slots, chases, recesses, etc., shall be formed in the concrete work at the locations indicated and/or required, but shall be so located as not to impair the strength of any structural member.
2. Coordinate work of other sections and divisions and cooperate with trades involved in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, other inserts and other related work.

C. Inspection of Work Site

1. Notify the Engineer three days prior to pouring concrete in order to permit his inspection and approval.

D. Contractor's Responsibility

1. Guarantee work of this Division for a period of 2 years against defective materials and workmanship from date of final acceptance.

**PART 2 - PRODUCTS**

Not used.

**PART 3 - EXECUTION**

Not used.

**END OF SECTION**

**030550 CONCRETE**

**PART 1 - GENERAL**

**1.01 WORK INCLUDED**

- A. Concrete materials, reinforcing steel, mesh reinforcement, dowels, anchors, anchor bolts, including setting grouting and building into concrete the work of all trades as hereinafter specified.
- B. Concrete equipment foundations.
- C. Finish concrete work by hand and machine.
- D. Rub and clean concrete surfaces.
- E. Cleanup and removal from site of material not used.
- F. Laboratory tests of concrete.
- G. Cast-in-place concrete.

**1.02 RELATED WORK**

- A. Formwork.
- B. Concrete reinforcement.
- C. Curing concrete.
- D. Anchor bolts.

**1.03 QUALITY ASSURANCE**

- A. Apply the applicable rules and practices set forth by ACI and ASTM to this work, except as otherwise noted. In case of conflict between any of the above codes, the Drawings and these Specifications, the most restrictive requirement shall apply. Conform to the reference standards and recommended practices referred to by ACI.
- B. Use only the latest editions and revisions of each code and Specification referenced herein as applicable for the work.

**1.04 REFERENCE STANDARDS**

- A. Use the following codes and recommendations which are applicable, except as modified by the requirements specified herein.
  - 1. ACI 211: Recommended Practice for Selecting Proportions for Concrete.



2. ACI 214: Recommended Practice for Evaluation of Compression Tests Results of Field Concrete.
3. ACI 301: Specifications for Structural Concrete for Buildings.
4. ACI 304: Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
5. ACI 305: Recommended Practice for Hot Weather Concreting
6. ACI 306: Recommended Practice for Cold Weather Concreting.
7. ACI 311: Recommended Practice for Concrete Inspection.
8. ACI 315: Manual of Standard Practice for Detailing Reinforced Concrete Structures.
9. ACI 318: Building Code Requirements for Reinforced Concrete.
10. ACI 347: Recommended Practice for Concrete Formwork.
11. ACI 614: Consolidation of Concrete, Committee Report.
12. ASTM C-33: Concrete aggregates shall conform to.
13. ASTM C-150: Portland cement shall conform to and shall be Type I.
14. Use water which is clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials or other substances that may be deleterious to concrete steel.
15. Remove and replace with proper construction all new work where testing indicates construction in the opinion of the Engineer, is not in conformance with requirements. All costs of such replacement shall be borne by the Contractor.

#### **1.05 TESTING AGENCY**

- A. Make arrangements for inspection and testing of concrete mixes to be performed by an independent firm in accordance with these Specifications.
- B. Retain a testing laboratory, acceptable to the Engineer, to prepare and test standard concrete test cylinders and to report the 28 day test results to the Engineer.
- C. Coordinate, and schedule properly, all required testing.
- D. Provide free access to work and cooperate with appointed firm.

- E. Submit proposed concrete mix design of each class of concrete to inspection and testing firm for review prior to commencement to work.
- F. Arrange for tests of cement and aggregates to be performed to ensure conformance with requirements stated herein.
- G. Take four concrete test cylinders for every 75 (100) cu. yds., or less, of concrete placed.
- H. Use one additional test cylinder during cold weather concreting, to be cured on job site under same conditions as concrete it represents.
- I. Conduct one slump test for each set of test cylinders taken.

**1.06 SHOP DRAWINGS**

- A. Prepare shop drawings under seal of Professional Structural Engineer registered in State of New York.

**1.07 PRODUCT HANDLING**

- A. Concrete Samples: The Engineer reserves the right to take samples for any or every lot of concrete delivered to the site. Tests shall be made as required by the Engineer and the expense incurred shall be borne by the Contractor. Any rejected concrete shall be immediately removed from the work.
- B. Aggregates shall be stored on platforms or otherwise protected to avoid any intrusion of foreign materials. Before using, any frost, ice and/or lumps of frozen material shall be removed.
- C. Cement shall be stored in containers that are weathertight and ventilated; and kept above ground in a dry space to prevent absorption of water.
- D. Reinforcing shall be stored on platforms or otherwise protected to avoid contact with water or other liquids.
- E. Rebars to be delivered with mill tags intact.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. General
  - 1. Provide a constant source of supply for cement, sand and gravel to assure a uniform coloring of the finished concrete.

B. Cement

1. Use only one brand and type of cement throughout project unless otherwise specified.
2. Use Portland cement, conforming to ASTM C-150, Type I or Type IA for all cement, unless otherwise noted.
3. Keep cement in dry storage. It must not be preset prior to use.

C. Aggregates

1. Fine aggregate shall be clean, natural siliceous sand consisting of hard, strong, durable, uncoated particles and shall conform to the requirements of ASTM C-33.
2. Use maximum size coarse aggregate of one inch, except as required by ACI-318. Coarse aggregate shall be Class 4S.
3. Provide coarse aggregate that conforms to the requirements of the ASTM C-33 Class 3S and shall consist of crushed sound trap rock, washed gravel or other inert material composed of hard, durable, strong, uncoated pieces. At Contractor's option, sizes #467 and #67 may be used for concrete over and under 12 inches thick respectively, or size #57 may be used throughout.

D. Mixing Water

1. Provide water which is clean and free from oils, acids, salts, grease, alkali or other injurious substances. It shall be of potable quality.

E. Admixtures

1. The only admixtures permitted will be those for air entraining and/or for water reduction (slump increase). If used, they shall also be used in the design mix and shall be as indicated in ACI-301, Table 3.4.1, and accepted by the Engineer.
2. Air entraining admixture shall be Darex AEA, Sika AER or accepted equal.
3. Water reducing admixture shall be Darex WRDA, Eucon WR-75 manufactured by the Euclid Chemical Co., Plasto-crete 160 manufactured by the Sika Chemical Corp. or Pozzolith 200N manufactured by Master Builders Co. The admixture shall conform to ASTM C-494, Type A, and shall not contain more chloride ions than are present in municipal drinking water.

4. Air entraining agent shall be an approved admixture conforming to ASTM C-260, such as MB-VR manufactured by Master Builders Co., or equal. Air Content of framed slabs shall be 5 to 7%. Maximum water/cement ratio shall be 0.40.
5. Use accelerating admixtures in cold weather only when accepted by Engineer. If accepted, use of admixtures will not relax cold weather placement requirements. Calcium chloride may be used only with written consent of Engineer.
6. Chloride-free accelerating admixture Acceleguard 80 manufactured by the Euclid Chemical Co., Darex Set Accelerator manufactured by Master Builders Co. In all concrete placed at temperatures below 50°F., the admixture shall conform to ASTM C-494, Type E and have long-term test results showing non-rusting of metal deck and/or reinforcing steel.
7. Use set-retarding admixtures during hot weather only when accepted by Engineer.
8. Obtain prior written approval from the Engineer to use other admixtures. These shall not adversely affect the properties of the identical concrete tested without such admixtures. They shall be certified in writing by the manufacturer to be in compliance with ASTM C-494.
9. Calcium chloride (shall not be used) or admixtures containing more than 1% chloride ions are not permitted.

F. Concrete

1. Provide concrete of following strength:
  - a. Compressive strength (@ 28 days): 4,000 PSI.
2. Add air entraining agent to concrete mix for concrete work exposed to exterior.
3. Conduct slump test for consolidation, by vibration: 3-4 inches.
4. Select proportions for normal weight concrete: Method 1.

G. Fillers

1. Porous fill shall be clean, crushed rock gravel that will pass a 1½ inch screen and not more than 5% will pass a No. 4 screen. Fill shall contain no clay, earth or other foreign substance deleterious to pipe or conduit.
2. Lean concrete fill shall be an approved concrete mix certified as testing out at 28 days with a strength of at least 2,000 PSI. Same test cylinder and

other controls shall be provided as for regular 3,000 PSI concrete, described below.

## **2.02 ANCHOR BOLTS**

### **A. General**

1. Anchor bolts to be embedded into concrete foundations to fasten structural elements located outdoors shall be of 304 stainless steel bent "I"-type complying with ASTM A193-Grade B8 (class 1 stainless steel, AISI 304, carbine solution treated) with 304 stainless steel hex head nuts and washers.

## **PART 3 - EXECUTION**

### **3.01 CONTROLLED CONCRETE**

- A. Furnish concrete which shall develop a minimum compressive strength at 28 days as follows:
  1. 4,000 PSI for all equipment pads.
- B. All concrete exposed to the outside, shall contain 5% air entrainment.
- C. Provide proportions of aggregate to cement in such quantities as to produce a mixture which will work readily into the corners and angles of the forms and around reinforcement but without permitting the materials to segregate, or excess free water to collect on the surfaces.
- D. Make sure the combined aggregates are of such composition of size that when separated on the No. 4 standard sieve, the weight passing shall not be less than 30% nor greater than 50% of the total unless otherwise directed.
- E. Use a water cement ratio which shall not exceed 6.0 gallons per sack of cement.
- F. Make sure the slump is not greater than four inches for slabs and five inches for other concrete.
- G. All cast-in-place concrete shall be proportioned by the Contractor in accordance with Section 4.3 Field Experience or Section 4.4, Trial Batches of ACI-318-77.
- H. If trial batches are selected as the method of proportioning, the mix design shall be proportioned to achieve an average 28 day strength of 1,200 PSI in excess of the design strength indicated on the Contract Drawings. Proposal mixes shall be submitted for the Engineers approval.

### 3.02 QUALITY CONTROL

- A. Retain a recognized testing laboratory, upon award of the Contract and approved by the Engineer, to design the concrete mix and to perform all testing required by the Contract. Reports of all tests shall be forwarded directly to the Engineer by the laboratory. The Contractor shall bear all costs of the testing laboratory.
- B. Sample and test all controlled concrete work in the field. The testing laboratory shall conduct these tests in accordance with applicable specifications of ACI, ASTM and the sections herein on Quality Control.
- C. Make sure the testing laboratory keeps a record of such inspection covering the quantity and slumps of concrete, the percent of air entrainment, the placing of the reinforcing steel, the progress of the work, the temperatures, when they fall below 50°F, and the protection given to the concrete while curing.
- D. Submit copies of this record to the Engineer during the progress of the work, together with the cylinder test reports specified hereinafter.
- E. Arrange for the testing laboratory to design the mix in accordance with the requirements of the ACI-301, Method 1 and submit the results with their recommendations, for approval of the Engineer. Do not pour concrete before such approval is obtained. The concrete placed must be identical to the approved design mix. If the concrete is to be pumped, the mix design shall also be based on the associated specific requirements.
- F. Limit the maximum slump which shall be four inches for walls and suspended slabs, three inches for foundations, and two inches for slabs, on grade, etc. The slump shall be determined in accordance with ASTM C-143.
- G. Remove from the site, concrete in ready-mix trucks rejected for excess water, or any other reason.
- H. No admixtures shall be used unless approved by Owner and included within the approved design mix. No material shall be added for correction.
- I. Arrange for three, 6 inch by 12 inch test cylinders to be taken for each day's pour of 50 cubic yards or less; and three additional test cylinders for each 50 cubic yard increment or less. One cylinder of each set is to be tested at seven days and two at 28 days. If the mix fails to meet the requirements for strength or placability, the Engineer can require adjustment of the mix proportions without cost to the Owner.
- J. Take core tests as directed by Owner at Contractor's expense when cylinders test-out low, or when there are other indications of substandard concrete.

Should the core tests confirm serious substandard materials in place, then load tests per ACI 318, will be conducted by the laboratory, as directed by Owner, all at Contractor's expense including his payment of normal fee for extra services required of Engineer. If the load test confirms substandard construction, the affected area will be removed, to the extent necessary, as determined by Owner. It will be replaced with proper construction, all at Contractor's expense.

- K. Identify each cylinder and keep records of the location the concrete for which the samples were taken. Provide this information with the test cylinder reports.
- L. Make age and test cylinders as specified in applicable sections of ACI specifications. Provide, at own cost, a safe storage box for undisturbed storage of these cylinders.
- M. In addition to the cylinder tests mentioned above, if, in the opinion of the Engineer, there exists evidence of faulty workmanship, violation of Specifications, likelihood of concrete having been frozen, or otherwise damaged, additional cylinder tests and/or load tests under the direction of the Engineer may be required. These shall be provided at no expense to the Owner.
- N. Assist the Engineer to inspect the reinforcing steel prior to placing of any concrete. Concrete shall not be poured until any corrections in rebar placement, ordered by the Engineer, have been made.
- O. Notify the Engineer a minimum of 24 hours prior to readiness of any reinforcing inspection.
- P. Provide at least six hours of inspection time if requested by the Engineer. Inspection should follow after the last reinforcement is placed and prior to placement of concrete.
- Q. Install vapor barrier under interior floor slabs on fill. Lap joints a minimum of six inches and seal. Do not disturb or damage vapor barrier while placing concrete reinforcing. If damage does occur, repair areas before placing concrete. Use vapor barrier material, lapped over damaged areas minimum six inches and seal.

### **3.03 WORK IN CONNECTION WITH OTHER TRADES**

- A. Coordinate all concrete work with requirements of other trades.

### **3.04 MIXING AND HANDLING**

- A. Machine-mix all concrete or ready-mixed as per ACI 301, Chapter 7. No hand-mixing will be permitted. Ready-mix concrete shall conform to ASTM C-94.

- B. Mixes shall be kept as dry as possible to work.
- C. Use machine-mixed concrete from a batch mixer of an approved type and so designed that all materials for each batch can be accurately measured. Mix for not less than 90 seconds at a peripheral speed of 200 feet per minute.
- D. Prevent water from being added to ready-mix concrete until the truck reaches the site. Such water shall be carefully metered into the mix based on batch plant instructions which include compensation for existing moisture in aggregate.
- E. Handle concrete with dispatch after mixing. Use due care to prevent deterioration through delays, loss of water, segregation of ingredients, or admixture of foreign material.
- F. Avoid retempering of partly set concrete, except with the approval of the Engineer.

### **3.05 TRUCK-MIXED CONCRETE**

- A. Use only truck-mixed concrete.
- B. Verify that all central plant and rolling stock equipment and methods conform to the latest "Truck Mixer and Agitator Standards" of the Truck Mixer Manufacturer's Bureau of the National Ready Mixed Concrete Association. Also conform to ACI 304 and with Sections 6 to 14, inclusive of the "Standard Specifications for Ready Mixed Concrete", ASTM C-94, as applicable and where not superseded by Specifications herein.
- C. Use mixing time of at least one minute per cubic yard, but not less than five minutes for total load for truck-mixed concrete. Mixing enroute will not be permitted.
- D. Deposit truck-mixed concrete within 30 minutes after water quantity is added, within 60 minutes from the time water is begun to be added and within 90 minutes after introduction of cement to mix. Mixing must begin within 30 minutes after cement is introduced to the mix.
- E. Furnish a delivery slip (certified by the laboratory representative) to the Engineer at building site for each delivery of concrete. This should show the mix quantity of cement, fine and coarse aggregates, water and time of departure from the plant.

### **3.06 INSTALLING OF CONCRETE**

- A. Place concrete in accordance with ACI 301, Chapter 8.
- B. Place all concrete with the aid of mechanical vibrators applied directly into



the concrete. At least two vibrators, in good condition, shall be ready for use when concrete placement starts in any one area. Vibrators shall not be used to move concrete horizontally.

- C. Avoid placing concrete during rain or snow.
- D. Clean forms thoroughly. Remove all foreign matter before any concrete is placed. Concrete shall be deposited within, 30 minutes after mixing, into well cleaned forms as nearly as practicable in its final position to avoid segregation due to rehandling of flowing concrete.
- E. Control the time to less than a two-hour interval between the completion of the pouring of piers, walls or other vertical members and the pouring of slabs, beams, girders, or other horizontal members. Pour work in alternate sections not over 40 feet long, with joints as directed by the Engineer.
- F. Provide keyed bulkhead stops properly fitted around reinforcement. No joints shall be permitted without the Engineer's written approval. All joints shall be keyed. Reinforcement shall be continuous through joints.
- G. Take care in placing concrete around reinforcement to work concrete well around and into thorough contact with the steel. Avoid disturbing the location of reinforcement.
- H. Remove and replace all concrete damaged by freezing or through any other causes as directed by the Owner and at the expense of the Contractor. If, in the opinion of the Owner, any surface shows objectionable voids or is unduly rough, or in any way defective, such work shall be demolished and replaced in an acceptable manner, at the Contractor's expense.
- I. Avoid installing footings until soil bearing has been approved by the Engineer. All footings shall rest on undisturbed and/or approved soil.
- J. Avoid placing concrete on frozen sub-grade or in water or until the sub-grade, forms, reinforcement placing, and preliminary work have been reviewed and accepted.
- K. Avoid placing concrete until all materials to be "built-in" have been approved by the various trades. Provide proper coordination of all embedded items, box-outs, recesses and openings of all trades.
- L. Scrape forms clean of concrete scale. Forms shall be just prior to placement of concrete, but shall be free of water and all dirt, debris and foreign matter when concrete is placed.
- M. Assure excavations are bottomed by undisturbed soil or filler compacted as accepted by the Engineer. Concrete placed in excavations shall not be placed under water or in running water. No debris, ice or foreign matter shall

be present.

- N. Avoid placing concrete when air temperature is below 40°F., or when concrete temperature is less than 50°F., except with special acceptance of the Engineer.
- O. Handle concrete from the mixer to forms as rapidly as possible by methods which shall prevent the separation of ingredients.
- P. Deposit concrete continuously for any one placement, in layers of such thickness that no concrete will be deposited on previously poured concrete which has hardened sufficiently to cause formation of cold joints. Concrete shall be deposited vertically in forms as nearly as possible in its final position, by use of accepted conveyors, chutes, spouts, etc. Free fall of concrete shall be limited to six feet maximum vertical drop.
- Q. Use construction joints that provide shear keys and bonding dowels where concrete placement must stop prior to completion of a designed section. Such special jointing shall be done only with acceptance of the Engineer. If that is not practical, the new joint location shall be reported as soon as possible to the Engineer for his analysis as to acceptability.
- R. Retighten forms and clean surfaces of all foreign matter and laitance, flushed with water and drain before depositing new concrete on or against concrete which has set.

### **3.07 COLD WEATHER PROTECTION**

- A. Conform to ACI 306 for cold weather concreting.
- B. Provide aggregate free of frozen lumps or snow. Avoid use of admixture to prevent freezing.
- C. Maintain a minimum temperature of 50°F. for concrete placed in forms. Maintain a minimum air temperature of 50°F. for five days, or 60°F. for three days.
- D. Provide adequate enclosure and heating when, in the opinion of the Engineer, the average ambient temperature is expected to drop below 50°F. In addition, if the ambient temperature is expected to go below 40°F., hot water and heated aggregate shall be employed in the mix. Concrete containing ice or frozen aggregate will not be permitted.
- E. Assist the inspector in keeping an adequate record of concrete temperatures.
- F. Obtain permission to pour concrete which shall be at the discretion of the Engineer when the air temperature is below 40°F. If permitted, the mixing water shall be heated to a temperature not to exceed 150°F., and aggregates shall be free from frost by injecting live steam into the pile before mixing.

- G. Maintain an air temperature of at least 50°F. around the concrete surfaces for at least 72 hours using canvases and salamanders or other heating devices. Take special care to assure that new concrete does not dry out due to low ambient humidity, and, that concrete surfaces are not unduly exposed to CO<sub>2</sub> generated by the salamanders.[]

### 3.08 HOT WEATHER CONCRETING

- A. Conform to ACI 305 for hot weather concreting.
- B. In compliance with ACI-305 hold a preplacement conference at least 15 days prior to concrete placement to review hot weather concreting requirements and mix design.
- C. Store all materials and equipment required for curing and protection at or near the project site before hot weather concreting commences.
- D. Submit concrete proportions to Engineer for review, include specific materials, manufacturer, and type for hot weather concreting.
- E. Installation
  - 1. Do not place concrete against surfaces of absorbent material that are dry. Do not place concrete against surfaces that have free water.
  - 2. Prepare all materials required for accepted evaporation control measures and have them available on site so that specified measures can be executed as necessary.
  - 3. Initiate accepted evaporation control measures when concrete and air temperatures, relative humidity of the air, and the wind velocity have the capacity to evaporate water from a free water surface at a rate that is equal to or greater than 0.2 lb/ft<sup>2</sup>/h, unless otherwise specified Determine the evaporation rate of surface moisture by use of the Menzel Formula (see ACI-305).
- F. Maximum Allowable Concrete Temperature
  - 1. Limit the maximum allowable fresh concrete temperature to 95°F, unless otherwise specified.
  - 2. Measure the fresh concrete temperature at the point and time of discharge in accordance with ASTM C 1064/C 1064M. Frequency of temperature determination shall be in accordance with ASTM C 94/C 94M and at the option of the inspector.
- G. Concrete Production and Delivery

1. Concrete shall be produced at a temperature such that its maximum temperature at discharge will not exceed the specified maximum allowable concrete temperature. Acceptable production methods to reduce the temperature of the concrete include: shading aggregate stockpiles, sprinkling water on coarse aggregate stockpiles; using chilled water for concrete production; substituting chipped or shaved ice for portions of the mixing water; and cooling concrete materials using liquid nitrogen. The submittals for hot weather concreting shall indicate which methods will be used and in what order they will be initiated when multiple methods are to be used. The substitution of other cooling methods will be considered by the Architect/Engineer when requested in the submittal and accompanied by satisfactory supporting data.
2. Unless otherwise specified, deliver concrete in accordance with ASTM C 94/C 94M, which required the concrete to be discharged within 1½ hours or before the truck mixer drum has revolved 300 revolutions, whichever comes first.

#### H. Concrete Placement and Finishing

1. Concrete placement and finishing operations shall proceed as quickly as conditions will permit.

#### I. Concrete Bleed-Water Evaporation

1. Control concrete surface bleed-water evaporation with application of evaporation reducers, plastic sheeting, fog spray, or wind breaks. Use these materials and methods in accordance with ACI 308.1.

#### J. Concrete Curing

1. Cure concrete in accordance with ACI 308.1.

#### K. Concrete Protection

1. Protection period – Protect the concrete against thermal shrinkage cracking due to rapid drops in concrete temperature greater than 40°F during the first 24 hours unless otherwise specified.
2. Protection materials – Acceptable protection materials to prevent excessive temperature drops are insulating blankets, batt insulation with moisture-proof covering, layers of dry porous material such as straw, hay, or multiple layers of impervious paper meeting ASTM C171. These protection materials shall not be applied until the concrete surface temperature has become steady or is beginning to decline.

**END OF SECTION**

**031000 CONCRETE FORMWORK**

**PART 1 - GENERAL**

**1.01 WORK INCLUDED**

- A. Wood and steel formwork for cast-in-place concrete, complete with shoring, bracing and anchorage.
- B. Waterstops.
- C. Void forms.
- D. Coordinate installation of items supplied by other Sections of work.

**1.02 QUALITY ASSURANCE**

- A. Construct and erect concrete formwork in accordance with ACI 318 (347) and applicable construction safety regulations for the place of work.
- B. Furnish forms that result in correctly aligned and finished concrete.

**1.03 REFERENCE STANDARDS**

- A. ACI 318: Building Code Requirements For Reinforced Concrete.
- B. ACI 347: Recommended Practice For Concrete Formwork.

**PART 2 - PRODUCTS**

**2.01 WOOD FORM MATERIALS**

- A. Plywood: Douglas fir or spruce species; solid one side (select sheathing-tight face) (select sheathing) (sheathing) (high density overlaid one side) (medium density overlaid one side) grade: sound undamaged sheets with clean true edges.
- B. Lumber: Douglas fir or spruce species: B/C grade; with grade stamp clearly visible.
- C. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required; of sufficient strength and character to maintain formwork in place while pouring concrete.
- D. Use footing sides of wood or metal formed except where otherwise noted and except where specifically called out on the Drawings for the concrete to be poured against earth.

## **2.02 PREFABRICATED FORMS**

- A. Steel Type: Minimum No. 10 gauge well matched, tight fitting, and adequately stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

## **2.03 FORMWORK ACCESSORIES**

- A. Form Ties: Removable (Snap-off) metal type of fixed (adjustable) length; minimum working strength of 3,000 PSI when assembled; free of defects that will leave holes larger than one inch in concrete surface.
- B. Form Release Agent: Colorless mineral oil which will stain concrete or impair natural bonding or color characteristics of coating intended for use on concrete.
- C. Fillets for Chamfered corners: Rigid foam plastic type; 3/4 inch; maximum possible lengths.

## **PART 3 - EXECUTION**

### **3.01 FORMWORK ERECTION**

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.
- B. Construct forms to produce finished concrete of the exact size, shape and location shown on the Drawings. Forms shall be of sufficient strength to support the dead weight of wet concrete without spreading or buckling, and shall be tight enough to prevent leaking.
- C. Provide adequately braced shores and reshores. The responsibility for safety in this regard shall be the Contractor's.
- D. Construct formwork, shoring and bracing to meet design and code requirements, so that resultant finished concrete conforms to required shapes, lines and dimensions.
- E. Use adequately braced new wood forms of plywood construction for exposed concrete surfaces that will produce a straight and dense surface, free from honeycombs, bulges or irregularities of any kind. Forms may be reused subject to the Engineer's approval. If any material is used to coat formwork to facilitate the removal, this material shall be of such a nature as not to stain or injure the concrete or cause injury to painted finishes or affect the bonding of subsequent finishes to the concrete.

- F. Arrange and assemble formwork to permit dismantling and stripping, so that concrete is not damaged during its removal.
- G. Align formwork joints and make watertight, to prevent leakage of mortar and disfigured appearance of concrete. Keep form joints to a minimum.
- H. Obtain Engineer's approval for use of earth forms. When using earth forms, hand-trim sides and bottoms, and remove loose dirt prior to placing concrete.
- I. Arrange forms to allow stripping without removal of principal shores, where and when these are required to remain in place.
- J. Obtain Engineer's approval before framing openings in structural members, which are not indicated on Drawings.
- K. Provide bracing to ensure stability of formwork. Prop or strengthen previously constructed formwork liable to be overstressed by construction loads.
- L. Use forms for footings and foundation walls for all faces. Substitution of earth embankments for forms will not be permitted.
- M. Provide chamfer strips on external corners of beams, joists and columns. Form exposed edges of beams, columns and outside corners with  $\frac{1}{4}$  inch chamfer, unless otherwise noted.
- N. Construct formwork to maintain following maximum tolerances:
  - 1. Deviation from horizontal and vertical lines:
    - a.  $\frac{1}{4}$  inch in 10 feet.
    - b.  $\frac{3}{8}$  inch in 20 feet.
    - c.  $\frac{3}{4}$  inch in 40 feet.
  - 2. Deviation of building dimensions indicated on Drawings and position of columns, walls and partitions:  $\frac{1}{4}$  inch.
  - 3. Deviation in cross-sectional dimensions of columns or beams or in thickness of slabs and walls:  $\pm\frac{1}{4}$  inch.
- O. Camber slabs and beams  $\frac{1}{4}$  inch per 10 feet.
- P. Apply form release agent on formwork in accordance with manufacturer's recommendations. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.
- Q. Avoid applying form release agent where concrete surfaces will receive special finishes or applied coverings which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces wet prior to



placing concrete.

- R. Avoid applying form release agent where wood graining characteristics are required on finished concrete surfaces. Leave formwork dry in these areas.
- S. Use form ties which are either snap-ties or ty-screws. Tie wire will not be permitted. After stripping, all ties shall be broken-off so that they are at least one inch inside face of concrete.

### **3.02 INSERTS, EMBEDDED PARTS AND OPENINGS**

- A. Provide formed openings where required for pipes, conduits, sleeves and other work to be embedded in and passing through concrete members.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate work of other Sections and cooperate with trades involved in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts. Do not perform work unless specifically indicated on Drawings or reviewed prior to installation.
- D. Install concrete accessories in accordance with manufacturer's recommendations; straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Install waterstops continuous without displacing reinforcement. Heat seal joints watertight.
- F. Place formed construction joints in floor slab pattern pouring sequence. Set top screed to required elevations. Secure to resist movement of wet concrete.
- G. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain. Close temporary ports or openings with tight fitting panels, flush with inside face of forms, neatly fitted so that joints will not be apparent in exposed concrete surfaces.
- H. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture before placing. Protect forms from crushing during concrete placement.

### **3.03 FIELD QUALITY CONTROL**

- A. Provide formwork which is true and rigid, thoroughly braced both horizontally and diagonally as well as sufficiently strong to carry the dead weight of the construction as liquid without deflection. Also tight enough to prevent leakage of mortar.

- B. Keep exposed concrete free from board or grain marks, poorly matched joints and other irregularities or defects by the use of form liners or other techniques as may be accepted by the Engineer. Forms shall be oiled with a non-staining oil.
- C. Inspect and check completed formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and parts are secure.
- D. Inform the Engineer when formwork is complete and has been cleaned, to allow for inspection. Obtain review prior to placing concrete.
- E. For exposed concrete surfaces, do not reuse wood type formwork. Do not patch formwork.
- F. Allow Engineer to inspect each section of formwork prior to use.

### **3.04 CLEANING**

- A. Clean forms as erection proceeds. Remove foreign matter such as cuttings, shavings, and other debris from within forms. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean out ports.
- B. Remove ice and snow from within forms during cold weather. Do not use de-icing salts. Do not use water to clean out completed forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

### **3.05 FORM REMOVAL**

- A. Notify Engineer prior to removing formwork.
- B. Take care not to damage concrete when removing forms.
- C. Avoid removal of forms, shores and bracing until concrete has gained sufficient strength to carry its own weight, plus construction and design load which are liable to be imposed upon it. Verify strength of concrete by compressive test results.
- D. Avoid removal of forms until the concrete is adequately set and in conformance with ACI 305 and ACI 306 as related to ambient temperature, and subject to the Engineer's decision at the time.
- E. Avoid disturbing forms until concrete has hardened adequately. In the determination of the time when forms and shoring for them may be removed, consideration shall be given to the retarding of setting action resulting from low temperatures or from any admixtures. Unless otherwise authorized by the

Owner, forms for grade beams, slabs and arches shall not be removed for a minimum of seven days and for walls and vertical surfaces two days.

- F. Remove formwork progressively and in accordance with code requirements; and, so that no shock loads or unbalanced loads are imposed on structure.
- G. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against concrete surfaces.
- H. Leave forms loosely in place, against vertical surfaces, for protection until complete removal is reviewed by the Engineer.
- I. Remove all form ties to a depth of one inch back of wall surfaces on both inside and outside face of walls, and fill the holes with material as specified for patching in the paragraph above.
- J. Store removed forms, for exposed architectural concrete, in manner that surfaces to be in contact with concrete will not be damaged. Marked or scored forms will be rejected.
- K. Place adequate reshores on the removal of forms, to prevent injury of the concrete by construction loads. Provide safe practice during removal.
- L. Reshore structural members where required due to design requirements or construction conditions and as required to permit progressive construction.
- M. Remove load supporting forms only when concrete has attained 75% of required 28 days compressive strength, provided construction is reshored.
- N. Remove forms, not directly supporting weight of concrete, as soon as stripping operations will not damage concrete.

**END OF SECTION**

**032000 CONCRETE REINFORCEMENT**

**PART 1 - GENERAL**

**1.01 WORK INCLUDED**

- A. Concrete reinforcing steel bars, and welded steel wire fabric, fabricated steel bar or rod mats for cast-in-place concrete, complete with tie wire.
- B. Support chairs, bolsters, bars supports, all other repaired supports, spacers for reinforcing and related accessories.

**1.02 RELATED WORK**

- A. Cast-in-place concrete reinforcement for the following:
  - 1. Equipment pads.

**1.03 QUALITY ASSURANCE**

- A. Perform concrete reinforcing work in accordance with CRSI 63 and CRSI 65 unless specified otherwise in this Section.

**1.04 SOURCE QUALITY CONTROL**

- A. Submit two certified copies of mill test report of supplied concrete reinforcing, indicating physical and chemical analysis.
- B. Provide Engineer with access to fabrication plant to facilitate inspection of reinforcement. Notify of commencement and duration of shop fabrication, in sufficient time to allow for proper inspection.

**1.05 REFERENCE STANDARDS**

- A. ACI 301: Chapter 5 Building Code Requirements for Reinforced Concrete.
- B. ACI 318: Building Code Requirements for Reinforced Concrete.
- C. ASTM A-185: Welded Steel Wire Fabric for Concrete Reinforcement.
- D. ASTM A-497: Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
- E. ASTM A-615: Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

- F. ASTM A-616: Rail Steel Deformed and Plain Bars for Concrete Reinforcement.
- G. ASTM A-617: American Concrete Institute - Manual of Standard Practice. Axle Steel Deformed and Plain Bars for Concrete Reinforcement.
- H. AWS D-12.1: Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction.
- I. CRSI-63 or 163: Recommended Practice For Placing Reinforcing Bars.
- J. CRSI-65: Recommended Practice For Placing Bar Supports, Specifications and Nomenclature.

#### **1.06 SHOP DRAWINGS**

- A. Submit shop drawings of reinforcing steel indicating bar sizes, spacings, locations, and quantities of reinforcing steel and wire fabric, bending and cutting schedules, and supporting and spacing devices.
- B. Prepare shop drawings under seal of Professional Structural Engineer registered in State of New York.

### **PART 2 - PRODUCTS**

#### **2.01 REINFORCING**

- A. Reinforcing steel shall be deformed bars conforming to Designation A of ASTM A-615, Grade 60, including Supplementary Requirement S-1.
- B. Welded Steel Wire Fabric: Plain type, ASTM A-185; deformed type, ASTM A-497; in flat sheets; coiled rolls; plain finish.
- C. Where placed against forms, chairs and similar embedded accessories shall be plastic or plastic coated approved type in accordance with ACI 315.

#### **2.02 ACCESSORY MATERIALS**

- A. Tie Wire: Minimum No. 16 gauge annealed type, or patented system accepted by Engineer.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcing during construction conditions.

- C. Special Chairs, Bolsters, Bar Supports, Spacers where ad (Stainless steel) type; sized and shaped as required.

## **2.03 FABRICATION**

- A. Fabricate concrete reinforcing in accordance with ACI 315.
- B. Locate reinforcing splices, not indicated on Drawings, at points of minimum stress. Location of splices: Reviewed by the Engineer.
- C. Where indicated, weld reinforcing bars in accordance with AWS D-12.1.

## **PART 3 - EXECUTION**

### **3.01 PLACEMENT**

- A. Exercise care in the placing of reinforcement and pouring of concrete so as not to displace the sleeves and boxing set by others.
- B. Place reinforcing supported and secured against displacement. Do not deviate from true alignment.
- C. Ensure reinforcing is clean, free of loose scale, dirt or other foreign coatings which would reduce bond to concrete, before placing concrete.
- D. Ensure the system of holding bars in place will keep all steel from moving during concrete placement and will, if necessary, support the weight of the workers without displacement. All reinforcement shall be rigidly wired in place with adequate spacers and tie chairs. Bar supports shall not exceed three feet on centers.
- E. Verify all reinforcing steel, within the limits of a one day's pour, are properly placed and firmly wired before concreting starts.
- F. Avoid placing or wiring steel less than six hours before concreting starts except by special authorization of the Engineer.
- G. Rigidly adhere to the protective covers shown on the Drawings or required by ACI Code. Coordinate conduit and insert placements so as to avoid decreasing or increasing protective cover on reinforcement.
- H. Bend all reinforcement cold per ACI standards.
- I. Support reinforcement, including fabric for concrete slabs on ground or fill, on precast concrete bricks of proper thickness or on suitable chairs. "Hooking-up" or "walking-in" of any reinforcement is prohibited.

- J. Follow bar spacing requirements of ACI.
- K. Use all reinforcing bars which are continuous, unless shown otherwise on the Drawings. Lap a minimum of 40 bar diameters at splices and corners. Continuous top bars shall be lapped at mid-span and continuous bottom bars shall be lapped at supports. All top bars shall be hooked at non-continuous ends, or shall extend 40 bar diameters. Splices shall be staggered unless otherwise shown.
- L. Use reinforcement of sizes shown. Bend cold to form and place as herein specified or shown on Drawings. Stirrups and other bars coming in contact with other reinforcement shall be properly tied or secured by other mechanical means so as to prevent displacement. Reinforcement and welded wire mesh shall be secured in place with approved metal spacing and tying devices except plastic coated metal chairs shall be used where chairs will be exposed to weather and to view. Avoid hot bending.
- M. Exercise extreme care to prevent discoloration of exposed concrete surface by reinforcement.
- N. Provide Engineer the opportunity to inspect and approve all reinforcement in forms. Notify the Engineer at least 24 hours prior to any pour to facilitate inspection arrangements.
- O. Replace with additional equivalent reinforcement, placed one half each side of opening of all bars interrupted at openings. All bars shall be continuous, with 40 diameter minimum lap.
- P. Use welding reinforcing steel only where indicated and approved by the Engineer.
- Q. Provide rebars of size, length and shape required to ensure positive support of inserts under normal loads.

**END OF SECTION**

**033900 CONCRETE CURING**

**PART 1 - GENERAL**

**1.01 WORK INCLUDED**

- A. Initial and final curing.
- B. Curing materials.

**1.02 RELATED WORK**

- A. Concrete.
- B. Formwork.

**1.03 REFERENCE STANDARDS**

- A. Cure concrete in accordance with ACI 301, Chapter 12.
- B. Cure concrete in hot weather in accordance with ACI 305.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Potable Water
- B. Absorptive Mats: Cotton fabric, minimum 1/4-inch thick or burlap polyethylene, minimum eight ounces per square yard bonded to prevent separation during handling, placement, curing.
- C. Membrane Curing Compound: Acrylic, or chlorinated rubber type, clear (pigmented).
- D. Curing Compound and Cover
  - 1. Curing compound shall be DEKOTE by W.R. Grace & Co., AR-30 by W.R. Meadows, or accepted equal.
  - 2. Compound to be compatible with finishes.
  - 3. Curing material shall be a polyethylene sheeting of approved manufacture, four mils thick, or sisalkraft paper, both lapped at least six inches at edges and ends so as to provide complete cover.
  - 4. Reinforcement paper for covering, curing and protecting concrete shall conform to FS UU-P147b, Type IV, Classes A, B, and C; also FS UU-P246a for concrete curing.



- E. Polyethylene Film: Six mil thick, clear or opaque color.

### **PART 3 - EXECUTION**

- 3.01** Maintain 100% coverage of water over slab areas continuously for seven days.
- 3.02** Keep moist the surfaces of all finished concrete continuously for period of seven days. Use paper or polyethylene for covering, protecting and curing slabs as specified herein. Cover concrete walls, etc., and keep moist by use of a moisture-retention burlap or other cover as approved by the Engineer. In lieu of the above, use an approved curing compound with a fugitive dye on slabs, if such will not interfere with later required surface hardener treatment of the slab. Such intent, based on a submission of manufacturer's technical literature, must be accepted by the Engineer, prior to such use.
  - A. Spray water over slab areas and maintain wetness for seven days.
- 3.03** Protect concrete from the sun and keep moist for at least seven days. In hot weather, exposed concrete shall be thoroughly wetted two times daily during the first week.
  - A. Spread cotton fabric over slabs. Spray with water until mats are saturated and maintain in saturated condition for seven days.
  - B. Saturate burlap and place burlap side down over slabs, lapping ends and sides minimum four inches, and maintain in place for seven days.
- 3.04** Apply curing compound in two coats with second coat at right angles to first coat.
- 3.05** Spread polyethylene film over slabs, lapping edges and sides a minimum of 12 inches, maintain in place with pressure sensitive tape and plywood for seven days.
- 3.06** Maintain all concrete at a temperature of at least 50°F. for not less than 72 hours after depositing. Keep sufficiently enclosed and protected so that this temperature can be maintained. Avoid use of salt or other chemical for such protection.
- 3.07** Leave permanently exposed surfaces smooth and true and without voids or tie holes, except for occasional small air holes. Rough joints on exposed surfaces shall be ground smooth, rubbed with carborundum blocks and grout cleaned in an approved manner. After removal of fins, bring irregular surfaces to reasonable smoothness by rubbing and troweling with an accepted specially prepared bonding concrete application. Fill tie holes. All exposed concrete corners shall have beveled or rounded edges or as otherwise specifically directed by notes on Drawings or Specifications.

**END OF SECTION**

DIVISION 22

PLUMBING

**DIVISION 22 - PLUMBING**

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**220001 GENERAL PROVISIONS**

**PART 1 - GENERAL**

**1.01 WORK INCLUDED**

- A. Work under this Division shall include all labor, material, equipment, plant services and administrative tasks required to complete and make operable the plumbing work shown on the Drawings and specified herein, including but not limited to the following:
1. Prepare and submit shop drawings, diagrams and illustrations to the Owner.
  2. Submit manufacturer's submittal sheets as specified within the Contract Documents.
    - a. Highlight all applicable material and data.
    - b. Non-applicable material and data shall be struck prior to submittal.
  3. Procure all necessary permits and approvals and pay all required fees and charges in connection with the work of this Division.
  4. Protect, test, balance, clean, adjust and guarantee all of the work of this Division to operate safely, properly and continuously.
  5. Submit as-built drawings, operating and maintenance instructions, and manuals.
  6. Provide identification labels, tags, charts and diagrams.
  7. Execute all cutting, drilling, rough and finish patching of existing or newly installed construction required for the work of this Division.
  8. Provide hangers, supports, foundations and bases for piping and equipment provided or installed under the work of this Division.
  9. Provide flexible connectors for piping and equipment provided or installed under the work of this Division.
  10. Provide counterflashing, sleeves and seals for floor, wall and roof penetrations.
  11. Demolish and remove existing piping, equipment and accessories as shown on the Drawings and any other abandoned items or equipment found even though not shown on the Drawings.

12. Provide all equipment, components, appurtenances, piping, and specialties required for making complete the following piping systems and installations indicated or specified, for the following piping systems:
  - a. Natural gas piping from regulator/meter to generators at the Bay Shore WMCA, Fire Department and Village Hall of Brightwaters including piping, valves, regulator, flexible connections and other devices required for proper operation.
13. Coordinate with National Grid for natural gas services at the Bay Shore WMCA, Fire Department and Village Hall of Brightwaters

**END OF SECTION**

**220516 EXPANSION COMPENSATION AND FLEXIBLE CONNECTORS**

**PART 1 - GENERAL**

**1.01 WORK INCLUDED**

- A. Flexible pipe connection (FPC)

**1.02 QUALITY ASSURANCE**

- A. All work shall conform to Standards of the Expansion Joint Manufacturers' Association.
- B. Examine piping layout and notify the Owner of additional anchors or expansion joints required to adequately protect the system.

**PART 2 - PRODUCTS**

- 2.01** Provide equipment of the type and size specified herein, as shown on the Drawings and listed in the Schedules.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Install flexible connectors where shown on Drawings and on pipes connected to equipment supported by vibration isolation.
- B. Install flexible connectors at right angles to displacement. One end immediately adjacent to isolated equipment and anchor other end.
- C. Rigidly anchor pipe to building structure.

<b>FLEXIBLE PIPE CONNECTOR SCHEDULE</b>						
TAG	FPC/1					
TYPE	BRAIDED					
SERVICE	CONNECTIONS TO ENGINE-GENERATORS					
LOCATION	AS SHOWN ON DRAWINGS					
CONNECTION	SCREWED					
SIZE, IN. O.D.	1/2	3/4	1	1-1/4	1-1/2	2
WORKING PRESS. -PSIG @ 70°F	957	552	534	414	377	442
LENGTH, IN.	6-1/2	7	8	8-1/2	9	10-1/2
WEIGHT, LBS.	3/8	1/2	3/4	1	1	2
MAX. PIPING MISALIGNMENT, IN.	1/8					
CONSTRUCTION	T321 STAINLESS STEEL HOSE AND BRAID WITH ANNULAR CORRUGATIONS					
MANUFACTURER & MODEL NO.	FLEXONICS, MODEL PCS – MMT (STAINLESS STEEL)  KEFLEX, METRAFLEX					
REMARKS	PROVIDE SHOP DRAWINGS  DO NOT PERMIT WEIGHT OF PIPING SYSTEM TO REST ON FLEXIBLE SECTION  BASE THE CONNECTOR SIZE ON PIPE LINE SIZE.					

**END OF SECTION**

**220523 MANUAL VALVES, COCKS, FAUCETS**

**PART 1 - GENERAL**

**1.01 WORK INCLUDED**

- A. Cock (CK)

**1.02 QUALITY ASSURANCE**

- A. Use only new valves. Rebuilt or refurbished valves are not acceptable.
- B. Provide manufacturer's certification that valves have been given shell and seat tests.
- C. Unless otherwise specified or required by codes, bronze valves shall conform to the following standards:
  - 1. 125 PSIG or 150 PSIG ASTM B62.
  - 2. 200 PSIG or 300 PSIG ASTM B61.
- D. Unless otherwise specified or required by codes, iron body valves shall conform to the following standards:
  - 1. ASTM A126, Grade B.
  - 2. ANSI B16.10.
- E. All valves shall have the size, manufacturer's name and the working pressure for which they are designed, cast in the valve body.
- F. Pressure-temperature rating of valves shall not be less than the design criteria applicable to all components of the system.

**PART 2 - PRODUCTS**

- 2.01** Provide equipment of the type, size and rating specified herein and listed in the Schedules.

**PART 3 - EXECUTION**

- 3.01** Install all valves in strict accordance with the manufacturer's recommendations as approved by the Owner.
- 3.02** Locate valves so they may be conveniently operated and readily repaired or replaced.



- 3.03** Remove all valve parts which may have become damaged during installation upon completion of the work. Replace them with new parts so that all valves are in first-class operating condition.
- 3.04** Valves are not to be installed inverted.

<b>COCK SCHEDULE</b>		
TAG	CK	
SERVICE	G	
VALVE TYPE	COCK – SQUARE HEAD	
ANSI PRESS. CLASS	150	125
SIZE, IN.	½ to 2	2½ to 4
MATERIAL & ASTM SPEC	BRONZE B62	CAST IRON A126 CLASS B
CONNECTION	SCREWED	SCREWED
MATERIALS		
-BODY	BRONZE	CAST IRON
-DISC	BRONZE	CAST IRON
-STEM	N/A	N/A
MANUFACTURER & MODEL NO.	CRANE, NO. 250	CRANE NO. 320
	WALWORTH	WALWORTH
REMARKS	PROVIDE SHOP DRAWINGS  PROVIDE TWO WRENCHES  SEE FLOW DIAGRAMS	

**END OF SECTION**

**220529 PIPING AND EQUIPMENT SUPPORTS, ANCHORS AND SLEEVES**

**PART 1 - GENERAL**

**1.01 WORK INCLUDED**

- A. Concrete expansion anchors
- B. Escutcheons and flashing
- C. Pipe hangers and rods
- D. Sleeves and seals
- E. Steel channels and surface raceway metal framing (Kindorf)
- F. Wall and floor penetration seal (WFS)

**1.02 QUALITY ASSURANCE**

- A. Manufacturer's certification that materials meet or exceed the minimum requirements specified herein and in the Schedules.
- B. Supports, anchors and seals shall conform to the following standards:
  - 1. Pipe Supports: ANSI B31.1  
MSS SP-58, SP-69 & SP-89
  - 2. Hanger Rods: ASTM A575
  - 3. Concrete Expansion Anchors: UL Listed
  - 4. Wall & Floor Seals (Fire-Rated): ASTM E-119-76
  - 5. All applicable local codes.

**PART 2 - PRODUCTS**

**2.01** Provide equipment and material of the type and size shown on the Drawings, specified herein and as listed in the Schedules, including accessories, such as nuts, bolts, caulking and sealants.

**2.02** Select and size pipe hangers and supports in compliance with the latest edition of MSS Manual SP-69 Pipe Hangers and Supports, Selection and Application.

- A. Design and selection shall include consideration of the following:
  - 1. Concrete fasteners and anchors.
  - 2. Weight of valves, flanges and specialties.
  - 3. Riser supports.

**2.03** Hanger and support material in contact with pipe shall be compatible with pipe material to prevent deteriorating action.

**2.04** Provide Kindorf, Midland-Ross, Uni-Strut or equal, structural support surface raceway metal framing as required.

**2.05** Provide concrete expansion anchors equal to Hilti HDI.

**2.06 ESCUTCHEONS AND FLASHING**

A. Plain or Painted, Bare or Insulated Pipes, Conduit or Tubes

1. Unfinished Areas

a. Cast iron or steel split-hinged escutcheons with flush screws, prime painted.

2. Finished Areas

a. Satin finish chromium-plated brass one piece escutcheons with flush setscrews.

B. Roof Pipes

1. Flash with aluminum flashing as shown in details on the Drawings.

**2.07 SLEEVES AND SEALS**

A. Install sleeves and seal annular space between sleeve and bare pipe as specified herein and as shown in the details on the Drawings.

B. Above Grade Masonry Floors

1. Pipe Penetrations

a. Provide structural support at floor opening as required.

b. Provide Schedule 40 galvanized steel pipe sleeves with an anchor ring welded to the outside. Internal diameter of sleeve shall be maximum one inch larger than the outside diameter of the bare or insulated pipe.

c. Provide escutcheon on both sides.

d. Fire-Rated

1) Fill voids to full depth with intumescent fire stopping material as specified in the Schedules.

- e. Contractor has the option to provide modular mechanical seals and sleeves (MMS) as specified in the Schedules.

### **PART 3 - EXECUTION**

#### **3.01 CONCRETE EXPANSION ANCHORS**

- A. Install anchors in accordance with manufacturer's printed instructions.
  - 1. Use carbide masonry bits of appropriate nominal diameter.
- B. When concrete expansion anchors are used to support loads in tension (pipe hangers suspended from concrete slabs), install a minimum of two anchors per hanger and reduce hanger spacing to  $\frac{1}{2}$  the specified distance.

#### **3.02 PIPE HANGERS AND SUPPORTS**

- A. General Piping Installations
  - 1. Fabricate and install hangers and supports in compliance with the latest edition of the following:
    - a. MSS Manual SP-89, Pipe Hangers and Supports, Fabrication and Installation Practices.
  - 2. Hanging materials shall have a safety factor of five built-in and be designed and arranged to minimize vibration.
  - 3. Support piping to maintain required grading and pitching of lines. Use hangers which are vertically adjustable  $1 \frac{1}{2}$  inches minimum after piping is erected. After adjusting hangers in place, trim, cut or file hanger rods so that the ends do not extend more than  $\frac{1}{2}$  inch below the hanger bolts.
  - 4. Design and install pipe supports to avoid interference with other piping, ducts, conduit and supports.
  - 5. Provide trapeze hangers where several pipes can be installed in parallel at same elevation.
    - a. Hanger spacing shall be determined by the smallest pipe size.
  - 6. Provide hangers of heavy construction suitable for the size of pipe to be supported. Materials, unless otherwise specified, shall be as follows:

- a. Wrought or malleable iron or steel.
  - b. Piping hangers shall be painted black, after initial zinc chromate dipping, before installation.
  - c. Rods may be galvanized in lieu of zinc chromate dipping.
7. Provide separate supports for all branches. No branch six feet in length or over shall be installed without an approved hanger.
  8. Provide sway bracing at every fourth hanger, where hangers are more than 18 inches in length.
  9. Support horizontal piping runs from overhead and vertical structural members. Locate to obtain maximum possible headroom.
  10. Provide a structurally sound piping and equipment suspension system, amply strong and rigid for the load, which shall not weaken or unduly stress the building structure.
  11. Provide all auxiliary structural steel members necessary to support all piping and equipment.
  12. Connect permanently and/or tie the auxiliary steel hanger supports, anchors and guides to the building structure.
  13. Avoid hanging pipe from other piping.
  14. Do not hang piping with chain straps, perforated bars, wire hangers, ropes, wood, perforated metal band or other makeshift systems.
  15. Suspend smaller pipes from cross-pieces of pipe or steel angles, which, in turn, shall be securely fastened to building beams or hung from the building structure by means of rods and inserts.
  16. Support piping supported from walls with welded steel brackets with an adjustable clevis hanger or a pipe saddle mounted on the bracket.
  17. Use double-bolt riser clamps, with each end having equal bearing on the building structure, for supporting vertical piping.
  18. Provide clevis type hangers for piping systems subject to minimum expansion and contraction due to temperature changes. In general, clevis type hangers are to be used in all piping systems.
  19. Support riser piping independently of connected horizontal piping.

<b>PIPE PENETRATION AND SEAL SCHEDULE</b>	
TAG	MMS
TYPE	DOUBLE SEAL, MODULAR MECHANICAL
SERVICE	PIPE PENETRATIONS OF ABOVE GRADE MASONRY WALLS AND FLOORS
SYSTEM	DOS, P, G
PRESS. RATING, PSIG @ °F	20 @ 450
TEMP. RANGE, °F	-67 TO 400
FLOOR THICKNESS, IN.	SEE DRAWINGS
PIPE MATERIAL	SEE PIPING SCHEDULES
PIPE SIZE, IN.	SEE DRAWINGS
SLEEVE TYPE	SCHEDULE 40 GALVANIZED STEEL PIPE
SERVICE DESIGNATION	FIRE-RATED
MATERIALS -PRESSURE PLATE -BOLT & NUT -SEALING ELEMENT	ZINC DICHROMATE PLATED LOW CARBON STEEL ZINC DICHROMATE PLATED LOW CARBON STEEL SILICONE RUBBER
MANUFACTURER & MODEL NO.	THUNDERLINE LINK-SEAL, MODEL FD/FS
REMARKS	PROVIDE SHOP DRAWINGS  PROVIDE STRUCTURAL SUPPORT AS REQUIRED  PROVIDE ESCUTCHEON ON BOTH SIDES  FOR PIPE PENETRATIONS OF FIRE-RATED FLOORS, MODULAR SEAL SHALL HAVE APPROPRIATE FIRE RATING AND SHALL BE FM APPROVED

**END OF SECTION**

**222000 PIPE AND PIPE FITTINGS**

**PART 1 - GENERAL**

**1.01 WORK INCLUDED**

- A. Natural gas (G)

**1.02 REFERENCE STANDARDS**

- A. The following codes and standards govern the installation of piping systems.
  - 1. Fuel Gas Piping Inside Industrial and Institutional Plants: ANSI/ASME B31.2.
  - 2. Fuel Gas Piping: ANSI Z223.1, NFPA 54, Local Utility.
  - 3. Generator Piping: ANSI/NFPA No. 37, "Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines".
  - 4. NYS Fuel Gas Code.
- B. Provide pipe and fittings conforming to the ANSI/ASTM Standard listed in the Schedules.
- C. Unless otherwise specified, work performed under this Section shall be in accordance with the following reference specifications:
  - 1. ASME Section B31.9 - Building Service Piping.

**1.03 DELIVERY, STORAGE AND HANDLING**

- A. Clean all pipe sections of foreign matter and cover ends with temporary sheet metal closures or plastic end caps of sufficient tightness to prevent entry of foreign matter prior to shipping to the construction site.
- B. Store pipe, fittings, valves and other components at the construction site on pallets or raised platforms with suitable coverings satisfactory to the Engineer to protect them against damage and weather.
- C. Inspect all pipe, fittings, valves and other components for damage before moving them from storage to installation site.

**1.04 SUBMITTALS**

- A. Submit the following in accordance with the requirements of Section 15010 of this Division.



1. General piping layout drawings including hanger and support locations and details.
2. Pipe material and schedule for each piping system.
3. Catalog cuts of fittings and flanges.

**1.05 SAFETY**

- A. Follow all applicable safety regulations. These include, but are not limited to, use of proper eye and body protection, adequate ventilation, presence of a proper type fire extinguisher, and proper grounding of all electrical equipment.

**PART 2 - PRODUCTS**

- 2.01** Provide material of the type, size and rating shown on the Drawings, specified herein and listed in the Schedules.

**PART 3 - EXECUTION**

**3.01 GENERAL PIPING INSTALLATION**

- A. Install piping systems using the best standard practices of the trade to make the connected equipment and system components complete and ready for regular operation. Installation shall be in accordance with all written installation procedures, piping accessory manufacturer's recommendations, requirements of ANSI B31.9 as applicable, and as specified.
- B. Modify piping arrangements as necessary to suit conditions in the building, and to permit access to equipment and accessories.
- C. Cut accurately all piping to measurements established and work into place without springing or forcing.
- D. Install piping to avoid pockets of air traps and assure free flow and positive drainage.
- E. Install piping straight and plumb, as direct as possible, and parallel to ceilings, walls, beams and girders.
- F. Construct pipe lines from full lengths of pipe. Use short sections only when run is less than a full length.
- G. Do not pass piping through ductwork or sheet metal work.

- H. Do not install piping over control panels, switchboards or other electrical equipment except by permission of the Owner. If approval is obtained, install shields or drip pans as directed by the Owner.
- I. Seal, as specified within, the space around the pipes passing through walls or floors.
- J. Cover, cap or plug open ends of all piping to prevent damage and to prevent entry of foreign matter. Only plugs or caps constructed of wood, plastic or metal are acceptable.
- K. Space piping to permit access for operation and servicing of valves.
- L. Cut piping so that ends are square. Ream or file each pipe cut to remove burrs. Inspect each length of pipe and each fitting for cleanliness, workmanship and clear passageway.
- M. Provide escutcheons on all exposed pipes passing through walls, partitions, floors and ceilings.
- N. Conceal main piping runs concealed in hung ceilings wherever possible, except where otherwise shown.
- O. Install overhead horizontal piping, a minimum of eight feet above the floor, except as dimensioned on Drawings. Unless otherwise noted, install all overhead horizontal piping above lighting fixtures.
- P. Install piping required to be concealed in floor, wall or ceiling construction promptly to not cause delay to other work, and to allow ample time for necessary tasks and approvals. In the event that difficulties are encountered in installing piping, notify the Owner promptly, and await his decision before installation of the work in question.
- Q. Separate all piping, except water piping, by at least six inches where possible. Contact between pipes is not permitted.
- R. Make all changes in pipe sizes with eccentric reducing or eccentric increasing fittings on horizontal piping for proper drainage or venting. Concentric reducing or concentric increasing fittings shall be used on all vertical piping.
- S. Provide pipe flexibility and expansion by bends, swing joints, loops, offsets and mechanical coupling devices as required unless expansion joints are shown and specified. Support, anchor and guide piping to preserve alignment and direct expansion.
- T. Make all exposed polished, finished or enameled connections with special care. Tool marks or exposed threads on pipe or fittings are not permitted.

- U. Ream the ends of all pipe free from burrs after threading. Threads shall be clean cut and tapered. Keep piping free from scale and dirt. Use graphite on cleanout and drain plugs.
- V. Do not use face bushings, close nipples, or street elbows, except where specified.
- W. Make sure thread ends conform to prevailing hose thread at the facility or to the size and type selected by the Owner where hose end fittings or valves are required, or shown on Drawings.
- X. Gas Piping
  - 1. Arrange with National Grid to provide gas service connection, curb stop with service box, master gas meter, pressure regulators and valves.
  - 2. Provide all other necessary equipment and gas piping connections to meter station not provided by National Grid.
  - 3. Make connection and installation of the gas system in such manner as required by National Grid and all authorities having jurisdiction.
  - 4. Furnish all equipment with independent controlling gas cocks for each item requiring gas service.
  - 5. Install gas piping graded not less than 1/4 inch per 15 feet to prevent traps. Horizontal lines shall pitch to risers and from risers to the meter or service regulator when a meter is not provided.
  - 6. Install gas piping system within a building with electrically continuous and bonded to a grounding electrode as defined by the NEC.

### **3.02 STEEL PIPE INSTALLATION**

#### **A. Threaded Pipe**

- 1. Cut threads full and clean with sharp dies.
- 2. Ream ends of pipe before threading and before assembly.
- 3. Leave not more than three pipe threads exposed at each connection.
- 4. Use thread tape, on male thread only, in making joints.

<b>PLASTIC PIPING SCHEDULE</b>	
SERVICE	UNDERGROUND NATURAL GAS (G)
PIPING -MATERIAL -SCHEDULE -MEDIUM DENSITY YELLOW -HIGH DENSITY BLACK -STD. ANSI/ASTM	POLYETHYLENE  PE 2406 PE 3408 D2513
FITTINGS -MATERIAL -SCHEDULE/STD. ANSI	POLYETHYLENE - ASTM D2683 SPECIFICATION FOR SOCKET TYPE POLYETHYLENE FITTINGS FOR OUTSIDE DIAMETER CONTROLLED PE PIPE AND TUBING - ASTM D3261 SPECIFICATION FOR BUTT FUSION POLYETHYLENE (PE) PLASTIC FITTINGS FOR POLYETHYLENE (PE) PLASTIC PIPE AND TUBING - ASTM F1055 STANDARD SPECIFICATION FOR ELECTROFUSION TYPE PE FITTINGS FOR OUTSIDE DIAMETER CONTROLLED PE PIPE AND TUBING
PIPING CONNECTIONS	SOLVENT-WELDED BUTT - WELDED ELECTROFUSION
TRANSITION RISERS -TYPE  -UNDERGROUND PORTION -CASING  -ABOVE GROUND PORTION -OUTLET -ACCESSORIES	-FACTORY FABRICATED, LEAK-TESTED ANODELESS, POLYETHYLENE-TO-STEEL -POLYETHYLENE COMPLYING WITH ASTM D2513 SDR II INLET -STEEL PIPE COMPLYING WITH ASTM A53/A53M, SCHEDULE 40, BLACK STEEL, TYPE E ORS, GRADE B WITH CORROSION-PROTECTIVE COATING COVERING -POLYETHYLENE TO STEEL TRANSITION FITTING -THREADED, FLANGED, OR SUITABLE FOR WELDING -TRACER WIRE CONNECTION ULTRAVIOLET SHIELD
MANUFACTURER	CELANESE, JOHNS-MANVILLE, CLOW
REMARKS	-ALL PIPE TO COMPLY WITH NATIONAL GRID'S BLUE BOOK REQUIREMENTS -PROVIDE DETECTIBLE UNDERGROUND MARKING TAPE OVER ALL BURIED PIPING. INSTALL TAPE 12 IN. BELOW GRADE AND DIRECTLY OVER PIPE. LINEGUARD INC., ALLAN TERRA-TAPE D OR EQUAL. -CONTRACTOR TO PERFORM INSTALLATION INTEGRITY TEST AND SUBMIT TEST REPORT TO NATIONAL GRID.

<b>STEEL PIPING SCHEDULE</b>	
SERVICE	NATURAL GAS (G)
PIPING -MATERIAL -ABOVEGROUND INDOOR -ABOVEGROUND OUTDOOR -UNDERGROUND -SCHEDULE -STD. ANSI/ASTM	BLACK STEEL GALVANIZED STEEL GALVANIZED STEEL 40 A539
UNIONS FITTING -SIZE/MATERIAL -PRESS. RATING, PSIG -STD. ANSI	PROVIDE UNION FOR PIPING 2½" AND LARGER 2 IN. & UNDER/MALLEABLE IRON 2-1/2 IN. & OVER/CAST IRON OR STEEL 125 B16.1, B16.3, B16.4, B16.5 & B16.9
PIPING CONNECTIONS -ABOVEGROUND -UNDERGROUND	THREADED COUPLINGS OR WELDED WELDED
MANUFACTURER	BONNEY FORGE & TOOL WORKS, GRINNELL, WALWORTH, CRANE, TUBE TURNS
REMARKS	FIELD COAT ALL UNDERGROUND PIPE PER UTILITY REQUIREMENTS, TAPECOAT, PROTECTION WRAP, ROYSTON LABORATORIES USE UL LISTED THREAD PIPE SEALANT 561R OR JOHN CRANE HEAVY DUTY, INDUSTRIAL GRADE THREAD-TYPE

<b>PIPING SYSTEM TESTING, CLEANING AND DISINFECTING SCHEDULE</b>					
<b>PIPING SYSTEM</b>	<b>TEST MEDIUM*</b>	<b>TEST PRESSURE*</b>	<b>TEST DURATION*</b>	<b>SYSTEM CLEANING</b>	<b>SYSTEM DISINFECTING</b>
NATURAL GAS @ WORKING PRESS. -UP TO 1 PSIG -OVER 1 PSIG	AIR AIR	6 IN. Hg 1.5 x MAX. PRESS. NOT LESS THAN 10 PSIG	1 HR. 1 HR.	YES YES	N/A N/A
*	SHALL ALSO COMPLY WITH LOCAL AUTHORITY AND				
N/A	NOT APPLICABLE				

**END OF SECTION**

DIVISION 26

ELECTRICAL

**DIVISION 26 - ELECTRICAL**

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## **260100 - BASIC ELECTRICAL REQUIREMENTS**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to this and the other sections of Division 26.
- B. Where items of General Conditions are repeated in this Section of these Specifications, it is intended to qualify or to call particular attention to them; it is not intended that any other parts of the General Conditions shall be assumed to be omitted if not repeated herein.

#### **1.02 DEFINITIONS**

- A. "The Contractor" means specifically the Contractor working under the Contract.
- B. "Provide" means to supply, erect, install, and connect up in complete readiness for regular operation, the particular work referred to.
- C. "Furnish" means to supply and deliver to the job.
- D. "Conduit" includes, in addition to conduit, all fittings, boxes, hangers, and other accessories related to such conduit.
- E. "Concealed" means hidden from sight as in chases, furred spaces, shafts, hung ceilings, or embedded in construction.
- F. "Exposed" means "not concealed" as defined above. Work in trenches, crawl spaces, and tunnels shall be considered "exposed" unless otherwise specifically noted.
- G. "Approved equal" means any equipment or material which, in the opinion of the Design Professional, is equal in quality, durability, appearance, strength, design, performance, physical dimensions, and arrangement to the equipment or material specified, and will function adequately in accordance with the general design.
- H. "Governmental" means all municipal, state and federal governmental agencies.
- I. Where any device or part of equipment is herein referred to in the singular number (such as "the pump"), such reference shall be deemed to apply to

as many such devices as are required to complete the installation as shown on the Drawings.

- J. "Electrical Contractor" means the Contractor doing electrical work.
- K. Wherever the words "Plan" or "Plans" are used under this Contract, it shall also mean "Drawing" or "Drawings".
- L. "The Town" shall mean the Town of North Hempstead.
- M. Design Professional shall mean the firm of:  
LIZARDOS ENGINEERING ASSOCIATES, P.C.  
200 OLD COUNTRY ROAD  
MINEOLA, NEW YORK 11501-4207

### **1.03 LOCAL CONDITIONS**

- A. Before Submitting the Final Proposal, visit each site where work is required, survey the existing conditions and become familiar with the difficulties which will affect the execution and completion of the work. Investigation shall be made of the nature and location of the work, the general and local conditions, particularly those bearing upon the work required, transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads, and physical conditions at the sites and character of equipment and facilities needed preliminary to and during the prosecution of the work and all other matters upon which information is reasonably obtainable and which can in any way affect the work or the cost thereof under the Contract.
- B. Investigation shall also be made of the character, quality and quantity of materials to be encountered insofar as this information is reasonably ascertainable from an inspection of the site. Any failure to become acquainted with all the available information will not be considered as a basis for not successfully fulfilling all terms of the Contract, regardless of the difficulty or cost, without extra compensation.
- C. The Owner assumes no responsibility for any understanding or representations made by any of its personnel during or prior to the execution of this Contract, unless (1) such understanding or representations are expressly stated in the Contract and (2) the Contract expressly provides that the responsibility therefore is assumed by the Owner. Representations made, but not so expressly stated, and for which liability is not expressly assumed by the Owner in the Contract, shall be deemed only for information.

- D. "Waiver of Responsibility" for incomplete, inadequate, or defective adjoining work will not be considered unless notice has been filed and acceded to, in writing, to the Design Professional, before the bids are accepted.

#### **1.04 PERMITS AND INSPECTIONS**

- A. The Contractor shall procure and pay for all certificates, fees, tests, inspections, bonds, deposits, and escrow accounts required for complete installation of the work.
- B. All necessary permits from the City, Town, County, and other public authorities shall be secured by and at the cost and expense of the Contractor who shall give all notices required by law, ordinances, or the rules and regulations of the various Bureaus or Departments, and also as a part of the Contract, and without extra charge or compensation, shall comply with all orders of the Local Department of Buildings, County Department of Health, Fire Marshal, etc., which shall be issued in compliance with ordinances or regulations existing at the time bids are presented by any or all of said Departments as applying to the work of the Contract.
- C. Wherever in these specifications the name of an official, bureau or department is mentioned, it is intended to mean the official, bureau or department having jurisdiction under the Local, County and State Laws.
- D. Attention is called to certain provisions of the State Building Code regarding support of walls adjoining scaffolding, floors to be filled in or covered, protection of floor openings, overloading, etc., which provisions shall be complied with.
- E. Deliver to the Owner's Representative all permits and certificates of approval issued by all Town, County, and State agencies having jurisdiction in connection with this work before the certificate for the final payment is issued.
- F. Furnish and hang, in a glazed metal frame, the Town, County, and State official equipment use permit.
- G. Comply with the requirements of Article 10 of New York State Labor Law, Rule No.23, Industrial Code, State of New York Department of Labor, latest edition, and all amendments thereof, insofar as the provision of such law is applicable to the work.
- H. Equipment Use Permits shall be obtained by the Contractor in accordance with Town, County, and State Code.

- I. Royalties
  - 1. Obtain all necessary allowance and pay all royalties in connection with the use of any patented devices or lawsuits arising from such use.
- J. Applications
  - 1. Assist the Owner in the preparation of any applications or forms referring to the work which the Owner desires or is required to file.
- K. No work shall be covered over until tests have been performed and the authorities having jurisdiction have examined, inspected and approved the tests and the work. The Contractor, through its agent, will provide all controlled inspections required by the regulations of Town, County, and State. The controlled inspections will be made by an inspector meeting the professional requirements set forth by State and Local Law. Controlled inspections shall be carried out in accordance with applicable Town, County, and State Building Code Sections. The Engineer or Architect employed by the Contractor will file all initial amendments, properly executed before work commences and all final amendments immediately upon completion of work. A copy of each approved amendment shall be forwarded to the Owner's Representative. Initial amendments must be on file before work commences and final amendments must be on file before final acceptance of the work. All Contractors shall notify in writing the Engineer designated for controlled inspection five (5) days before the specific work item commences.
- L. Thereafter, it will be the Contractor's responsibility to keep up with the progress of the work. The inspections and tests performed under controlled inspection shall in no way relieve the Contractor of his responsibility to construct in accordance with drawings and specifications.

#### **1.05 CODES AND STANDARDS**

- A. Codes
  - 1. All work installed under this Division shall comply with all Local, State and Federal Codes and the requirements of any other authorities having jurisdiction. At the completion of the work, secure certificates of approval from the various authorities having jurisdiction and deliver same to the Design Professional.
- B. Standards

1. State Uniform fire Prevention and Building Code
2. State Energy Code
3. NFPA National Fire Protection Association
4. ASME American Society of Mechanical Engineers
5. ANSI American National Standards Institute
6. ASTM American Society for Testing Materials
7. NEMA National Electrical Manufacturers Association
8. UL Underwriters Laboratories
9. NEC National Electric Code

C. Safety and Health Regulations

1. The Contractor shall comply with the 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 Standards Act (PL 91-54), including all the installation procedures, methods, conditions and requirements in effect at the time the work is to be performed.
2. Existing hazardous materials during the course of the work:
  - a. Should any existing construction materials be encountered which are listed by Local, State and Federal Agencies as being hazardous for health or safety, the Contractor shall stop work and consult Owner for directions. The Owner's hazardous materials consultant shall determine if such materials should be removed, enclosed, or encapsulated as required by regulatory agencies in strict conformance with their procedures. The removal and disposal of the existing lead cables by this Contractor shall be performed in accordance with all local, state and Federal agencies.
3. Asbestos-containing materials shall be not be used on this project.
4. All pertinent precautions for accident prevention recommended by the Local Building Trades Employers Association, or by State or Local Laws and Regulations, shall be considered to form a part of the Contract Work.
5. First Aid
  - a. Provide, at site, kit of articles and medications for supplying first-aid treatment to anyone injured in connection with the work.
  - b. Make kit available for use by other Contractors working on site.

6. Reports of Accidents and Claims
  - a. Submit promptly, on printed forms, reports of all accidents arising out of performance of Contract work.
  - b. Furnish full details, including statements of witnesses, if any.
  - c. Report immediately all accidents resulting in death, serious personal injury or serious property damage.
7. If any claim is made against the Contractor as the result of any accident, the Contractor shall submit the facts, in written report, giving full details of claims.

#### **1.06 INDEMNIFICATION**

- A. Pay all royalties and defend all suits or claims for infringement of any patent rights and save the Owner harmless from loss on account thereof.
- B. If process or article specified is an infringement of a patent, promptly notify the Design Professional in writing, and any necessary changes shall be as provided in the Contract for changes in the work. If the Contractor performs any work specified knowing it to be an infringement of patent, he shall bear all costs arising therefrom.
- C. Take out all necessary insurance, free of extra charge, and agree to indemnify and save harmless the party contracting for services against loss or expense, by reason of the liability imposed by law upon such party for damages because of bodily injuries, including death at any time resulting therefrom, accidentally sustained by any person or persons or on account of damage to property arising out of or in consequences of the performance of this Contract, whether such injuries to persons or damage to property are due or claimed to be due to any negligence in the performance of the Contract, the party contracting for services, employees or agents, or any other person.

#### **1.07 INTENT**

- A. It is the intention that these Specifications and drawings accompanying same shall provide for the work as specified and shown. Any work shown on the drawings and not particularly described in the Specifications, or vice-versa, or any work or changes which may be evidently necessary to complete the installation shall be provided as being included in the Contract.

- B. Where no specified manufacturer or quality of material is given, a first-class standard article as approved by the Design Professional shall be furnished. The drawings and specifications do not undertake to illustrate or set forth every item necessary for the work, as it is assumed that with his bid submissions, the Contractor acknowledges that he is expert in the several lines of the work and is capable on interpreting them.
- C. Small details not shown or specified, but necessary for proper installation and finishing, shall be included in the estimate, the same as if herein specified or shown.

#### **1.08 DRAWINGS**

- A. The Drawings are generally diagrammatic and are intended to convey the scope of work and indicate general arrangement of equipment, generators, transfer switches, underground conduit ductbanks, conduits, cabling, piping, and fixtures, etc.
- B. The locations of all items shown on the Drawings or called for in the Specifications that are not definitely fixed by dimensions are approximate only. The exact locations necessary to secure the best conditions and results must be determined at the project and shall have the approval of the Design Professional before being installed.
- C. Follow Drawings in laying out work and check to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. Where headroom and space conditions appear inadequate, Design Professional shall be notified before proceeding with installation.
- D. If directed by the Design Professional, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.
- E. Conduits connected to equipment may require different size connection than indicated on the Drawings. The Contractor shall provide transition pieces as required at the equipment.

#### **1.09 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS**

- A. Any questions or disagreements arising as to the true intent of this Specification or the Drawings or the kind and quality of work required thereby shall be decided by the Design Professional, whose interpretations thereof shall be final, conclusive, and binding on all parties.
- B. In case of disagreement between Drawings and Specifications, or within either document itself, the better quality, greater quantity or more costly

work shall be included in the Contract Price and the matter referred to the Design Professional's attention for decision and/or adjustment.

- C. Maintain an awareness to avoid conflict with existing conditions.
- D. Purchase the equipment and material required in accordance with field measurements taken at the proper time during the construction progress.

#### **1.10 EQUIPMENT AND MATERIALS**

- A. The words "or approved equal" shall be understood to apply only to those items of equipment and material listed under the paragraph "List of Approved Manufacturers" or as otherwise indicated on the Drawings or in the Specifications.
- B. Within ten (10) working days after the acceptance of the proposal, and prior to the submission of any shop drawings for review, a complete list of manufacturers shall be submitted to the Design Professional of all equipment and materials proposed for the work. No reviews will be rendered on shop drawings submitted before the complete list of manufacturers is reviewed.
- C. If material or equipment is installed before the Contractor obtained "No Objections" comment from the Design Professional, trade installing same shall be liable for the removal and replacement at no extra charge to the Owner if, in the opinion of the Design Professional, the material or equipment does not meet the intent of the Drawings and Specifications.
  - 1. The words "or approved equal" are understood as follows:
    - a. The name of any manufacturer, vendor, equipment or materials;
    - b. Any trade name, plate number, or catalog number;
    - c. Any detailed description used to define equipment or material; except where otherwise indicated on the Drawings or in the Specifications.
  - 2. It is the intent of these Specifications that wherever a manufacturer of a product is specified, and the terms "other approved" or "or approved equal" are used, the substituted item must conform in all respects to the specified item. Consideration will not be given to claim that the substituted item meets the performance requirements with lesser construction. Performance as delineated in schedules



and in the Specifications shall be interpreted as minimum performance.

- D. All equipment and materials required for installation under these Specifications shall be new and without blemish or defect. All electrical equipment shall bear labels attesting to Underwriters Laboratories and Factory Mutual approval. Where no specific indication as to the type of quality of the material or equipment is indicated, a first class standard article shall be furnished, material to be delivered knocked-down where necessary for entrance into the building.
- E. Where it is proposed to use an item of equipment other than that specified or detailed on the Drawings which requires any redesign of the structure, partitions, piping, wiring, or of any other part of the mechanical, electrical, or architectural layout, all such redesign, and all new drawings and detailing required therefore shall, with the review of the Design Professional and subsequent comments by the Design Professional "No Substitution" or "Approved as Noted" on the shop drawings, be prepared at no additional cost to the Owner.
- F. Where such deviation from contract documents requires a different quantity and arrangement of equipment, piping, wiring, and conduit, etc., from that specified or indicated on the Drawings, furnish and install any such equipment, piping, structural supports, insulation, controllers, motors, starters, electrical wiring, and conduit, and any other additional equipment required by the system at no additional cost to the Owner.
- G. All equipment of one type (such as switchgear, panels, wiring devices, etc.) shall be the product of the same manufacturer.
- H. Note that the comments "No Exception" or "Exception as Noted" marked on the shop drawings or other information submitted in accordance with the requirements hereinbefore specified does not assure that the Design Professional or any other Owner's representative attests to the dimensional accuracy or dimensional suitability of the material or equipment involved or the mechanical performance of equipment.

Comment on the shop drawings does not invalidate the Plans and Specifications if the shop drawings are in conflict with the Plans and Specifications.

#### **1.11 REVIEW OF MATERIALS AND EQUIPMENT**

- A. Submissions and Shop Drawings

1. Submit complete and accurate Shop Drawings consisting of roughing drawings, manufacturer's shop drawings, field drawings, cuts, bulletins, and method of installation of all materials, and all equipment shown on the Drawings and specified, prior to procurement or fabrication.
2. Review and stamp indicating approval and submit, with reasonable promptness and in orderly sequence, so as to cause no delay in the work of any other Contractor, all Shop Drawings and Samples required by the Contract Documents or subsequently by the Design Professional. Shop Drawings and samples shall be properly identified as specified, or as the Design Professional may require. At the time of submission, the Contractor shall inform the Design Professional, in writing, of any deviation in the Shop Drawings or samples from the requirements of the Contract Documents.
3. By approving and submitting Shop Drawings and Samples, the Contractor thereby represents that he has determined and verified all field measurements, field construction criteria, materials, catalogue numbers and similar data, or will do so, and that he has checked and coordinated each Shop Drawing and Sample with the requirements of the work and of the Contract Documents and has coordinated his work with all trades and all other Contractors.
4. Samples shall be submitted in duplicate to the Design Professional with all shipping charges prepaid.
5. Submit eight (8) copies of all catalogue cuts. Submit two (2) white prints and one (1) reproducible transparency of all Drawings prepared in multiples of 8-1/2" x 11". All corrected shop drawings will be returned by the Design Professional.
6. Provide on each Drawing a clear space for stamp: "Date Received", "Approved", "Approved as Noted", "Disapproved", and "Resubmit".
7. After completion of checking, the Design Professional will obtain prints of the transparency for his record and will return the transparency to the Contractor.
8. Drawings Returned "Resubmit" or "Disapproved": The original drawing shall be corrected, and a new transparency reproduction made and resubmitted until final approval is obtained.
9. Drawings Returned "Approved" or "Approved as Noted": The Contractor shall obtain and provide such number of prints as is required for field distribution.

10. The Contractor's responsibility for shop drawings includes his responsibility for correctness of shop drawings and the coordination of shop drawings of each trade with those of all other trades wherein the work of the one or another is involved or affected. The Design Professional's check will cover only general design.
11. As part of the work, sleeve drawings, equipment base, and foundation drawings shall be prepared and distributed for coordinating purposes.
12. Shop Drawings at the time of submission shall bear evidence with an accompanying transmittal letter that such drawings have been checked by the Contractor. Any drawings submitted not in accordance with this procedure will be returned to the Contractor for resubmission and will not be considered. In such event, it will be deemed that the Contractor has not complied with the provisions herein specified and shall bear the risks of all delays as if no drawings had been submitted at all.
13. The Contractor shall prepare composite shop drawings and installation layouts, when required, to solve tight field conditions. Such drawings are to consist of dimensioned plans and elevations, and must give complete information, particularly as to size and location of sleeves, inserts, attachments, openings, pipes, sprinkler heads, conduits, underground conduit banks, ducts, lighting fixtures, boxes, structural interferences, etc. Prepare complete scale working drawings and sections, clearly showing how the work is to be installed in relation to work of other trades. The scale of the drawings shall be  $3/8" = 1'-0"$  or as directed by the Design Professional. If work is installed before coordinating with other trades, or as to cause interference with work of other trades, the Contractor shall make changes necessary to correct the condition without extra charge.
14. These composite shop drawings and field installation layouts shall be coordinated in the field by the Contractor and his Sub-Contractors and all other Contractors for proper relationship to the work of other trades, based on field conditions, and shall be checked for accuracy and approved by them before submission to the Design Professional for his final approval. The Contractor shall have competent technical personnel readily available for such coordinating and checking as well as for accordance with the shop drawings and field installations as determined by him to be correct and carrying the Design Professional's stamp of approval.
15. Prepare sleeve drawings, showing the locations of all sleeves both horizontal and vertical. Location of sleeves shall be dimensioned

from center line of columns and in the elevation from the underside of slab and from finished floor. Sleeve drawings will not be checked by the Design Professional. The responsibility for the accuracy of the drawings rests with the Contractor preparing same.

16. The costs of preparing all of the above listed drawings and prints of same shall be borne by the Contractor.
17. All Shop Drawings and Samples shall be identified as follows:  
  
Name of Project  
Name of Contractor  
Name of Supplier  
Job Number  
Reference to Specification Section and/or Drawing Number
18. In addition, samples shall have additional information, as may be required, to establish characteristics such as finish, color, texture, gauge or thickness, weight, etc.
19. The Shop Drawing and Sample Identification label shall include sufficient blank space for approval stamps, including 2" wide x 3" high for the Design Professional's approval stamp.

B. Approval of Submissions

1. The Design Professional will review and approve shop drawings and samples, but only for conformance with the design concept of the project and with the information given in the Contract Documents. The Design Professional's approval of a separate item shall not indicate approval of an assembly in which the item functions.
2. The Design Professional's Approval is for design only. The Contractor is responsible for dimensions, field measurements, quantities, and coordination with other trades. Approval does not authorize change to Contract requirements.
3. The approval of shop drawings, composite drawings and samples shall not be construed as an order for extra work. Such claims shall be made in accordance with Contract Conditions.
4. Failure of any sample to pass the specified test or tests shall be sufficient cause for refusal to consider any further sample of the same brand or manufacturer.

5. After the shop drawings are "Approved," record copies of all data for maintenance and operating instructions shall be accumulated.

C. Resubmission of Submissions

1. The Contractor shall make any corrections required by the Design Professional and shall resubmit the required number of corrected copies of shop drawings or new samples until approved. The Contractor shall direct specific attention in writing or on resubmitted shop drawings to revisions other than the corrections requested by the Design Professional on previous submissions.

D. Execution of Work

1. No work requiring a shop drawing or sample submission shall be commenced until the submission has been approved by the Design Professional. All such work shall be in accordance with approved shop drawings and samples.
2. After shop drawings and samples have been approved, no changes will be permitted unless satisfactory evidence is presented to and approved by the Design Professional that the manufacturer cannot make scheduled delivery of approved material, or that material developed has been rejected and the substitution of a suitable material is an urgent necessity, or that other conditions become apparent which indicate the approval of changes to be in the best interest of the Owner.

E. Packaged Equipment

1. Where packaged (factory assembled) mechanical and electrical equipment is furnished, a certificate shall be included with the submission of shop drawings or catalog data stating that the equipment complies with OSHA, National Electric Code, and applicable Underwriters Laboratories Standards in respect to motor protection, grounding and protection against hazards, and is approved by all Regulatory Agencies.

F. Products

1. Products of the specified "EQUIPMENT" AND "MATERIALS" manufacturers may be considered as acceptable for use on this Project, provided that such products conform to Specification Requirements as hereinafter set forth. Whenever a manufacturer's name is mentioned, it shall only serve as a guide to a possible source of supply. Before submitting a bid, verify that the named

manufacturers can, in fact, comply with the specification requirements. Assume all responsibility for the source of supply.

2. All materials or products specified by manufacturer and model number within these specifications shall imply that an "or equal" material or product shall be acceptable for substitution upon review by the Engineer. Substitution items under the "or equal" provision shall be submitted with shop drawings describing operating performance criteria, materials of construction, wiring diagrams, applicable guarantee and warranty provisions, etc. as necessary to demonstrate that the substituted item is equal to the specified material or product. The Engineer shall review such submissions and determine whether the material or product is equal to the named material or product.
3. Unless particularly specified otherwise, all manufactured articles, materials and equipment shall be applied, assembled, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer and including the necessary preparation to properly install the work. Where reference is made to manufacturer's directions, the Contractor shall submit such directions to the Design Professional as required.

#### G. Equivalents

1. The mention of apparatus, articles, or materials by trade name, and such specific description of same as is made, with the words "similar to" or "or equal", is intended to convey to the Contractor's understanding, the degree of excellence required. An article of material which will conform substantially to the standard of excellence established and furnish an article of equivalent merit, strength, durability and appearance to perform the required functions, is deemed to be eligible for offer.

#### H. Material and Equipment List

1. Within ten (10) days after the date of award of the Contract, the Contractor shall submit for approval a complete list of suppliers, materials, and equipment proposed for use in connection with the project. After ten (10) days, no changes for approved materials and equipment will be considered. Partial lists submitted from time to time will not be considered.
2. After any material or piece of equipment has been approved, no change in brand or make will be permitted unless satisfactory written

evidence is presented and approved by the Design Professional that the manufacturer cannot make scheduled delivery of approved material, or that material delivered has been rejected and the substitution of a suitable material is an urgent necessity, or that other conditions have become apparent which indicate that the approval of such other material is in the best interest of the Owner.

I. Equipment and Material Certifications

1. Be responsible for obtaining certificates and guarantees from the various manufacturers of equipment and materials proposed for use on the project. The manufacturers shall certify and guarantee that their equipment and materials, when installed, shall, as a minimum, conform to all the requirements specified and indicated on the drawings. In addition, the Contractor shall guarantee that all systems conform to the design shown on the drawings or specified herein and will develop and deliver the capacities of all certified equipment.

**1.12 MINOR DEVIATIONS**

- A. Whenever field conditions or the proper execution of the work requires reasonable changes in piping, ducts, outlets, conduit work and equipment shown on the drawings, make all such changes as directed or approved, without extra cost to the Owner. This the bidder must take into consideration.
- B. All locations are approximately correct, but are understood to be subject to modifications as may be found necessary or desirable in order to meet structural conditions and the requirements of other equipment installations prior to or at the time of installation.
- C. The Design Professional reserves the right to change the locations of electrical equipment outlets, fixtures, conduits, switches, panels, and the like, to accommodate the architectural treatment and any other conditions which may arise during the progress of the work, without additional compensation to the Contractor for such changes. Should it be found that any work is laid out and interference will occur, the Contractor shall report to the Design Professional.

**1.13 ORGANIZATION OF WORK**

- A. The work called for under this Contract shall be carried on simultaneously with the work of other trades in a manner such as not to delay the overall progress of the work. Furnish promptly to other trades involved at the project, all information and measurements relating to the work which they

may require. Cooperate with them in order to secure the harmony necessary in the interest of the project as a whole.

- B. Provide all new materials and workmanship of the best grade; and install all apparatus in a practical and first class manner; being complete in operation, nothing being omitted in the way of labor and materials required to make it so, although not specifically shown or mentioned herein; and delivered in well-working order, complete and perfect in every respect.
- C. All materials, design, apparatus, and workmanship shall be subject to the approval of the Design Professional and shall be in accordance with all new and existing laws, rules, and regulations, both Local and State, together with the National Fire Protection Association.
- D. Parts of the building may be used as a shop and storage facilities, subject to the written approval of the Design Professional.
- E. Make the necessary arrangements with other trades to leave openings large enough to bring in the equipment and set same in place. Where necessary, equipment shall be brought into the building in sections and reassembled on the job by the manufacturer's mechanics or qualified mechanics under the supervision of the manufacturer's Representative.
- F. Operate and test all equipment in the presence of, and to the satisfaction of, the Design Professional and as hereinafter specified. All systems shall be properly balanced and controls adjusted to meet the design requirements. All equipment shall be tested for quiet operation and for freedom of excess vibration, as determined by the Design Professional and as elsewhere specified.
- G. The ratings, capacities, and requirements of all equipment are scheduled on the drawings or specified. Obtain Certifications and Guarantees from the various manufacturers of equipment proposed for use, that said equipment shall, as a minimum, conform to the hereinbefore referred-to requirements. In addition, at the time of completion of this Contract, guarantee that all equipment, apparatus, switchgear and transformers is installed in a manner conforming to the design shown on the drawings and specified, and will develop and deliver the capacities of all certified equipment. Assume all responsibilities and costs for temporary furnishing and installation of all instruments and recording devices as requested by the Design Professional for checking design conditions, at no extra cost to the Owner.
- H. Put all work in place as fast as reasonably possible and at all times keep a competent superintendent in charge of the work.



- I. Place upon the work or any part thereof only such loads as are consistent with the safety of that portion of the work, and to check and verify that equipment and apparatus shall not be stacked on or be carried over floor and roof construction that would stress any of its members beyond the designed live loads.
- J. Provide scaffolding, platforms, ladders, rigging, temporary supports and braces as required to accomplish the work.
- K. Verify the agreements between all collective bargaining agencies and Sub-Contractors after which prepare a sequence of operations and a division of labor which will nor result in any jurisdictional labor disputes or work delays.
- L. Provide all necessary trailers, extension cords, and lamps to provide light and power for the proper execution of the work.
- M. Maintain a complete file of shop drawings at all times available to the Owner's representative.
- N. Every facility shall be provided to permit inspection of the work by the Owner's Representative during the course of construction.
- O. Where items of equipment and/or materials are indicated in the Specifications as being furnished by other trades for installation, assume responsibility for the unloading of such equipment and/or materials from the delivery trucks, and for providing safe storage for same as required pending installation.
- P. Where the work is to be installed in close proximity to work of other trades, or where there is evidence that the work is to interfere with work of other trades, assist in working out space conditions to make a satisfactory adjustment.

#### **1.14 PROTECTION OF WORK AND PROPERTY**

- A. Maintain and protect all equipment, materials and tools from loss or damage from all causes until final acceptance by the Owner.
- B. Assume responsibility for the protection of any finished work or other traces from damage or defacement by the operations and remedy any such injury or damages.
- C. General Safety Restrictions

1. The operation of the existing power distribution interior fire alarm system, gongs, bells and telephone in the building shall not be interfered with, except during final connections are made to buildings electric services.
2. Nothing shall be done to in any way block the streets at or about exits, or exits themselves.
3. There shall be no unauthorized interference with free and unobstructed use of corridors, stairways, toilets, and rooms.
4. Whenever work is carried on during normal working hours, not more than one stairway shall be closed off from free and safe use at any time, and this only after the written permission of the Owner's Representative has been obtained.
5. No part of the building or premises shall be closed to the use of the occupants without the permission of the Owner's Representative has been obtained.

D. Precautions Against Fire

1. Take every precaution in the performance of the work to prevent fires.
2. Smoking shall not be permitted within the premises at any time.
3. Fire Department regulations shall govern the storage and use of flammable materials. Flammable materials and fire-producing equipment shall not be left unattended about the premises in locations accessible to the public.
4. Rubbish shall be removed as hereinafter specified.
5. Fire extinguishers and other protective equipment shall be provided as required by regulations.
6. During all interruptions of work, flammable mixtures shall be stored in Fire Department Approved Enclosures in Fire Department designated locations. Coordinate work with Local Fire Department.

E. Fire Watch

1. Contractors using open flame or spark-producing tools, blow torches and welding rods shall provide fire guards to maintain a fire watch over the operation of these items at all times when it is in use.

Provide any additional requirements by Local Fire Department inspector after work is underway.

2. Throughout the duration of switchovers/shutdowns of electrical service to the buildings, Contractor shall provide fire guards to maintain a fire watch throughout the buildings.
3. The Contractor shall provide all fire guards required by Fire Department for total work (all items), and shall include in his bid a particular amount for payment of such guards. The Contractor shall employ and pay all the required guards.

F. Temporary Maintenance of Hazardous Conditions

1. Upon receipt of official notice to start work, carefully inspect all existing work which is required to be repaired, altered or removed. Any such work which is found to be hazardous shall be immediately put in a safe condition and so maintained until such time as the permanent work in connection therewith is completed.
2. Any restrictions regarding sequence of operations and locations of work do not apply to the elimination of hazardous conditions; all parts of the premises will be available at all times for the performance of work.

G. Protection of Property

1. The Contractor shall be responsible for all damage to all new and existing work of the premises due to his operations, and shall provide and maintain adequate protection against such damage.
2. The premises shall not be used as a work shop to the detriment of any portion thereof.
3. Desk, tables, benches and other furniture and equipment shall not be used as workbenches; neither shall materials and furniture be piled thereon without proper protection.
4. Provide decking on floors, steps, platforms and pavements where subject to damage from heavy traffic.
5. Protect doors and door jambs when conveying rubbish and materials.
6. Provide and maintain barricades to confine dust to work areas.

7. Provide watertight enclosures over openings at roof and walls; provide watertight protection where tank houses, bulkheads and other roof structures are removed; remove temporary waterproofing protection for installation of new permanent work.
8. All damage to adjoining work due to failure to provide adequate protection shall be made good by the Contractor causing same at his own expense.
9. After completion of his work, each Contractor shall thereafter protect his own work until accepted, except as otherwise required to be protected or made good by other Contractors hereinbefore specified.

H. Protection of Public

1. Each Contractor shall be responsible for all injury to persons due to his operations and shall provide and maintain adequate protection against injury.
2. Provide guards, rails, barricades, fences, sidewalk sheds, catch-platforms, decking, night lighting, etc. as required by N.Y.S Building Code, Laws and as further required to provide adequate protection.
3. Protect sidewalks and curbs around the premises so that they may be safely used by the public at all times.
4. Provide barricades around work areas as required to prevent unauthorized persons from entering therein.
5. Provide plumbing and/or temporary drainage as required to keep all pits, trenches and other excavations, and the adjoining areas of the premises, dry during the course of the work; provide pumping for removal of rain and ground-water, back-up from sewers and drains, return-line flow, etc.

**1.15 CONTRACTOR'S RESPONSIBILITY**

- A. Examine all of the drawings and specifications data covering the work of the Mechanical, Electrical, and Construction Trades and with the work as a whole to determine the relations and extent of this work.
- B. Confer with the proper execution of the drawing and specification requirements for the purpose of eliminating any and all conflicts. Where conflict exists which cannot be resolved at the job site, except to the

detriment of this work, the Design Professional shall be consulted for instructions before proceeding with the work in question.

#### **1.16 CUTTING AND ROUGH PATCHING**

- A. Cutting and rough and finished patching for the installation of the work of this Contract shall be included in the bid of the Contract which requires the cutting and patching. Finished patching will be done by the Contractor. No structural beams or walls shall be cut until approval is given by the Design Professional.
- B. Provide all labor, materials, etc. necessary to complete all cutting, rough patching, painting and finishing work including, but not limited to, the following:
  - 1. Exterior ferrous metals disturbed by the work of this Contract, including door frames and miscellaneous metals.
  - 2. Interior ferrous metals disturbed by the work of this Contract, including: structural and miscellaneous metals doors and frames, interior partitions, access panels and doors, louvers, miscellaneous metal supports, grilles, registers and diffusers.
  - 3. Existing surfaces disturbed by the work of this Contract (walls, ceilings, floors, partitions, frames, trim, etc., of whatever materials).
  - 4. Interior exposed block masonry disturbed by the work of this Contract.
  - 5. Interior existing surfaces in corridors disturbed by the work of this Contract.
  - 6. Interior plaster, concrete and cement disturbed by the work of this Contract.
  - 7. Interior drywall construction disturbed by the work of this Contract.
  - 8. Interior carpentry and millwork disturbed by the work of this Contract.
  - 9. All concrete work, all pavements and all walls disturbed by the work of this Contract.
  - 10. All other items disturbed by the work of this Contract.

- C. The type of materials to be used and the number of coats to be applied shall match existing. All materials shall match existing. Colors and paint type shall be as selected by the Owner.
- D. Existing Hung Ceilings
  - 1. Remove the existing hung ceiling as required to permit the installation of the new work.
  - 2. Reinstall the altered existing ceilings.
  - 3. Do all reframing; provide additional members and furring to provide proper arrangement to receive altered ceilings.
- E. Do not cut existing floor or walls until shop drawings have approved by the Owner's Representative.
- F. Verify that spaces to remain unaltered adjacent to areas of alteration, or cutting are completely secured and rendered dustproof before beginning such work.
- G. Cutting and Drilling
  - 1. Do cutting and drilling of existing floors walls, partitions, ceilings, and like for installation of new work shown, including cutting of holes and other openings for new mechanical and electrical work.
  - 2. Perform cutting by hand or with small power tools wherever possible. Cut holes and slots neatly to size required, with minimum disturbance of adjacent work. Cut around holes in concrete slabs, floors and walls for pipes and conduit with core drills or required sizes and types. Cut square and rectangular holes by line drilling and using chipping hammers to remove material between drill holes. Large air hammers will not be permitted.
  - 3. Drilling or cutting of columns, beams, joist, girders, or other structural supporting elements will not be permitted, unless specifically approved in each case.
  - 4. Cover openings temporarily when not in use and patch as soon as work is installed.
- H. Alterations, Patching and Repairs
  - 1. Cut, remove, alter, temporarily remove and install, or relocate existing work as required for performance of work.

2. Restore finish work of floors, walls and ceilings remaining in place but damaged or defaced because of demolition of alteration work to condition equal to original condition before the work under this Contract was started.
3. Where alterations or removals exposed damaged to unfinished surfaces or materials, finish or refinish such surfaces or material, or remove the damaged or unfinished surfaces or materials and provide new, acceptable, salvaged materials to make continuous areas and surfaces uniform.
4. Perform new work and restoration and refinishing of existing work to comply with applicable requirements of the performance specification, except as follows:
  - a. Materials for use in repair of existing surfaces but not otherwise specified, shall conform to the highest standards of the trade involved, and be in accordance with approved industry standards, as required to match the existing surface.
  - b. Workmanship for existing materials to be repaired, but not otherwise specified, shall conform to similar workmanship existing in or adjacent to the space in which alterations are to be made.
  - c. Reinstallation of salvaged items where no similar item exist shall be done in accordance with the highest standards of the trade involved and in accordance with approved shop drawing.
- I. Properly close and patch holes and openings in existing floor, wall and ceiling surfaces to be filled or resulting from alteration work. Match adjacent undisturbed surfaces.
- J. Firestop all openings caused by cutting and patching work and as required by Local and State Codes.

#### **1.17 CHASES AND OPENINGS**

- A. Chases and openings shall be laid out in advance to permit their provision in the work. Sleeves and inserts shall be set in forms before concrete is poured. Any extra work required where sleeves, chases, openings, or inserts have been omitted or improperly placed shall be performed at the expense of the trade which made the error or omission.

### **1.18 FIELD MEASUREMENTS**

- A. Maintain all reference points and perform all field operations required to insure that work shall conform with grades, elevations, and lines required. Take all necessary field measurements of work previously executed as required for fabrication and installation of the work, and assume complete responsibility for the conditions on the job and be responsible for knowledge of same so that all work will properly join the other work. Verify the construction program of the other trades, ascertain and promptly furnish the information they may require for the proper installation of their work and his work.

### **1.19 DETAIL DRAWINGS**

- A. Provide drawings to scale of such portions of the work as may be required by the Design Professional and furnish prints of same, as required. Such drawings shall show the work and its exact relation to the construction and adjoining work of all other trades. When necessary, sections and elevations shall be made, as well as plans.
- B. Provide sleeve opening and core drilling opening drawings showing the locations of all sleeves, core drilling opening and sizes, duct opening and sizes, conduit opening and sizes, both horizontal and vertical. Location of sleeves shall be dimensioned from center line of columns and in the elevation from the underside of slab and from finished floor. Three (3) sets of the sleeve drawings shall be furnished to the General Contractor for his use, and a copy of the distribution transmittal sent to the Design Professional for record purposes. Sleeve drawings will not be checked by the Design Professional. The responsibility for the accuracy of the drawings rests with the Contractor.
- C. Provide coordination drawings in accordance with Division 1 Section "PROJECT COORDINATION," to a scale of 3/8"=1'-0" or larger; detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the work, including (but not necessarily limited to) the following:
  - 1. Indicate the proposed locations of switchgear, transformers and other equipment, and materials. Include the following:
    - a. Clearances for installing and maintaining equipment.



- b. Clearances for servicing and maintaining equipment, including removal of switches and disassembly required for periodic maintenance.
  - c. Equipment connections and support details.
  - d. Exterior wall and foundation penetrations.
  - e. Fire-rated wall and floor penetrations.
  - f. Sizes and location of required concrete pads and bases.
  - g. Conduit supports and routing.
2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
  3. Prepare floor plans, elevations, and details to indicate penetrations in floor, walls and ceilings and their relationship to other penetrations and installations.
  4. Prepare reflected ceiling plans to coordinate and integrate installations of conduits with existing equipment in spaces of work.
- D. Where the work to be installed is in close proximity to existing work, or where it appears that work may interfere with existing work, assist in working out space conditions to make satisfactory adjustments. If so directed, prepare complete scale working drawings and sections, clearly showing how this work is to be installed in relation to the existing work. The scale of the drawings shall be  $3/8" = 1'-0"$ , or as directed by the Design Professional. If work is installed before coordinating with other trades or so as to cause interference with work of other trades, the Sub-Contractor at fault shall make changes necessary to correct condition without extra charge.

#### **1.20 RECORD DRAWINGS**

- A. During construction keep an accurate record of all deviations between the work as shown on the Contract Drawings and that which is actually installed.
- B. Prepare a complete set of Mylar transparencies and AutoCAD of the Drawings and note thereon all changes. Make a complete record of all changes and revisions in the original design which exist in the complete work. The cost for the Mylar transparencies and AutoCAD drawings shall be paid for the Contractor.
- C. Prepare Record Drawings of the work as it proceeds. The drawings shall be kept current at all times, and prints of the drawings shall be submitted with all requests for payments. The drawings will include the amount of work accomplished during the construction period and will form part of the

request for payment data. The responsibility of keeping the drawings current rests with the Contractor.

- D. Furnishing of above documents and preparing these Record Drawings shall be at no additional cost to the Owner. When all revisions showing the work as finally installed are made, the corrected Mylar transparencies and AutoCAD drawings shall be submitted for review by the Design Professional.
- E. After review of the "Record Drawings" transparencies by the Design Professional, provide the Owner with one (1) set of black-line prints, Mylar transparencies and AutoCAD drawing file, at no additional cost to the Owner.
- F. In addition to the requirements specified in Division I, indicate the following installed conditions:
  - 1. Outdoor switchgear layout.
  - 2. Electric service room layout.
  - 3. Locations of riser conduits and branch feeders.
  - 4. Underground conduit banks and feeders.
  - 5. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
  - 6. Approved substitution, Contract Modifications, and actual equipment and materials installed.
  - 7. Contract Modifications, actual equipment and materials installed.
  - 8. Location of manholes.
  - 9. Emergency system equipment (generators, automatic transfer switches, etc.)

#### **1.21 SUPERVISION**

- A. In addition to the provisions of Division 1, the following shall provide the services of a competent supervisor who is not a working job foreman to supervise the entire installation and report on same. The supervisor shall be responsible for maintaining progress reports and shall furnish same to the Design Professional upon request, but not less than one each month. The Supervisor shall coordinate his work with the Owner's Representative and Design Professional in accomplishing the foregoing. The supervisor shall meet the Professional Requirements set forth by Local and State Laws.

#### **1.22 TEMPORARY AND TRIAL USAGE**

- A. The Owner shall have the privilege of temporary and trial usage of any portion of the Mechanical and Electrical Equipment before final acceptance by the Design Professional. It is expressly stipulated that such

usage shall not be construed as evidence of acceptance of any part of the work by the Design Professional.

### **1.23 TEMPORARY LIGHT, POWER, HEAT AND WATER**

- A. The Contractor may utilize the existing Electric System for temporary light and power except where the power tools would overload existing circuits or otherwise inhibit the normal operation of the existing building. Upon completion of temporary use, all worn and damaged parts are to be replaced and all equipment placed in proper operating condition.
- B. The Contractor during his work shall provide temporary transformers or standby generators (25 dB sound attenuation) so that power interruption in all the buildings shall be limited to a minimum. Power shutdowns during switchover of equipment shall be performed after hours or during weekends.
- C. Energy charges for the electricity taken from the existing service shall be borne by the Owner.
- D. Provide all necessary trailers, extension cords and lamps to provide light and power for the proper execution of his work.
- E. The existing cold water distribution system may be used for temporary water, except where its use would inhibit the normal operation of the existing building. Upon completion of temporary use, all worn or damaged parts are to be replaced and all equipment placed in proper operating condition.
- F. The costs of temporary water will be borne by the Owner.
- G. The existing building is occupied and operational. The Owner's forces will operate and maintain the existing boiler plants. The Owner's forces will provide heat.

### **1.24 OPERATING AND MAINTENANCE INSTRUCTIONS**

- A. General
  - 1. Upon completion of all work and of all tests, furnish the necessary skilled labor and helpers for operating the systems and equipment for a period of five (5) days of eight (8) hours each for all the Systems specified. During this period, instruct the Owner or his Representative fully in the operation, adjustment and maintenance of all equipment furnished. Give at least two (2) weeks notice to the Owner in advance of this period.

2. Furnish six (6) complete bound sets of typewritten or blue-printed instructions for operating and maintaining all systems and equipment included in this Contract. All instructions shall be submitted in draft, for approval, prior to final issue. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions. After "Approval", the copies shall be distributed, through the Design Professional, as follows: Two (2) copies to the Design Professional, and four (4) copies to the Owner.
3. Inasmuch as the Operating and Maintenance Instruction affects the operation of the building as a whole, the work will not be considered substantially complete until the Design Professional acknowledges, in writing, the acceptance thereof.
4. It is recommended that during the progress of the work, the material which must be included in the above manual be accumulated. After the shop drawings of each item is "Approved", the Maintenance and Operation Data shall be accumulated.
5. In the above-mentioned instructions, include the maintenance and lubrication schedule for all items of equipment furnished.

B. Instruction Manual

1. The following materials shall be included in the Instruction Manual:
  - a. Brief description of each system, sub-system and basic operating features.
  - b. Manufacturer's name and model numbers of all components of the systems listed on the equipment schedules, drawings, control diagrams and wiring diagrams of controllers.
  - c. Chart of the numbers, location, position and function of all components of the systems listed on the equipment schedules, drawings, control diagrams and wiring diagrams of controllers.
  - d. Step-by-step operating instructions, including preparation for starting summer operation, winter operation, shutdown and draining.
  - e. Maintenance instructions.
  - f. Possible breakdowns and repairs.

- g. Manufacturer's literature describing each piece of equipment listed on the equipment schedules, drawings, control diagrams and wiring diagrams of controllers.
- h. As installed control diagrams by the Control Manufacturer.
- i. Description of sequence of operation by the manufacturer.
- j. Parts of list of major equipment.
- k. As installed, color coded wiring diagrams of electrical connections and interlock connection.
- l. Manufacturer's literature describing the lubrication type, source, quantity and schedule for each item of equipment and each component part of an item.

NOTE: Items h and k shall be available at the final inspection and all other items at least four (4) weeks prior to the "Substantial Completion Date", which will determine the type of final inspection and the Owner's Instruction Period.

- 2. The format of the instruction manuals shall be the two (2) part format indicated on pages 42.3 and 42.4, ASHRAE 1980 Systems Handbook (modified to include all work of Division 22 and Division 26).
- 3. Include the following labeling on all documents:

DASNY, Engineers and Contractors project numbers, name, address and phone no. of the Contractor.

#### **1.25 QUIET OPERATION**

- A. All equipment and material shall operate under all conditions of load without any sound or vibration conditions areas, which are considered objectionable by the Design Professional, eliminate same in a manner reviewed by the Design Professional.

#### **1.26 DELIVERY OF MATERIAL**

- A. Deliver the material and store same in spaces indicated by the Design Professional and assume full responsibility for damage to structure caused by any overloading of the material.

- B. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

#### **1.27 TESTS, ADJUSTING AND DEMONSTRATION**

##### A. General

1. Test, adjust and demonstrate all the systems and equipment specified. In addition, perform all tests and adjustments required by Local, State and Federal Authorities. Provide all labor, materials, appliances, equipment, instruments, water, electricity and transportation and engage, where specified, independent testing laboratories to conduct the specified tests.
2. Tests to demonstrate the capacity specified and general operating characteristics of all apparatus shall be conducted in the presence of the Design Professional, to the satisfaction of the Design Professional.
3. Test instruments shall be checked and certified for accuracy by an approved laboratory or by the manufacturer, and certificates showing degree of accuracy shall be furnished to the Design Professional.
4. See the Section entitled, "Permits and Inspections" for additional requirements.
5. All piping, wiring, and equipment shall be tested as specified under the various sections of the work.
6. Tests shall be performed to the satisfaction of the Design Professional. The Design Professional will be present at such tests, when he deems necessary and such other parties as may have legal jurisdiction.
7. All defective work shall be promptly repaired or replaced and the tests shall be repeated until the particular system and component parts thereof receive the review of the Design Professional.
8. Any damages resulting from tests shall be repaired or replaced and the tests shall be repeated until the particular system and component parts thereof receive the approval of the Design Professional.

9. The duration of tests shall be as determined by all authorities have in jurisdiction, but in no case less than the time prescribed in the Specifications.

B. Equipment Tests

1. Capacities of all equipment shall be determined by operating tests of not less than two (2) hours duration, after stable conditions have been established. Test procedures shall be in accordance with the portions of recognized test codes and as hereinafter specified.
2. Should any grounds, defective materials, or equipment be found during the testing operations, such grounds shall be corrected and defective materials and equipment replaced. After corrections have been made, tests shall be repeated until all systems are proven satisfactory to the Design Professional. All corrections and retests shall be made until satisfactory without additional cost to the Owner.
3. Equipment and systems which normally operate during certain seasons of the year shall be tested during the appropriate season. Tests shall be performed on individual equipment, systems, and their controls. Whenever the equipment or systems under test is interrelated with and depends upon the operation of other equipment, systems and controls for proper operation, functioning, and performance, the latter shall be operated simultaneously with the equipment or system being tested.

C. Adjusting

1. Adjust all systems and equipment in the presence of and to the satisfaction of the Design Professional, and as hereinafter specified.
2. Assume all responsibilities and costs for temporary furnishing and installation of all instruments and recording devices.
3. All instrumentation shall be calibrated by an approved laboratory not more than one (1) month preceding its use.
4. All systems shall be adjusted and placed in operation by the manufacturer. Readjustments necessary to accomplish the specified results during the first year of operation shall be made during the first year of operation and shall be made without cost to the Owner.

D. Demonstration

1. After the adjusting report is approved and the Contractor certifies that all adjustments have been performed, demonstrate to the satisfaction of the Design Professional that the system meets all the Design Criteria and all items hereinbefore listed have been satisfactorily accomplished.
- E. Additional Requirements: As set forth in each Section of the Project Specification.

#### **1.28 PROTECTION AND CLEANING**

- A. The Contractor shall protect all finished surfaced, including the jambs and soffits of all openings used as passageways or through which materials are handled, against any possible damage resulting from the conduct of work by all trades.
- B. All finished surface, including factory-finished and job finished items, shall be clean and not marred upon delivery in the building to the Owner. The Contractor shall, without extra compensation, refinish all such spaces where such surfaces prove to have been inadequately protected and are damaged.
- C. Tight wood sheeting shall be laid under any materials that are stored on finished cement surfaces. Reinforced non-staining kraft building paper and plywood or planking must be laid over all types of finished floor surfaces in traffic areas and before moving any materials over these finished areas. Wheelbarrows, if used over such areas, shall have rubber-tired wheels.
- D. Roof surfaces shall not be subjected to traffic nor shall they be used for storage of material. Where some activity must take place in order to carry out the Contract, adequate protection shall be provided.
- E. All materials and equipment shall be properly and effectively protected. All piping and conduits must be properly capped during construction so as to prevent obstruction and damage. Any damage resulting in the failure to use proper precautions to this work shall be replaced or altered to the satisfaction of the Design Professional.
- F. The following shall be protected by heavy fiberglass cloth protective covers.
- G. All pull boxes and junction boxes to be painted shall be cleaned to remove dirt and grease or oil.
- H. All conduit, wiring, fixtures, apparatus, equipment, and appurtenances shall be thoroughly cleaned and put in first-operating condition before being offered for acceptance.



- I. Be responsible for keeping the building clean at all times. Remove all rubbish, debris, cartons, boxes, waste and the like originating with the work.
- J. Cleaning Up
  1. In addition to cleaning up detailed in Conditions of the Contract, the following shall apply:
    - a. All areas of the building in which work is to be performed shall be cleaned throughout by the Contractor just prior to the start of this work, and these areas shall be continuously maintained in safe and satisfactory condition at all times. This cleaning shall include the removal of trash and rubbish from area; broom cleaning of floors, the removal of any plaster, mortar, dust and other extraneous materials from all finish surfaces, including but not limited to: all exposed structural, miscellaneous metal, woodwork, plaster, masonry, concrete, mechanical conduit and also all surfaces visible after all permanent fixtures, fan coil units covers, covers for heating and cooling piping, grilles, registers, and other such fixtures or devices are in place.
    - b. Electrical closets, pipe and duct shafts, chases, furred spaces, and similar spaces which are generally unfinished shall be cleaned and left free from rubbish, loose plaster, mortar drippings, extraneous construction materials, dirt and dust before preliminary inspection of the work.
    - c. Care shall be taken by all workmen not to mark, soil or otherwise deface any finished surfaces. In the event that any finished surface becomes defaced in any way by mechanics or workmen, the Contractor responsible shall clean and restore such surfaces to their original condition.
    - d. Before final payment will be approved, the Contractor shall prepare the construction area as follows: The Contractor shall clean all construction areas free from construction materials. All areas shall be broom cleaned from excess dirt and materials.

#### **1.29 ALLOWABLE TOLERANCES**

- A. Equipment shall fit in space allocated.

- B. Clearances around all equipment shall permit removal of switchboards, transformers, compressors, fans, motors, and all components.
- C. Clearances must conform to State, Local and OSHA Requirements.
- D. Clearances must be provided for access to all parts and components.

**1.30 LUBRICATION**

- A. Assume responsibility that all rotating equipment is properly lubricated before operation of this equipment is started. Assume responsibility for any damage to equipment that is turned on without previously having been oiled or greased when connected up.

**1.31 WATERPROOFING**

- A. Where any work pierces waterproofing, including waterproof concrete, the method of installation shall be as approved by the Design Professional before the work is done. The General Contractor shall provide all necessary sleeves, caulking, and flashing required to make openings absolutely watertight.

**1.32 SCAFFOLDING, RIGGING, AND HOISTING**

- A. Provide all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished. Remove same from premises when no longer required.

**1.33 GUARDS AND RAILINGS**

- A. Provide belt drives and rotating machinery with readily removable guards and railings. Guards shall consist of heavy galvanized iron wire crimped mesh securely fastened to frames. Railings shall be galvanized 1-1/2" pipe and railing fittings.

**1.34 DRAIN PANS OVER ELECTRIC EQUIPMENT**

- A. Drain pans shall be provided under this Contract.
- B. Provide drawings indicating the locations where piping passes over electric panels.

**1.35 ALTERATIONS**

- A. When new work and alterations render equipment, conduit, wiring, piping and ductwork to view, it shall be properly capped or plugged and left in construction. If construction, such as hung ceiling, furred beam, chase,

etc., is opened up and removed during the course of the construction, the useless pipe required to accommodate new work, useless conduit, wiring, piping, wiring and ductwork concealed in construction shall be treated as though exposed to view.

- B. When existing piping and duct system at points of connection to new work or in rerouting are found defective, such defective portions shall be removed and replaced with new materials without cost to the Owner.
- C. Provide temporary supports where required.
- D. When alterations reveal piping, ductwork, conduit circuits, wiring, and accessories that must necessarily remain in service, same shall be rerouted, replaced with new material without cost to the Owner.
- E. Where existing piping or ductwork insulation is damaged by the requirements of the work, replace all damaged insulation to match existing.

#### **1.36 EXISTING MECHANICAL AND ELECTRICAL WORK**

- A. Remove, abandon, relocate or reroute, as required to accomplish the work, all piping, conduit, wiring, ductwork, equipment, fixtures, materials, and apparatus which are laid bare in the course of, or interfere with, the alterations and additions to the building. Abandon, behind patched finishes, all unused piping and remove all exposed piping and branch work which may interfere with the alterations and additions required.
- B. All removals, abandonments, relocations and rerouting shall be performed in strict conformance with Federal, State and Local Codes and N.F.P.A. Standards.
- C. Compare the drawings with the existing conditions to determine the amount of work affected. Remove all "unused exposed" piping, conduit, ductwork, wiring, materials, apparatus, and the like not required by alterations and additions to the building.
- D. All piping, conduit, ductwork, wiring, materials, apparatus, and equipment laid bare by the removal of floors, ceiling, walls and partitions, and which are required in the present building and alterations, shall be rearranged, rerouted, relocated and installed as indicated, specified or directed.

#### **1.37 EXISTING ELECTRIC WORK**

- A. Remove, abandon, or re-route, as required for the work, any conduit, and/or wiring and outlets which are laid bare in the course of, or interfere with, the alterations in the building. Abandon, behind patched finishes, all

unused outlets, and remove all exposed outlets, conduit and branch circuit work, which may interfere with the alterations, as directed.

- B. Compare the drawings with the existing conditions to determine the amount of work affected. Remove all unused switches, transformers, exposed circuit work, outlets, fixtures, switches, underground high voltage feeders and the like not required by alterations in the building. Any conduits, outlets, circuit work, feeders, etc. laid bare by the removal of floors, ceilings, walls, and partitions, and which are required in the present building and alterations, shall be rearranged, rerouted and installed as specified herein, shown on the Contract Drawings or as approved by shop drawings and as required by the National Electric Codes.
- C. Miscellaneous branch circuits, other than those which are specifically indicated to be rerouted and connected to the new or existing panelboards, shall be rerouted to suitable spare branch circuits at nearest available panel. It is the intention of this specification to provide for the continuance of all electrical facilities now installed in the unaltered portions of the building. Furnish and install all conduit and wiring, pull boxes, etc. to permanently maintain service to these facilities, as required, at no additional cost to the Owner.
- D. All existing local switches, receptacles, device plates, and other existing wiring devices indicated for removal shall not be required in this alteration.
- E. All existing wire and cable involved or disturbed in any relocation and extension shall be removed back to the nearest outlet, junction or pull box in the runs, and shall be replaced with new wire or cable as herein specified.
- F. The Contractor shall be responsible for notifying the Campus Public Safety or as directed by the Campus before any alterations are begun in the existing building for the purpose of removing, rerouting, etc., of existing fire alarm system and equipment, telephone conduits, cables, strip boxes, outlets, wiring and equipment, as specified above.

### **1.38 REMOVALS AND RELOCATIONS**

- A. Where conduit, panels, wiring, piping, ductwork, equipment, materials, apparatus, and other items are specified or indicated as being removed, or are required to be removed in order to accomplish the new work, the Contractor shall, as a minimum, be subject to the following operations:
  - 1. Disconnect item from adjoining piping, conduit, panels, materials, apparatus, wiring, ductwork, equipment, and items.

2. Existing pipe, conduit, panels, wiring, and/or ductwork connections to items being removed shall be terminated, capped and concealed.
  3. If the item is specified or indicated to remain on the property of the Owner, the item shall be transported to a place on the site designated by the Owner.
- B. Items not specified or indicated as becoming the property of the Contractor shall remain the property of the Owner.
  - C. If the item is specified or indicated to become the property of the Contractor, the Contractor shall transport the item off the site.
  - D. All items indicated as being relocated shall be removed, transported to the place of designation location, and connected to the system as indicated, specified or directed.

**1.39 CONDUCT OF WORK IN AND OPERATION OF EXISTING PLANT**

- A. The term "Existing Plant" shall be understood to mean all existing buildings at the site, grounds, equipment, and services.
- B. In general, all the existing buildings will be occupied and in operation during the progress of the work. Provide all required temporary transformer, standby generators and connections to insure the continued operating condition of all existing services within the existing building.
- C. No work shall be left incomplete or any hazardous situations created which will affect the life or safety of the building occupants. At no time shall the work interfere with or cut off any of the existing services without the Owner's Representative's written permission.
- D. It is required that the work indicated and/or specified shall be carried out with a minimum of interference to the established routine of the existing buildings, and that all work required herein shall be performed within the required contract time. Furnish a schedule indicating the time required to complete the work in the existing building. The above schedule will be reviewed and times and dates established for the accomplishment of this work. Do not perform work in the present building without the Owner's written permission.
- E. Any work necessary to be performed after regular working hours, on Sundays, or Legal Holidays, shall be performed without additional expense to the Owner.

- F. Existing steam, storm water and sanitary drainage water, domestic cold water, domestic hot water, condensate return, electric and gas services and systems shall be operational at all times.

The Owner's Representative shall be notified, in writing, when, for any reason, interruption of the presently maintained services, mechanical, electrical or otherwise, is required to accomplish the work. Written permission shall be obtained from the Owner's Representative prior to commencing with the work.

- G. Written permission shall be obtained from the Owner's Representative prior to commencing with the work.

**1.40 P.M. PROGRAM**

- A. A computerized program of scheduling preventative and routine maintenance will be implemented by the Owner. In order to fit any equipment furnished into this program, the Contractor shall furnish the Owner with the data shown on the attached form for each piece of equipment.

DATA ON EQUIPMENT FURNISHED

DATE:

1. Equipment Name.
2. Manufacturer.
3. Model No.
4. Serial No.
5. Contractor.
6. Sub-Contractor.
7. Vendor.
8. Job Name.
9. Job Number.
10. Agency from whom parts may be obtained:
11. Agency from whom service may be obtained:
12. Service Agreement:      Yes      No      Expires
13. a) Guarantee:              Yes      No      Expires
- b) Warrantee:              Yes      No      Expires
14. Equipment Location:              Building      Floor
- Room No.                      Area Des.
15. Area Served:      Building      Floor
- Room No.      Area Des.
16. Furnished in accordance with:
- Contract Drawing No.

- Specification Paragraph  
Specified by Design Professional
17. List Shop Drawings, Equipment Cuts, Catalogs, or the other drawings which show this equipment.
  18. Indicate spare parts lists, maintenance and instruction manuals, or other data furnished.
  19. Indicate all services connected to this equipment - water, drain, steam, return, gas, vacuum, chilled water, electric, etc. Give sizes of connections, amount used, pressure, etc.
  20. Capacity of equipment.
  21. Electrical Characteristics:                      Voltage    Amp    Phase
  22. Electrical Circuit Data Panel Designation  
Panel Location              Circuit Number  
Fuse Size              Fuse Type
  23. Location and data of any auxiliaries.
  24. Other Data.

#### **1.41 MANUFACTURER'S DIRECTIONS**

- A. Except as elsewhere specified, all proprietary and manufactured articles and materials shall be used, connected, cleaned and finished, in accordance with the directions and recommendations of the manufacturers of such articles and materials.

#### **1.42 SIGNS**

- A. No signs will be permitted on any of the properties except for the project sign to be provided.

#### **1.43 ACCESS TO THE SITES**

- A. Access to the various sites for delivery of construction material and/or equipment shall be made only from locations as approved by the Owner's Representative.

#### **1.44 EMPLOYEE'S TOILET**

- A. Employees of the Contractor and his Sub-Contractors shall use the toilet facilities in his trailer. Access to other toilets shall be prohibited except for performing the work required by the Contract.

#### **1.45 ENVIRONMENTAL CONTROLS**

- A. Inasmuch as the existing buildings will be in operation during the course of the work, the Contractor shall perform his work such that the dust and noise generated is kept to a practical minimum.

**1.46 FIELD OFFICE**

- A. The Contractor may maintain a field office with a telephone at the job site in a space designated by the Owner for use by him and the Owner's Representative. The Contractor shall pay for all costs in conjunction with the office.

**1.47 TELEPHONE**

- A. The Contractor shall pay costs in connection with his telephone, which shall be used by the Design Professional.

**1.48 FIRST AID STATION**

- A. The Contractor shall provide a First Aid Station as required by O.S.H.A., Federal, State and Local Laws.

**1.49 GUARANTEE**

- A. Prior to issuance of Certificate of Completion, each Contractor shall deliver to the Owner's Representative, bound in a single folder, all guarantees and bonds that are required by the Conditions of the Contract and the various technical sections of the Specifications.

**1.50 STORAGE OF MATERIALS**

- A. The Contractor shall be provided with space, if available by the Owner, for the storage of materials. The space assigned shall be determined pursuant to the award of the Contract and not necessarily in the building but on the site.

**1.51 RELEASE**

- A. Prior to issuance of Certificate of Completion, each Contractor shall deliver to the Design Professional complete release of all claims as required by the General Conditions.

**1.52 PROJECT SCHEDULE CONTROL ACCEPTED**

- A. The Project Schedule
  - 1. After a notice to proceed has been given to the Contractor, the Owner and the Owner's Representative shall meet the Contractor within one week to develop a comprehensive and detailed Project Schedule. It shall be the Contractor's responsibility to ensure that the Project Schedule includes all of the Contractor's work and correctly



represents the previously submitted and agreed upon sequence of the time durations for the work.

2. The Contractor shall make the requirements of the Project Schedule an essential part of the each purchase order and each Sub-Contract.
3. The Contractor shall cooperate in every way possible with other contractors in order to maintain the completion date and meet all the intermediate milestone dates. The Contractor expressly understands and agrees that no additional compensation shall be paid for such cooperation.
4. The Contractor shall submit such proof as may be required by the Owner or the Owner's Representative to show that he has completed the schedule of dates for ordering equipment and materials.
5. The Contractor shall, when directed by the Owner or the Owner's Representatives, cooperate in the development, implementation and updating of detailed Critical Path Method sub-schedules for any special areas.

B. Project Control and Progress Meetings

1. The Contractor shall regularly review the reports generated by the Project Schedule and use such reports as working tools to meet his obligations under this Contract.
2. The Contractor shall attend all scheduling meetings as directed by the Owner or the Owner's Representatives. In addition to the Owner's Representative and the Contractor's Superintendent and Scheduling Coordinator, such meetings shall also be attended by the representatives of such subcontractors as the Contractor or Owner or Owner's Representative may deem advisable. The agenda for such meeting shall include the Project Schedule reports, the progress and current status of the work, proposed solutions for problem areas and a review of schedules for future work in order to meet the Contractor's objectives and his obligations under the Contract. Consideration shall be given to establishing actual start dates, actual completion dates, planned starts and finishes, quantities installed, manhours worked as well as other data relevant to the performance of the Contract.
3. At least one week before each meeting hereinbefore described, the Contractor shall furnish to, and in the form required by, the Owner or Owner's Representative progress data for:

- a. All activities as of the date determined by the Owner or Owner's Representative, and
  - b. A list of actual start and completion dates for all activities.
- C. Project Schedule Updating
1. After the Owner's Representative has received the information required from the Contractor and all other contractors doing work at the same location, the Owner or Owner's Representative shall compare the information received and, if appropriate, will make and update to the Project Schedule to show how changes or delays will effect the scheduled completion of work. This Project Schedule as updated, shall become binding on the Contractor.

## **PART 2 - PRODUCTS (Not Applicable)**

## **PART 3 - EXECUTION**

### **3.01 ROUGH-IN**

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Refer to equipment specifications in Divisions 2 through 33 for rough-in requirements.

### **3.02 ELECTRICAL INSTALLATIONS**

- A. General: Sequence, coordinate, and integrate the various elements of electrical systems, materials and equipment. Comply with the following requirements:
  1. Coordinate electrical systems, equipment, and materials installation with other building components.
  2. Verify all dimensions by field measurements.
  3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.

4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
5. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
7. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
8. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to the greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Design Professional.
9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
10. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
11. Install access panel or doors where equipment is concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "ACCESS DOORS AND FRAMES" and Division 26 Section "BASIC Electrical MATERIALS AND METHODS."
12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

### **3.03 CUTTING AND PATCHING**

- A. General: Perform cutting and patching as specified in Part 1 of this Section "CUTTING AND PATCHING." In addition to the requirements specified in Division 1, the following requirements apply:
1. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
- B. Perform cutting, fitting, and patching of electrical equipment and materials required to:
1. Uncover Work to provide for installation of ill-timed Work.
  2. Remove and replace defective Work.
  3. Remove and replace Work not conforming to requirements of the Contract Documents.
  4. Remove samples of installed Work as specified for testing.
  5. Install equipment and materials in existing structures.
  6. Upon written instructions from the Design Professional, uncover and restore Work to provide for Design Professional observation of concealed Work.
  7. Cut, remove and legally dispose of selected electrical equipment, components, and materials as indicated.
  8. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
  9. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
  10. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
  11. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

**END OF SECTION**

## **260500 - BASIC ELECTRICAL MATERIALS AND METHODS**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to this Section.
- B. Requirements specified in Division 26 Section "Basic Electrical Requirements" apply to this Section.
- C. Related Sections:
  - 1. Division 7 Section 07270 - Firestopping system applies to this section.
  - 2. Division 2 Section 312316 - Earthwork FOR STRUCTURES AND UTILITIES applies to this section.
- D. Contractor shall refer to Section 011200 - "Contract Summary of Work", Section 015000 - "Temporary Facilities" and the "Temporary Power and Sequence of Connections" notes for each building on Drawings for the sequencing required to accomplish the work.

#### **1.02 SUMMARY**

- A. Include all labor, materials, tools, equipment and services required to furnish, deliver and install all work under this Section as required by the drawings and as specified hereinafter.
- B. This Section includes limited scope general construction materials and methods for application with electrical installations as follows:
  - 1. Miscellaneous metals for support of electrical materials and equipment.
  - 2. Wood grounds, nailers, blocking, fasteners, and anchorage for support of electrical materials and equipment.
  - 3. Joint sealers for sealing around electrical materials and equipment; and firestopping for sealing penetrations in fire and smoke barriers, floors, and foundation walls.
  - 4. Firestopping shall be provided in the following locations:
    - a. Conduit, penetrations through walls, floor slabs, through partitions and through walls.
    - b. Other locations where shown or required.

5. Electrical equipment nameplate data.

### **1.03 SUBMITTALS**

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for the following products:
  1. Joint sealers.
  2. Firestopping.

### **1.04 QUALITY ASSURANCE**

- A. Installer Qualifications: Engage an experienced Installer for the installation and application joint sealers.

### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver joint sealer materials in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.
- B. Store and handle joint sealer materials in compliance with the manufacturers' recommendations to prevent their deterioration and damage.

### **1.06 PROJECT CONDITIONS**

- A. Conditions Affecting Selective Demolition: The following project conditions apply:
  1. Protect adjacent materials indicated to remain. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.
  2. Locate, identify, and protect electrical services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.
- B. Environmental Conditions: Apply joint sealers and firestopping under temperature and humidity conditions within the limits permitted by the joint sealer manufacturer. Do not apply joint sealers to wet substrate.

### **1.07 SEQUENCE AND SCHEDULING**

- A. Coordinate the shut-off and disconnection of electrical service with the

- Owner and the utility company.
- B. Notify the Owner at least five (5) days prior to commencing demolition operations.
  - C. Perform demolition in phases as indicated.

## **PART 2 - PRODUCTS**

### **2.1 ELECTRICAL EQUIPMENT NAMEPLATE DATA**

- A. Nameplate: For each item of electrical equipment, provide a permanent operational data nameplate indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data. Locate nameplates in an accessible location.

### **2.02 MISCELLANEOUS METALS**

- A. Steel Plates Shapes, Bars, and Bar Grating: ASTM A 36.
- B. Cold-Formed Steel Tubing: ASTM A 500.
- C. Hot-Rolled Steel Tubing: ASTM A 501.
- D. Steel Pipe: ASTM A 53, Schedule 40, welded.
- E. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout, recommended for interior and exterior applications.
- F. Fasteners: Zinc-coated, type, grade, and class as required.

### **2.3 MISCELLANEOUS LUMBER**

- A. Framing Materials: Standard Grade, light-framing-size lumber of any species. Number 3 Common or standard grade boards complying with WCLIB or AWWA rules, or Number 3 boards complying with SPIB rules. Lumber shall be preservative treated in accordance with AWPB LP-2, and kiln dried to a moisture content of not more than 19%.
- B. Construction Panels: Plywood panels; APA C-D PLUGGED INT, with exterior glue; thickness as indicated, or if not indicated, not less than 3/4 inches, fire retardant treated.

## **PART 3 - EXECUTION**

### **3.01 PREPARATION FOR JOINT SEALERS**

- A. Surface Cleaning for Joint Sealers: Clean surfaces of joints immediately before applying joint sealers to comply with recommendations of joint sealer manufacturer.
- B. Apply joint sealer primer to substrate as recommended by joint sealer manufacturer. Protect adjacent areas from spillage and migration of primers, using masking tape. Remove tape immediately after tooling without disturbing joint seal.

### **3.02 ELECTRICAL MATERIALS AND EQUIPMENT**

- A. Remove, abandon, or re-route, as required for the work, any conduit, and/or wiring and outlets which are laid bare in the course of, or interfere with, the alterations in the building. Abandon, behind patched finishes, all unused outlets, and remove all exposed outlets, conduit and branch circuit work, which may interfere with the alterations, as directed.
- B. Compare the drawings with the existing conditions to determine the amount of work affected. Remove all unused exposed circuit work, outlets, fixtures, switches, and the like not required by alterations in the building. Any conduits, outlets, circuit work, feeders, etc., laid bare by the removal of floors, ceilings, walls, and partitions, and which are required in the present buildings and alterations, shall be rearranged, rerouted and installed as directed.
- C. Miscellaneous branch circuits, other than those which are specifically indicated to be rerouted and connected to the new or existing panelboards shall be rerouted to suitable spare branch circuits at nearest available panel. It is the intention of this Specification to provide for the continuance of all electrical facilities now installed in the unaltered portions of the building.
- D. All existing local switches, receptacles, device plates, and other existing wiring devices indicated for removal shall not be reused in this alteration.
- E. All existing wire and cable involved or disturbed in any relocation and extension shall be removed back to the nearest outlet, junction or pull box in the run, and shall be replaced with new wire or cable as herein specified.
- G. Perform cutting and patching required for demolition in accordance with Section GR "Cutting and Patching" and Section 02070 Minor Demolition, Removals, Restorations, Additions, Alterations, Cutting and Patching for Work in Buildings, Areaways, Service Rooms and Site Work.

### **3.03 REMOVALS AND RELOCATIONS**

- A. Where pipe, fittings, valves, conduit, panels, wiring, ductwork, equipment, materials, apparatus, and other items are specified or indicated as being removed, or are required to be removed in order to accomplish the new



work, the work required shall, as a minimum, shall be subject to the following operation:

1. Disconnect item from adjoining piping, conduit, panels, materials, apparatus, wiring, ductwork, equipment, and other items.
  2. Existing pipe, conduit, panels, wiring, and/or ductwork connections to items being removed shall be terminated, capped and concealed.
  3. If the item is specified or indicated to remain on the property of the Owner, the item shall be transported to a place on the site designated by the Owner.
- B. All items indicated as being relocated shall be removed, transported to the place of designation location, connected to the system as indicated, specified or directed.

#### **3.04 ERECTION OF METAL SUPPORTS AND ANCHORAGE**

- A. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS "Structural Welding Code."

#### **3.05 ERECTION OF WOOD SUPPORTS AND ANCHORAGE**

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Select fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood members.
- C. Attach to substrate as required to support applied loads.

#### **3.06 APPLICATION OF JOINT SEALERS**

- A. General: Comply with joint sealer manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.
  1. Comply with recommendations of ASTM C962 for use of elastomeric joint sealants.
  2. Comply with recommendations of ASTM C790 for use of acrylic-emulsion joint sealants.

- B. Tooling: Immediately after sealant application and prior to time shinning or curing begins, tool sealants to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
- C. Installation of Fire-Stopping Sealant: Install sealant, including forming, packing, and other accessory materials, to fill openings around electrical services penetrating floors and walls, to provide fire-stops with fire-resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.
- D. See Joint Sealant Schedule on Drawings.

### **3.07 EQUIPMENT BASES**

- A. Construct concrete equipment pads as follows:
  - 1. Form concrete pads using framing lumber with form release compounds, chamfer top edge and corners of pad.
  - 2. Place concrete and allow to cure before installation of equipment. Use portland cement conforming to ASTM C150, 4,000 psi compressive strength, and normal weight aggregate.
  - 3. Clean exposed steel form and apply two (2) coats of rust-preventative metal primer and two (2) coats of exterior, gloss, alkyd enamel. Color shall be as selected by the Design Professional.

### **3.08 BUILDING PENETRATIONS**

- A. General Penetration Requirements: Provide properly sized, fabricated, located, and trade coordinated sleeves and prepared openings, for conduits, ductwork piping, and other item penetrations, for the surface to be penetrated. Provide sleeves for round duct and items 15 inches and smaller and prepared openings for round duct larger than 15 inches and all square or rectangular duct. Sleeves, except as otherwise specified or indicated, shall be 20-gauge, 0.0396-inch thick mill galvanized sheet metal. Sleeves penetrating load bearing surfaces shall be standard weight galvanized steel pipe.
- B. Framed Opening: Provide framing for new and existing openings as specified and indicated and in accordance with approved shop drawings for application with approved firestopping material.
- C. Clearances: Provide not less than one inch clearance between penetrating and penetrated surfaces. Fill clearance space with approved firestopping material and seal and close as required.

- D. Tightness: Penetrations shall be: weathertight and fireproof where new and existing fire rated surfaces are penetrated. They shall be vaportight to prevent vapor transmission to conditioned spaces, soundtight to prevent sound transmission to or between normally occupied or finished spaces, deleterious or hazardous substance-tight where toxic and/or flammable substances or gases could migrate.
- E. Sealants: Sealant shall be elastomeric type or foamed silicone type, as specified under paragraph entitled "Sealants," applied to oil free surfaces to not less than 3/8 inch depth.
- F. Existing and New Conduits, Ductwork, Pipe, Closure Collars: Closure collar, not less than 4 inches wide, unless otherwise indicated, shall be provided for all items on each side of penetrated surface. Install collar tight against the surface and fit snugly around penetrating item without contact. Sharp edges shall be ground smooth to preclude damage to penetrating surface. Collars for pipes, conduits and round ducts 15 inches in diameter or less shall be fabricated from 20-gauge, 0.0396 inch nominal thickness, mill galvanized steel. Not less than four (4) fasteners shall be used to attach collars where the opening is 12 inches in diameter or less, and not less than eight (8) fasteners shall be used where the opening is 20 inches in diameter or less.

Collars for square and rectangular ducts with a minimum side of 15 inches or less shall be fabricated from 20-gauge, 0.0396 inch nominal thickness, mill galvanized steel. Collars for round, square, and rectangular ducts with minimum dimension over 15 inches shall be fabricated from 18-gauge, 0.0516 inch in nominal thickness, mill galvanized steel. Collars shall be installed with fasteners on maximum 6-inch centers. Where penetrating items are irregularly shaped and where approved, smoothly finished, fire-retardant, foamed silicone elastomer may be utilized without closure collar.

- G. Conduit Sleeves: Conduit passing through concrete or masonry walls or concrete floors shall be provided with conduit sleeves. Sleeves shall not be installed in structural members except where indicated or approved. Each sleeve shall extend through its respective wall, floor, and shall be cut flush with each surface. Unless otherwise indicated, sleeves shall be of such size as to provide a minimum of 1/4 inch all around clearance between bare conduit and sleeves. Sleeves in bearing walls, waterproofing membrane floors, and wet areas shall be steel pipe or cast iron pipe. Sleeves in nonbearing walls, floors, or ceilings may be steel pipe, cast iron pipe, or galvanized sheet metal with lock-type longitudinal seam. Except in conduit and pipe chases or interior walls, the annular space between conduit and sleeve in nonfire rated walls and floors shall be sealed as indicated and specified in section: caulking, sealants and firestopping and in fire rated walls and floors shall be as indicated and hereinbefore specified. Conduit passing through wall waterproofing membrane shall be sleeved as described above. In addition, a waterproofing clamping flange shall be installed as indicated.

1. Conduits Passing Through Floor Waterproofing Membrane: Pipes shall be installed through a 4-pound lead-flashing sleeve, a 16-ounce copper sleeve, or a 0.032 inch thick aluminum sleeve, each within an integral skirt or flange. Flashing sleeve shall be suitably formed, and the skirt or flange shall extend 8 or more inches from the pipe and shall be set over the floor membrane in a troweled coating of bituminous cement. The flashing sleeve shall extend up the conduits a minimum of 10 inches above the floor. The annular space between the flashing sleeve and the metal-jacket-covered insulation shall be sealed as indicated. Conduits and pipes up to and including 10 inches in diameter passing through floor waterproofing membrane may be installed through a cast iron sleeve with caulking races, anchor lugs, flashing clamp device, and pressure ring with brass bolts. Waterproofing membrane shall be clamped into place and sealant shall be placed in the caulking recess.

2. Sealing of Conduits or Uninsulated Pipes Passing Through Waterproofing Membrane: A modular mechanical type sealing assembly may be installed. The seals shall consist of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe/conduit and sleeve with corrosion protected carbon steel bolts, nuts, and pressure plates. The links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and each nut.

After the seal assembly is properly positioned in the sleeve, tightening of the bolt shall cause the rubber sealing elements to expand and provide a watertight seal between the pipe/conduit and the sleeve. Each seal assembly shall be sized as recommended by the manufacturer to fit the pipe/conduit and sleeve involved. Contractor electing to use the modular mechanical type seals shall provide sleeves of the proper diameters.

3. Optional Counterflashing: As an alternate to caulking and sealing the annular space between the conduit and flashing sleeve or counterflashing may be by standard roof coupling for threaded pipe up to 6 inches in diameter; lead-flashing sleeve for dry vents and turning the sleeve down into the pipe to form a waterproofing joint; or tack-welded or banded-metal rain shield round the pipe and sealing as indicated.

H. Escutcheons shall be provided at all finished surfaces where exposed conduit and piping, bare or covered, passes through floors, walls, or ceilings, including mechanical equipment rooms. Escutcheons shall be fastened securely to pipe sleeves or to extensions of sleeves without any part of sleeves being visible. Where sleeves project slightly from floors, special deep-type escutcheons shall be used. Escutcheons shall be chromium-plated iron or chromium-plated brass, either one-piece or split pattern, held in place by

internal spring tension or setscrew.

**3.09 TESTS**

- A. Test all the wiring systems and equipment. Perform all tests required by Local, State and Federal authorities. Provide all labor, materials, appliances, equipment, instruments, electricity, and transportation and engage, where specified, independent testing laboratories to conduct the specified tests.
- B. Tests, to demonstrate the capacity specified and general operating characteristics of all apparatus, shall be conducted in the presence of the Design Professional.
- C. Where it is impossible to test out whole systems at one time, they may be divided into parts and each tested independently.
- D. Test instruments shall be checked and certified for accuracy by an approved laboratory or by the manufacturer, and certificates showing degree of accuracy shall be furnished to the Design Professional.
- E. If gauges and other instruments which are to be left permanently installed are used for tests, they shall not be installed until just prior to the tests to avoid possible changes in calibration.

**END OF SECTION**

## **260519 - WIRES AND CABLES - BELOW 600 VOLTS**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Requirements of the following Division 26 Sections apply to this Section:
  - 1. Section 260100 - Basic Electrical Requirements
  - 2. Section 260500 - Basic Electrical Materials and Methods
  - 3. Section 260530 - Conduits Raceways
  - 4. Section 260532 - Cabinets, Boxes and Fittings
  - 5. Section 262726 - Wiring Devices
  - 6. Section 260553 - Electrical Identification

#### **1.02 SUMMARY**

- A. This Section includes wires, cables, and connectors for systems rated 600 volts and less.

#### **1.03 SUBMITTALS**

- A. Shop Drawings:
  - 1. For Electrical Circuit Protective Systems: Show proposed routes and installation details (include UL classification data, listing, and system number).
- B. Product Data: Catalog sheets, specifications and installation instructions.

#### **1.04 QUALITY ASSURANCE**

- A. Regulatory Requirements: Comply with provisions of the following code:
  - 1. National Electrical Code (NFPA 70)
  - 2. Conform to applicable codes and regulations regarding toxicity of combustion products of insulating materials.
- B. UL Compliance: Provide components which are listed and labeled, (as designed by NFPA 70, ART 100), by UL under the following standards.
  - 1. UL Std. 83 Thermoplastic-Insulated Wires and Cables.
  - 2. UL Std. 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors.

3. UL Std. 854 Service Entrance Cable.
- C. IEEE Compliance: Provide components which comply with the following standard.
1. Std. 82 Test Procedures for Impulse Voltage Tests on Insulated Conductors.

#### **1.05 DELIVERY AND STORAGE**

- A. Deliver wires and cables according to NEMA WC 26.
- B. 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. Data which explains the meaning of coded identification (UL assigned electrical reference numbers, UL assigned combination of color marker threads, etc.).
  6. 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:
- 1) Southwire Co.
  - 2) General Cable Industries Inc.
  - 3) Cerro Wire & Cable Co. Inc.
  - 4) Prysmian Cable Corp.
  - 5) Houston Wire and Cable Co.
  - 6) Or Engineer Approved Equal
- 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. 8 and larger shall be stranded.

D. Types:

1. Electric Light and Power Wiring:

- a. General: Rated 600V, NFPA 70 Type FEP, THHN-2, THW, THW-2, THWN, THWN-2, XHH, XHHW-2.
- b. THWN Gasoline and Oil Resistant: Polyvinylchloride insulation rated 600 V with nylon jacket conforming to UL requirements for type THWN insulation, with the words "GASOLINE AND OIL RESISTANT II" marked thereon.
- c. USE, USE-2: Dual rated heat and moisture resistant insulation rated 600 V with jacket or dual purpose insulation/protective covering conforming to UL requirements for type USE service entrance cables.

2. Class 1 Wiring:

- a. No. 18 and No. 16 AWG: Insulated copper conductors suitable for 600 volts, NFPA 70 types KF-2, KFF-2, PAFF, PF, PFF, PGF, PGFF, PTF, SF-2, SFF-2, TF, TFF, TFN, TFFN, ZF, or ZFF.
- b. Larger than No. 16 AWG: Insulated copper conductors suitable for 600 volts, in compliance with NFPA 70 Article 310.
- c. Conductor with other types and thickness of insulation may be used if listed for Class 1 circuit use.

3. Class 2 Wiring:

- a. Multiconductor Cables: NFPA 70 Article 725, Types CL2P, CL2R, CL2.
- b. Other types of cables may be used in accordance with NFPA 70 Table 725-61 "Cable Uses and Permitted Substitutions", as approved.

4. Class 3 Wiring:

- a. Single Conductors No. 18 and No. 16 AWG: Same as Class 1 No. 18 and No. 16 AWG conductors except that:
  - 1) Conductors are also listed as CL3.
  - 2) Voltage rating not marked on cable except where cable has multiple listings and voltage marking is required for one or more of the listings.
- b. Multiconductor Cables: NFPA 70 Article 725, Types CL3P, CL3R, CL3.
- c. Other types of cables may be used in accordance with NFPA 70, Table 725-61 "Cable Uses and Permitted Substitutions", as approved.



- E. See Section **260553** Electrical Identification for color coding of wires and cables.

## **2.02 ELECTRICAL CIRCUIT PROTECTIVE SYSTEM**

- A. Minimum 1-Hour Fire Rating: A system listed in UL Building Materials Directory, product category Electrical Circuit Protective Systems (FHT).

## **2.03 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 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:
    - 1) Buchanan/Ideal Industries Inc.'s B-Cap
    - 2) Electrical Products Div./3M's Scotchlok Type Y, R, G, B, O/B+, R/Y+, or B/G+
    - 3) Ideal Industries Inc.'s Wing Nuts or Wire Nuts.
  - b. Rated 150° C, 600V:
    - 1) Ideal Industries Inc.'s High Temperature Wire-Nut Model 73B, 59B.
2. Indent Type with Insulating Jacket:
  - a. Rated 105° C, 600V:
    - 1) Buchanan/Ideal Industries Inc.'s Crimp Connectors
    - 2) Ideal Industries Inc.'s Crimp Connectors
    - 3) Penn-Union Corp.'s Penn-Crimps
    - 4) Thomas & Betts Corp.'s STA-KON.
3. Indent Type (Uninsulated):
  - 1) Anderson/Hubbell's Versa-Crimp

- 2) VERSAtile
- 3) Blackburn/T&B Corp.'s Color-Coded Compression Connectors
- 4) Electrical Products Div./3M's Scotchlok 100001 1000 Series
- 5) Framatome Connectors/Burndy's Hydent
- 6) Penn-Union Corp.'s BCU, BBCU Series,
- 7) Thomas & Betts Corp.'s Compression Connectors.

4. Connector Blocks:

- 1) NIS Industries Inc.'s Polaris System
- 2) Thomas & Betts Corp.'s Blackburn AMT Series.

5. Resin Splice Kits:

- 1) Electrical Products Div./3M's Scotchcast Brand Kit Nos. 82A Series, 82-B1 or 90-B1,
- 2) Scotchcast Brand Resin Pressure Splicing Method.

6. Heat Shrinkable Splices:

- 1) Electrical Products Div./3M's ITCSN
- 2) Raychem Corp.'s Thermofit Type WCS
- 3) Thomas & Betts Corp.'s SHRINK-KON Insulators.

7. Cold Shrink Splices:

- 1) Electrical Products Div./3M's 8420 Series.

C. Gutter Taps:

1. Anderson/Hubbell's GP/GT with GTC Series Covers
2. Blackburn/T&B Corp.'s H-Tap Type CF with Type C Covers
3. Framatome Connectors/Burndy's Polytap KPU-AC
4. H-Crimpfit Type YH with CF-FR Series Covers
5. ILSCO's GTA Series with GTC Series Covers
6. Ideal Industries Inc.'s Power-Connect GP
7. GT Series with GIC covers
8. NSI Industries Inc.'s Polaris System
9. OZ/Gedney Co.'s PMX or PT with PMXC
10. PTC Covers
11. Penn-Union Corp.'s CDT Series
12. Thomas & Betts Corp.'s Color-Keyed H Tap CHT with HTC Covers.

D. Terminals:

1. Nylon insulated pressure terminal connectors by Amp-Tyco/Electronics
2. Electrical Products Div./3M

3. Framatome Connectors/Burndy
4. Ideal Industries Inc.
5. Panduit Corp.
6. Penn-Union Corp.
7. Thomas & Betts Corp.
8. Wiremold Co.

E. Lugs:

1. Single Cable (Compression Type Lugs)- Copper, one or 2 hole style (to suit conditions), long barrel:
  - a. Anderson/Hubbell's VERSAtile VHCL
  - b. Blackburn/T&B Corp.'s Color-Coded CTL
  - c. LCN
  - d. Framatome Connectors/Burndy's Hylug YA
  - e. Electrical Products Div./3M Scotchlok 31036 or 31145 Series
  - f. Ideal Industries Inc.'s CCB or CCBL
  - g. NSI Industries Inc.'s L, LN Series
  - h. Penn-Union Corp.'s BBLU Series
  - i. Thomas & Betts Corp.'s 54930BE or 54850BE Series.
2. Single Cable (Mechanical Type Lugs) - Copper, one or 2 hole style (to suit conditions):
  - a. Blackburn/T&B Corp.'s Color-Keyed Locktite Series
  - b. Framatome Connectors/Burndy's Qiklug Series
  - c. NSI Industries Inc.'s Type TL
  - d. Penn-Union Corp.'s VI-TITE Terminal Lug Series
  - e. Thomas & Betts Corp.'s Locktite Series.
3. Multiple Cable (Mechanical Type Lugs)- Copper, configuration to suit conditions:
  - a. Framatome Connectors/Burndy's Qiklug Series
  - b. NSI Industries Inc.'s Type TL
  - c. Penn-Union Corp.'s VI-TITE Terminal Lug Series
  - d. Thomas & Betts Corp.'s Color-Keyed Locktite Series.

**2.04 TAPES**

A. Insulation Tapes:

1. Plastic Tape:
  - a. Electrical Products Div./3M's Scotch Super 33+ or Scotch 88
  - b. Plymouth Rubber Co.'s Plymouth/ Bishop Premium 85CW.

2. Rubber Tape:
  - a. Electrical Products Div./3M's Scotch 130C
  - b. Plymouth Rubber Co.'s Plymouth/Bishop W963 Plysafe.
- B. Moisture Sealing Tape:
  - a. Electrical Products Div./3M's Scotch 2200 or 2210,
  - b. Plymouth Rubber Co.'s Plymouth/Bishop 4000 Plyseal-V.
- C. Electrical Filler Tape:
  - a. Electrical Products Div./3M's Scotchfil,
  - b. Plymouth Rubber Co.'s Plymouth/Bishop 125 Electrical Filler Tape.
- D. Color Coding Tape:
  - a. Electrical Products Div./3M's Scotch 35
  - b. Plymouth Rubber Co.'s Plymouth/Bishop Premium 37 Color Coding.
- E. Arc Proofing Tapes:
  1. Arc Proofing Tape:
    - a. Electrical Products Div./3M's Scotch 77
    - b. Mac Products Inc.'s AP Series
    - c. Plymouth Rubber Co.'s Plymouth/Bishop 53 Plyarc.
  2. Glass Cloth Tape:
    - a. Electrical Products Div./3M's Scotch 27/Scotch 69
    - b. Mac Products Inc.'s TAPGLA 5066
    - c. Plymouth Rubber Co.'s Plymouth/Bishop 77 Plyglas.
  3. Glass-Fiber Cord:
    - a. Mac Products Inc's MAC 0527.

## **2.05 WIRE-PULLING COMPOUNDS**

- A. To suit type of insulation;
  1. American Polywater Corp.'s Polywater Series
  2. Electric Products Div./3M's WL, WLX, or WLW
  3. Greenlee Textron Inc.'s Y-ER-EAS
  4. Cable Cream

5. Cable Gel
6. Winter Gel
7. Ideal Industries Inc.'s Yellow 77
8. Aqua-Gel II
9. Aqua-Gel CW
10. Thomas & Betts Corp.'s Series 15-230 Cable Pulling Lubricants
11. Series 15-631 Wire Slick.

## **2.06 TAGS**

As Per Specification Section **260553**

## **2.07 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 WIRING METHOD**

- A. Install conductors in raceways after the raceway system is completed. Exceptions: Type MC, 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
- C. Unless otherwise noted USE-2 Type cable shall be utilized for all underground feeders entering or leaving buildings.

### **3.02 CIRCUITING**

- A. Do not change, group or combine circuits other than as indicated on the drawings.
- B. Do not change, group or combine circuits other than as indicated on the drawings except as permitted under Section **260532** when reusing existing raceways.

### **3.03 NEUTRAL CONDUCTORS- FOR BRANCH CIRCUITS**

- A. Common neutral conductors are not allowed for newly installed grouped branch circuits where circuits are installed enclosed within the same raceway, contractor shall provide a dedicated neutral for each circuit provided in each branch circuit.

- B. The following circuits shall have a separate neutral:
1. Circuits containing ground fault circuit interrupter devices.
  2. Circuits containing solid state dimmers.
  3. Circuits recommended by equipment manufacturers to have separate neutrals.

### **3.04 CONDUCTOR SIZE**

- A. Conductor Size:
1. For Electric Light and Power Branch Circuits: Install conductors of size shown on drawings. Where size is not indicated, the minimum size allowed is No. 12 AWG.
  2. For Class 1 Circuits:
    - a. No. 18 and No. 16 AWG may be used provided they supply loads that do not exceed 6 amps (No. 18 AWG), or 8 amps (No. 16 AWG).
    - b. Larger than No. 16 AWG: Use to supply loads not greater than the ampacities given in NFPA 70 Section 310-15.
  3. For Class 2 Circuits: Any size to suit application.
  4. For Class 3 Circuits: Minimum No. 18 AWG.

### **3.05 COLOR CODING**

- A. Color Coding for 120/208 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, pullboxes, 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, pullboxes, 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, yellow, orange, 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:
      - 1) 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, pullboxes, 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, pullboxes, 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 Electric Light and Power: In accordance with ICEA/NEMA WC-30 "Color Coding of Wires and Cables". Other coding methods may be used, as approved.

### **3.06 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 pullboxes and gutters. Identify by feeder number and size.
  2. Exterior Feeders: Identify each feeder in manholes and in interior pullboxes 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. In addition to identification as call for in sections 3.06-A and 3.06-B above provide identification as called for in specification section 260533.

### **3.07 WIRE MANAGEMENT**



- A. Use wire management products to bundle, route, and support wiring in junction boxes, pullboxes, wireways, gutters, channels, and other locations where wiring is accessible.

### **3.08 EQUIPMENT GROUNDING CONDUCTOR**

- A. Install equipment grounding conductor:
  - 1. Where specified in other Sections or indicated on the 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.

### **3.09 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".

### **3.10 ARC PROOFING**

- A. Arc proof feeders installed in a common pullbox or manhole as follows:
  1. Arc proof new feeders.
  2. Arc proof existing feeders that are spliced to new feeders.
  3. Arc proof each feeder as a unit (except feeders consisting of multiple sets of conductors).
  4. Arc proof feeders consisting of multiple sets of conductors by arc proofing each set of conductors as a unit.
  5. Arc proof feeders 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.

### **3.11 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).

- 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).

### **3.12 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 above ground 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.

**END OF SECTION**

## **260526 - GROUNDING**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Division-26 Basic Materials and Methods sections apply to work of this section.
- C. Requirements of this Section apply to electrical grounding and bonding work specified elsewhere in these Specifications.
- D. See Section 260544 "Underground Electrical Work" for additional grounding requirements.

#### **1.02 SUMMARY**

- A. Extent of electrical grounding and bonding work is indicated by drawings and schedules and as specified herein. Grounding and bonding work is defined to encompass systems, circuits, and equipment.
- B. Type of electrical grounding and bonding work specified in this Section includes the following:
  - 1. Solidly grounded system.
- C. Applications of electrical grounding and bonding work in this Section include the following:
  - 1. Underground metal piping.
  - 2. Underground metal structures.
  - 3. Electrical power systems.
  - 4. Grounding electrodes.
  - 5. Raceways.
  - 6. Service equipment.
  - 7. Enclosures.
  - 8. Equipment.
  - 9. Manholes.
  - 10. Handholes.
  - 11. Protective fencing.
- D. Refer to other Division-26 sections for wires/cables, electrical raceways, boxes and fittings, which are required in conjunction with electrical grounding and bonding work; not work of this section.

#### **1.03 SUBMITTALS**

- A. Product Data: Submit manufacturer's data on grounding and bonding products and associated accessories.
- B. Wiring Diagrams: Submit wiring diagrams for electrical grounding and bonding work which indicates layout of ground rings, location of system grounding electrode connections, routing of grounding electrode conductors, also include diagrams for circuits and equipment grounding connections.

#### **1.04 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of grounding and bonding products, of types, and ratings required, and ancillary grounding materials, including stranded cable, copper braid and bus, grounding electrodes and plate electrodes, and bonding jumpers whose products have been in satisfactory use in similar service for not less than five (5) years.
- B. Installer's Qualifications: Firm with at least three (3) years of successful installation experience on projects with electrical grounding work similar to that required for project.
- C. Codes and Standards
  - 1. Electrical Code Compliance: Comply with applicable local electrical code requirements of the authority having jurisdiction, and NEC as applicable to electrical grounding and bonding, pertaining to systems, circuits and equipment.
  - 2. UL Compliance: Comply with applicable requirements of UL Standards No.'s 467, "Electrical Grounding and Bonding Equipment", and 869 "Electrical Service Equipment", pertaining to grounding and bonding of systems, circuits and equipment. In addition, comply with UL Std 486A, "Wire Connectors and soldering Lugs for Use with Copper Conductors." Provide grounding and bonding products which are UL-listed and labeled for their intended usage.
  - 3. IEEE Compliance: Comply with applicable requirements and recommended installation practices of IEEE Standards 80, 81, 141 and 142 pertaining to grounding and bonding of systems, circuits and equipment.

### **PART 2 - PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide grounding and bonding products of one of the following (for each type of product):

1. Burndy Corporation.
2. Crouse-Hinds Div; Cooper Industries.
3. Eagle Electric Mfg Co.
4. Ideal Industries, Inc.
5. Okonite Company.
6. OZ Gedney Div; General Signal Corp.
7. Thomas and Betts Corp.

## **2.02 GROUNDING AND BONDING**

### **A. Materials and Components**

1. General: Except as otherwise indicated, provide electrical grounding and bonding systems indicated; with assembly of materials, including, but not limited to, cables/wires, connectors, solderless lug terminals, grounding electrodes, bonding jumper braid, surge arresters, and additional accessories needed for a complete installation. Where more than one type component product meets indicated requirements, selection is Installer's option. Where materials or components are not indicated, provide products which comply with NEC, UL, and IEEE requirements and with established industry standards for those applications indicated.
2. Conductors: Unless otherwise indicated, provide copper grounding conductors for grounding system connections that match power supply wiring materials and are sized according to NEC.
3. Bonding Jumper Braid: Copper braided tape, constructed of 30-gauge bare copper wires and properly sized for indicated applications.
4. Flexible Jumper Strap: Flexible flat conductor, 480 strands of 30-gage bare copper wire; 3/4" wide, 9-1/2" long; 48,250 CM. Select braid with holes sized for 3/8" diameter bolts, and protect braid with copper bolt hole ends.
5. Ground Electrodes
  - a. Grounding Electrodes: Stainless steel, 3/4" dia. by 10 feet. Unless otherwise indicated, ground rods shall be driven into the ground until tops of rods are approximately 1 foot below finished grade. In counterpoise systems, tops of ground rods shall be approximately at elevations of counterpoises. Where the specified ground resistance cannot be met with the indicated number of ground rods, additional ground rods, longer ground rods, or deep-driven sectional rods shall be installed and connected until the specified resistance is

obtained, except that not more than three (3) additional 8-foot ground rods shall be required at any one installation. Ground rods shall be spaced as evenly as possible at least 6 feet apart and connected 2 feet below grade.

6. Electrical Grounding Connection Accessories: Provide electrical insulating tape, heat-shrinkable insulating tubing, welding materials, bonding straps, as recommended by accessories manufacturers for type service indicated.
7. Field Welding: All grounding system connections shall be field welded by exothermically welded connections or approved equal.
  - a. Installation shall conform to the manufacturer's instructions.
  - b. Proper mold and associated equipment shall be used for each connection.
  - c. All materials used (molds, weld material, tools, and accessories) shall be the product of one manufacturer to insure compatibility.
8. Neutral Grounding: Neutral conductors shall be grounded where indicated. Ground wires shall be not less than No. 1/0 AWG, except that where the rated phase current exceeds 400 amperes, the size of neutral ground wires shall be increased to not less than one-half the size of the cross-sectional area of the individual phase conductors. Neutral ground wires shall be protected by conduit where such wires run exposed above grade in nonfence-enclosed areas or are run through concrete construction. Where concrete penetration is necessary, nonmetallic conduit shall be cast flush with the points of concrete entrance and exit so as to provide an opening for the ground wire and the opening shall be sealed with a suitable compound after installation of the ground wire. Bends greater than 45 degrees in ground wire connections to the ground rods or are not permitted.
9. Equipment Grounding: Equipment frames of metal-enclosed equipment, medium-voltage cable shields at cable joints and terminations, metal splice boxes, chain-link fencing, and other noncurrent-carrying metal items in close proximity to electric circuits, shall be grounded unless otherwise indicated. Connections to earth shall be made in the same manner as required for neutral grounding. Equipment or devices operating at less than 750 volts may be connected to secondary neutral grounds. Equipment operating at more than 750 volts to ground shall be provided with grounds separate from secondary neutral grounds, but both grounds shall be bonded together below grade at the ground rods.



10. System Grounding
  - a. Secondary service neutrals ground at the supply side of the secondary disconnecting means at the related transformers.
11. Primary Switchboard: Provide a bare grounding electrode conductor from the switchboard ground bus to a grounding electrode system, metal underground water pipe or driven ground rods for the grounding electrode.
12. Duct Banks and Manholes
  - a. 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 voltage cable splices and terminations, and equipment enclosures.
  - b. Provide a grounding conductor having at least 50 percent ampacity of the largest phase conductor in the duct bank.
  - c. Connect the equipment grounding conductor to the ground rod.
13. All conduit systems shall contain a grounding conductor.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine areas and conditions under which electrical grounding and bonding connections are to be made and notify Design Professional in writing of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Design Professional.

#### **3.02 INSTALLATION OF ELECTRICAL GROUNDING AND BONDING SYSTEMS**

- A. General: Install electrical grounding and bonding systems as indicated, in accordance with manufacturer's instructions and applicable portions of the NEC, NECA's "Standard of Installation", and in accordance with recognized industry practices to ensure that products comply with requirements.
- B. Weld grounding conductors to underground grounding electrodes.
- C. Ground electrical service system neutral at each service entrance switch to grounding electrodes.

- D. Connect together system neutral, service equipment enclosures, exposed noncurrent carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors.
- E. Terminate feeder and branch circuit insulated equipment grounding conductors with grounding lug, bus, or bushing.
- F. Connect grounding electrode conductors to 1-inch diameter, or greater, metallic cold water pipe using a suitably sized ground clamp. Provide connections to flanged piping to street side of flange.
- G. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with tightening torque values specified in UL 486A to assure permanent and effective grounding.
- H. Install braided type bonding jumpers with code-sized ground clamps on water meter piping to electrically bypass water meters.
- I. Route grounding connections and conductors to ground and protective devices in shortest and straightest paths as possible to minimize transient voltage rises.
- J. Apply corrosion-resistant finish to field-connections, buried metallic grounding and bonding products, and places where factory applied protective coatings have been destroyed, which are subjected to corrosive action.
- K. Install clamp-on connectors on clean metal contact surfaces, to ensure electrical conductivity and circuit integrity.

### **3.03 FIELD QUALITY CONTROL**

- A. Upon completion of installation of electrical grounding and bonding systems, test ground resistance with ground resistance tester. Where tests show resistance-to-ground is over 5 ohms, take appropriate action to reduce resistance to 5 ohms, or less, by driving additional ground rods; then retest to demonstrate compliance. Equipment rated at more than 1000 KVA shall be handled similarly except that maximum ground resistance shall be 3 OHMS. Services at power company interface points shall comply with the Utility Company ground resistance requirements.

**END OF SECTION**

**260529 - FASTENERS, ATTACHMENTS, AND SUPPORTING DEVICES**

**PART 1 - GENERAL**

**1.01 SUBMITTALS**

- A. Shop Drawings: Show support details if different from methods specified or shown on the drawings.
- B. Product Data: Catalog sheets, specifications and installation instructions.

**PART 2 - PRODUCTS**

**2.01 ANCHORING DEVICES**

- A. Sleeve Anchors: Molly/Emhart's Parasleeve Series, Phillips' Red Head AN, HN, FS Series, or Ramset's Dynabolt Series.
- B. Wedge Anchors: Hilti's Kwik Bolt Series, Molly/Emhart's Parabolt Series, Phillips' Red Head WS, or Ramset's Trubolt Series.
- C. Self-Drilling Anchors: Phillips' Red Head Series S or Ramset's Ram Drill Series.
- D. Non-Drilling Anchors: Hilti's Drop-In Anchor Series, Phillips' Red Head J Series, or Ramset's Dynaset Series.
- E. Stud Anchors: Phillips' Red Head JS Series.

**2.02 CAST-IN-PLACE CONCRETE INSERTS**

- A. Continuous Slotted Type Concrete Insert, Galvanized:
  - 1. Load Rating 1300 lbs./ft.: Kindorf's D-986.
  - 2. Load Rating 2400 lbs./ft.: Kindorf's D-980.
  - 3. Load Rating 3000 lbs./ft.: Hohmann & Barnard Inc.'s Type CS-H.
  - 4. Load Rating 4500 lbs./ft.: Hohmann & Barnard Inc.'s Type CS-HD.
- B. Threaded Type Concrete Insert: Galvanized ferrous castings, internally threaded.
- C. Wedge Type Concrete Insert: Galvanized box-type ferrous castings, designed to accept bolts having special wedge shaped heads.

**2.03 MISCELLANEOUS FASTENERS**

- A. Except where shown otherwise on the Drawings, furnish type, size, and grade required for proper installation of the Work, selected from the following: Furnish galvanized fasteners for exterior use, or for items anchored to exterior walls, except where stainless steel is indicated.
1. Standard Bolts and Nuts: ASTM A 307, Grade A, regular hexagon head.
  2. Lag Screws: ASME B18.2.1.
  3. Machine Bolts: ASME B18.5 or ASME B18.9, Type, Class, and Form as required.
  4. Wood Screws: Flat head, ASME B18.6.1.
  5. Plain Washers: Round, ASME B18.22.1.
  6. Lock Washers: Helical, spring type, ASME B18.21.1.
  7. Toggle Bolts: Spring Wing Type; Wing AISI 1010, Trunion Nut AISI1010 or Zamac Alloy, Bolt Carbon Steel ANSI B18.6.3.
- B. Stainless Steel Fasteners: Type 302 for interior Work; Type 316 for exterior Work; Phillips head screws and bolts for exposed Work unless otherwise specified.

#### **2.04 TPR (THE PEEL RIVET) FASTENERS**

- A. 1/4 inch diameter, threadless fasteners distributed by Subcon Products, 315 Fairfield Road, Fairfield, NJ 07004 (800) 634-5979.

#### **2.05 POWDER DRIVEN FASTENER SYSTEMS**

- A. Olin Corp.'s Ramset Fastening Systems, or Phillips Drill Company Inc.'s Red Head Powder Actuated Systems.

#### **2.06 HANGER RODS**

- A. Mild low carbon steel, unless otherwise specified; fully threaded or threaded each end, with nuts as required to position and lock rod in place. Unless galvanized or cadmium plated, provide a shop coat of red lead or zinc chromate primer paint.

#### **2.07 "C" BEAM CLAMPS**

- A. With Conduit Hangers:
1. For 1 Inch Conduit Maximum: B-Line Systems Inc.'s BG-8, BP-8 Series, Caddy/Erico Products Inc.'s BC-8P and BC-8PSM Series, or GB Electrical Inc.'s HIT 110-412 Series.
  2. For 3 Inch Conduit Maximum: Appleton Electric Co.'s BH-500 Series beam clamp with H50W/B Series hangers, Kindorf's 500 Series beam

clamp with 6HO-B Series hanger, or OZ/Gedney Co.'s IS-500 Series beam clamp with H-OWB Series hanger.

3. For 4 Inch Conduit Maximum: Kindorf's E-231 beam clamp and E-234 anchor clip and C-149 series lay-in hanger; Unistrut Corp.'s P2676 beam clamp and P-1659A Series anchor clip with J1205 Series lay in hanger.

B. For Hanger Rods:

1. For 1/4 Inch Hanger Rods: B-Line Systems Inc.'s BC, Caddy/Erico Products Inc.'s BC, GB Electrical Inc.'s HIT 110, Kindorf's 500, 510, or Unistrut Corp.'s P1648S, P2398S, P2675, P2676.
2. For 3/8 Inch Hanger Rods: Caddy/Erico Products Inc.'s BC, Kindorf's 231-3/8, 502, or Unistrut Corp.'s P1649AS, P2401S, P2675, P2676.
3. For 1/2 Inch Rods: Appleton Electric Co. BH-500 Series, Kindorf's 500 Series, 231-1/2, OZ/Gedney Co.'s IS-500 Series, or Unistrut Corp.'s P1650AS, P2403S, P2676.
4. For 5/8 Inch Rods: Unistrut Corp.'s P1651AS beam clamp and P1656A Series anchor clip.
5. For 3/4 Inch Rods: Unistrut Corp.'s P1653S beam clamp and P1656A Series anchor clip.

**2.08 CHANNEL SUPPORT SYSTEM**

A. Channel Material: 12 gage steel.

B. Finishes:

1. Phosphate and baked green enamel/epoxy.
2. Pre-galvanized.
3. Electro-galvanized.
4. Hot dipped galvanized.
5. Polyvinyl chloride (PVC), minimum 15 mils thick.

C. Fittings: Same material and finish as channel.

D. UL Listed Systems:

1. B-Line Systems Inc.'s B-22 (1-5/8 x 1-5/8 inches), B-12 (1-5/8 x 2-7/16 inches), B-11 (1-5/8 x 3-1/4 inches).
2. Grinnell Corp.'s Allied Power-Strut PS 200 (1-5/8 x 1-5/8 inches), PS 150 (1-5/8 x 2-7/16 inches), PS 100 (1-5/8 x 3-1/4 inches).

3. Kindorf's B-900 (1-1/2 x 1-1/2 inches), B-901 (1-1/2 x 1-7/8 inches), B-902 (1-1/2 x 3 inches).
4. Unistrut Corp.'s P-3000 (1-3/8 x 1-5/8 inches), P-5500 (1-5/8 x 2-7/16 inches), P-5000 (1-5/8 x 3-1/4 inches).
5. Versabar Corp.'s VA-1 (1-5/8 x 1-5/8 inches), VA-3 (1-5/8 x 2-1/2 inches).

## **2.09 MISCELLANEOUS FITTINGS**

- A. Side Beam Brackets: B-Line Systems Inc.'s B102, B103, B371-2, Kindorf's B-915, or Versabar Corp.'s VF-2305, VF-2507.
- B. Pipe Straps:
  1. Two Hole Steel Conduit Straps: B-Line Systems Inc.'s B-2100 Series, Kindorf's C-144 Series, or Unistrut Corp.'s P-2558 Series.
  2. One Hole Malleable Iron Clamps: Kindorf's HS-400 Series, or OZ/Gedney Co.'s 14-G Series, 15-G Series (EMT).
- C. Deck Clamps: Caddy/Erico Products Inc.'s DH-4-T1 Series.
- D. Fixture Stud and Strap: OZ/Gedney Co.'s SL-134, or Steel City's FE-431.
- E. Supporting Fittings for Pendent Mounted Industrial Type Fluorescent Fixtures on Exposed Conduit System:
  1. Ball Hanger: Appleton Electric Co.'s AL Series, or Crouse-Hinds Co.'s AL Series.
  2. Flexible Fixture Hanger: Appleton Electric Co.'s UNJ-50, UNJ-75, or Crouse-Hinds Co.'s UNJ115.
  3. Flexible (Hook Type) Fixture Hanger: Appleton Electric Co.'s FHHF, or Crouse-Hinds Co.'s UNH-1.
  4. Eyelet: Unistrut Corp.'s M2250.
  5. Eyelet with Stud: Kindorf's H262, or Unistrut Corp.'s M2350.
  6. Conduit Hook: Appleton Electric Co.'s FHSN, or Crouse-Hinds Co.'s UNH-13.
- F. Supporting Fasteners (Metal Stud Construction): Metal stud supports, clips and accessories as produced by Caddy/Erico Products Inc.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Where specific fasteners are not specified or indicated for securing items to in-place construction, provide appropriate type, size, and number of fasteners for a secure, rigid installation.
- B. Install anchoring devices and other fasteners in accordance with manufacturer's printed instructions.
- C. Make attachments to structural steel wherever possible.

### **3.02 FASTENER SCHEDULE**

- A. Material:
  - 1. Use cadmium or zinc coated anchors and fasteners in dry locations.
  - 2. Use hot dipped galvanized or stainless steel anchors and fasteners in damp and wet locations.
  - 3. For corrosive atmospheres or other extreme environmental conditions, use fasteners made of materials suitable for the conditions.
- B. Types and Use: Unless otherwise specified or indicated use:
  - 1. Cast-in-place concrete inserts in fresh concrete construction for direct pull-out loads such as shelf angles or fabricated metal items and supports attached to concrete slab ceilings.
  - 2. Anchoring devices to fasten items to solid masonry and concrete when the anchor is not subjected to pull out loads, or vibration in shear loads.
  - 3. Toggle bolts to fasten items to hollow masonry and stud partitions.
  - 4. TPR fasteners to fasten items to plywood backed gypsum board ceilings.
  - 5. Metallic fasteners installed with electrically operated or powder driven tools for approved applications, except:
    - a. Do not use powder driven drive pins or expansion nails.
    - b. Do not attach powder driven or welded studs to structural steel less than 3/16 inch thick.
    - c. Do not support a load, in excess of 250 lbs from any single welded or powder driven stud.

- d. Do not use powder driven fasteners in precast concrete.

### **3.03 ATTACHMENT SCHEDULE**

- A. General: Make attachments to structural steel or steel bar joists wherever possible. Provide intermediate structural steel members where required by support spacing. Select steel members for use as intermediate supports based on a minimum safety factor of 5.
  1. Make attachments to steel bar joists at panel points of joists.
  2. Do not drill holes in main structural steel members.
  3. Use "C" beam clamps for attachment to steel beams.
- B. Where it is not possible to make attachments to structural steel or steel bar joists, use the following methods of attachment to suit type of construction unless otherwise specified or indicated on the drawings:
  1. Attachment to Steel Roof Decking (No Concrete Fill):
    - a. Decking With Hanger Tabs: Use deck clamps.
    - b. Decking Without Hanger Tabs:
      - 1) Before Roofing Has Been Applied: Use 3/8 inch threaded steel rod welded to a 4 x 4 x 1/4 inch steel plate and installed through 1/2 inch hole in roof deck.
      - 2) After Roofing Has Been Applied: Use welding studs, or self-drilling/tapping fasteners. Exercise extreme care when installing fasteners to avoid damage to roofing.
  2. Attachment to Concrete Filled Steel Decks (Total thickness, 2-1/2 inches or more):
    - a. Before Fill Has Been Placed:
      - 1) Use thru-bolts and fish plates.
      - 2) Use welded studs. Do not support a load in excess of 250 pounds from a single welded stud.
    - b. After Fill Has Been Placed: Use welded studs. Do not support a load in excess of 250 lbs from a single welded stud.
  3. Attachment to Cast-In-Place Concrete:



- a. Fresh Concrete: Use cast-in-place concrete inserts.
  - b. Existing Concrete: Use anchoring devices.
4. Attachment to Cored Precast Concrete Decks:
- a. New Construction: Use thru-bolts and fish plates before Construction Work Contractor has placed concrete fill over decks.
  - b. Existing Construction: where toggle bolts are to be installed in cells contractor to provide loading calculations by a licensed structural engineer.
5. Attachment to Hollow Block or Tile Filled Concrete Deck:
- a. New Construction: Use cast-in-place concrete inserts by having Construction Work Contractor omitting blocks and pouring solid blocks with insert where required.
6. Attachment to Waffle Type Concrete Decks:
- a. New Construction:
    - 1) Use cast-in-place concrete inserts in fresh concrete.
    - 2) If concrete fill has been applied over deck, thru-bolts and fish plates may be used where additional concrete or roofing is to be placed over the deck.
7. Attachment to Precast Concrete Planks: Use anchoring devices, except do not make attachments to precast concrete planks less than 2-3/4 inches thick.
8. Attachment to Precast Concrete Tee Construction:
- a. New Construction:
    - 1) Use tee hanger inserts between adjacent flanges.
    - 2) Use thru-bolts and fish plates, except at roof deck without concrete fill.
  - b. Existing Construction:
    - 1) Use anchoring devices installed in webs of tees. Install anchoring devices as high as possible in the webs.

- c. Do not use powder driven fasteners.
  - d. Exercise extreme care in drilling holes to avoid damage to reinforcement.
9. Attachment to Wood Construction: Use side beam brackets fastened to the sides of wood members to make attachments for hangers.
- a. Under 15 lbs Load: Attach side beam brackets to wood members with 2 No. 18 x 1-1/2 inch long wood screws, or 2 No. 16 x 1-1/2 inch long drive screws.
  - b. Over 15 lbs Load: Attach side beam brackets to wood members with bolts and nuts or lag bolts. Do not use lag bolts in wooden members having a nominal thickness (beam face) under 2 inches in size. Install bolts and nuts or lag bolts in the side of wood members at the mid-point or slightly above. Install plain washers under all nuts.

LOAD	LAG BOLT SIZE	BOLT DIAMETER
15 lbs to 30 lbs	3/8 x 1-3/4 inches	3/8 inch
31 lbs to 50 lbs	1/2 x 2 inches	1/2 inch
Over 50 lbs to load limit of structure.	Use bolt & nut.	5/8 inch

- c. Bottom chord of wood trusses may be utilized as structural support, but method of attachment must be specifically approved.
  - d. Do not make attachments to the diagonal or vertical members of wood trusses.
  - e. Do not make attachments to the nailing strips on top of steel beams.
10. Attachment to Metal Stud Construction: Use supporting fasteners manufactured specifically for the attachment of raceways and boxes to metal stud construction.
- a. Support and attach outlet boxes so that they cannot torque/twist. Either:
    - 1) Use bar hanger assembly, or:

- 2) In addition to attachment to the stud, also provide far side box support.

### **3.04 CONDUIT SUPPORT SCHEDULE**

- A. Provide number of supports as required by National Electrical Code. Exception: Maximum support spacing allowed is 4'-0" for conduit sizes 3 inches and larger supported from wood trusses.
- B. Use pipe straps and specified method of attachment where conduit is installed proximate to surface of wood or masonry construction.
  1. Use hangers secured to surface with specified method of attachment where conduit is suspended from the surface.
- C. Use "C" beam clamps and hangers where conduit is supported from steel beams.
- D. Use deck clamps and hangers where conduit is supported from steel decking having hanger tabs.
  1. Where conduit is supported from steel decking that does not have hanger tabs, use clamps and hangers secured to decking, utilizing specified method of attachment.
- E. Use channel support system supported from structural steel for multiple parallel conduit runs.
- F. Where conduits are installed above ceiling, do not rest conduit directly on runner bars, T-Bars, etc.
  1. Conduit Sizes 2-1/2 Inches and Smaller: Support conduit from ceiling supports or from construction above ceiling.
  2. Conduit Sizes Over 2-1/2 Inches: Support conduit from beams, joists, or trusses above ceiling.

### **3.05 CHANNEL SUPPORT SYSTEM SCHEDULE**

- A. Use channel support system where specified or indicated on the drawings.
- B. Channel supports may be used, as approved, to accommodate mounting of equipment.
- C. Material and Finish:

1. Dry Locations: Use 12 gage steel channel support system having any one of the specified finishes.
2. Damp Locations: Use 12 gage steel channel support system having any one of the specified finishes except green epoxy/enamel.
3. Wet Locations: Use 12 gage steel channel support system having hot dipped galvanized, or PVC finish.

**END OF SECTION**

## **260530 – CONDUIT RACEWAYS**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to this Section.
- B. Requirements of the following Division 26 Sections apply to this Section:
  - 1. Section 260100 - Basic Mechanical and Electrical Requirements.
  - 2. Section 260500 - Basic Electrical Materials and Methods.
  - 3. Section 260519 - Wires and Cables – Below 600 Volts.
  - 4. Section 260532 - Electrical Boxes and Fittings.
  - 5. Section 260509 - Supporting Devices.
  - 6. Section 260553 - Electrical Identification.
  - 7. Section 260544 - Underground Electrical Work.

#### **1.02 SUMMARY**

- A. This Section includes raceways for electrical wiring. Types of raceways in this section include the following:
  - 8. Liquid-tight flexible conduit.
  - 9. Rigid Galvanized Steel Conduit (RGS) (for Con-Edison service feeders and inside buildings).
  - 10. Flexible Metal Conduit (Final Connections).
  - 11. Underground non-metallic conduits (Schedule 40 PVC).
  - 5. Electrical metallic tubing (EMT).
  - 6. Intermediate metal conduit (IMC).
  - 7. Wireway
- B. Related Sections: The following Division 26 Sections contain requirements that relate to this Section:
  - 1. "Wires and Cables" for other wiring methods.
  - 2. "Supporting Devices" for raceway supports.
  - 3. "Electrical Boxes and Fittings" for boxes used with conduit and tubing systems.
  - 4. "Electrical Identification" for raceways cables and conductors.

#### **1.03 SUBMITTALS**

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product Data for the following products:

1. Surface raceway and fittings.
  2. Wireway and fittings.
- C. Samples, 12 inches long of each type and size of surface raceway requested with required finish.
- D. Installation Instructions: Manufacturer's written installation instructions for wireway, surface raceway, and nonmetallic raceway products.

#### **1.04 QUALITY ASSURANCE**

- A. Electrical Component Standard: Components and installation shall comply with:
1. National Electric Code.
  2. Underwriters Laboratories Inc. (U.L)
- B. National Fire Protection Association (NFPA):
- No. 70 National Electrical code, the following Articles:
- |      |                                     |
|------|-------------------------------------|
| 345  | Intermediate metal conduit          |
| 346  | Rigid galvanized steel conduit.     |
| 348  | Electric metallic tubing            |
| 349  | Flexible metallic tubing            |
| 350  | Flexible metal conduit              |
| 351A | Liquidtight Flexible Metal Conduit. |
| 362  | Wiring.                             |
- C. UL Compliance and Labeling: Comply with applicable requirements of UL standards pertaining to electrical raceway systems. Provide raceway products and components listed and labeled by UL, ETL, or CSA:
- |              |  |
|--------------|--|
| UL 1,        |  |
| UL 6,        | Rigid galvanized steel conduit.                                  |
| UL 360,      | Liquidtight Flexible Steel conduit, Electrical                   |
| UL 514B,     | Fittings for conduit and Outlet Boxes.                           |
| UL 870, 1985 | Electrical Wireways, Auxiliary Gutters, and Associated Fittings. |
- D. ANSI Compliance: Provide raceways which comply with the following:
- |             |   |
|-------------|---|
| ANSI-C80.1, | Specification for rigid Steel Conduit, Zinc-Coated. |
| ANSI-C80.3  | Electrical metallic tubing (EMT), zinc-coated.      |
| ANSI-C80.6  | Intermediate Metal Conduit (IMC).                   |
- E. American Society for Testing and Materials (ASTM):
- ASTM F 512 Standard Specification for Smooth Wall Poly (Vinyl Chloride) (PVC) Conduit and Fitting for Underground Installation.

## 1.05 COORDINATION

- A. Coordinate with other Work, as necessary to interface installation of electrical raceways and components with other Work.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
  - 1. Metal Conduit and Tubing:
    - a. Alflex Corp.
    - b. Anamet, Inc.; Anaconda Metal Hose.
    - c. Anizter Brothers, Inc.
    - d. Carol Cable Co., Inc.
    - e. Cole-Flex Corp.
    - f. Electri-Flex Co.
    - g. Flexcon, Inc.; Colemena Cable Systems, Inc.
    - h. Grinnell Col; Allied Tube and Conduit Div.
    - i. Monogram Co.; AFC.
    - j. Spiraduct, Inc.
    - k. Triangle PWC, Inc.
    - l. Wheatland Tube Co.
  - 2. Conduit Bodies:
    - a. Appleton Electric Co.
    - b. Carlon
    - c. Hubbell, Inc.
    - d. O-Z/Gedney
    - e. Spring City Electrical Mfg. Co.
  - 3. Wireway:
    - a. Hoffman Engineering Co.
    - b. Keystone/Rees, Inc.
    - c. Square D Co.
  - 4. Non-metallic (PVC) Conduit and Tubing
    - a. Appleton Electric Co.
    - b. Carlon
    - c. Hubbell, Inc.

**2.02 METAL CONDUIT**

A. Rigid Galvanized Steel Conduit

1. Galvanized, threaded, full weigh steel conduit, minimum size 3/4 inch., except as otherwise noted.
2. Hot dipped rigid galvanized for Con-Edison electric service feeders and interior of buildings.
3. Hot dipped rigid galvanized conduit encased in reinforced concrete envelope forming duct where indicated on Drawings.

B. Electric Mettalic Tubing (EMT)

1. Galvanized, threadless, thin wall conduit, with compression fittings, minimum size 3/4 inch. It shall be installed concealed above hung ceiling and in drywalls.

C. Intermediate Metal Conduit (IMC)

1. Galvanized, threaded steel conduit, minimum size 3/4 inch shall be used for feeder runs indoors.

D. Flexible Metal Conduit (Greenfield)

1. Galvanized, flexible metal conduit of circular cross-sections, minimum size 3/4 inch, and 24 inches maximum length, except as otherwise noted.

E. Liquid-tight Flexible Conduit

1. Galvanized flexible metal conduit of circular cross section having as outer liquid-tight non-metallic, sunlight resistant covering, for use in wet locations. (Use only for final connections only 2'-0" maximum.)

F. PVC (Polyvinyl Chloride Conduit) Schedule 40 -- Provide only underground and as indicated on Drawings.

1. Conduit shall be approved by Underwriters Laboratories for use as rigid non-metallic conduit. The conduit shall have the following properties:

Defective Strength	1215 volts/mil
Tensile Strength	6000 psi
Compressive Strength	8600 psi
Flexural Strength	11,500 psi
Flammability	Self-extinguishing

and shall be corrosive-resistant to an 80% concentrate of sulfuric acid



- at 73°F.
2. All PVC conduit shall be Schedule 40, rigid, heavy wall, Federal Specification No. W-C-1094, as manufactured by Carlon, Triangle Conduit Cable Company, or Harvel Plastics, Inc.
  3. Bending of conduit may be accomplished in the field by using a heat bender. Heat shall be applied to the conduit evenly. Overheated conduit that has a brown appearance shall not be used.
- G. Conduit shall be run concealed in hung or furred ceilings, in finished areas, bar-joist construction, masonry, metal and drywall partitions.
- H. Branch circuit wiring for light and power wiring of non-emergency system installed concealed in metal stud partitions or above hung ceilings shall be armor-clad type cable, rated 90 degrees C with THHN insulation, insulated ground conductor and comply with UL Standard 1569. This wiring shall not be installed if not approved by NEC. Coordinate with Engineer regarding the acceptance armor-clad cable for this application.
- I. Branch circuit wiring for light and power of emergency system concealed in metal stud partitions or above hung ceilings shall be installed in EMT.
- J. The route of conduits indicated on the drawings is diagrammatic. Before installing any work, examine the working layouts and shop drawings of the other trades to determine the exact locations and clearance.

### **2.03 FITTINGS AND ACCESSORIES**

- A. Raceway
1. Rigid Steel: Hot dipped galvanized, threaded, malleable iron exposed or in concrete, lock nuts, grounding lugs with cable connectors. Threadless connectors will not be acceptable.
  2. Flexible Steel Conduit: Metallic fittings with nylon insulated throat bushing, locknuts and external grounding lugs.
  3. Liquid-tight Flexible Conduit: Liquid-tight fittings with nylon insulated throat bushing, locknuts and external grounding lugs.
  4. Provide all PVC fittings including couplings, adapters, reducers, expansion couplings, elbows, bell ends, plugs and caps required for the installation.
  5. PVC conduits shall be joined by means of couplings, PVC cleaner and solvent cement. The ends of conduit shall be cut square using a fine cloth tooth handsaw and ends deburred.

6. Electric metallic tubing: Steel, compression connectors and coupling for dry locations.
7. Intermediate metal conduit: Galvanized threaded fittings, malleable iron exposed or in concrete, locknuts, grounding lugs with cable connectors.

#### **2.04 CONDUIT BODIES (CONDULETS)**

- A. General: Types, shapes, and sizes as required to suit individual applications and NEC requirements. Provide matching gasketed covers secured with corrosion-resistant screws.
  1. Metallic Conduit and Tubing: Use metallic conduit bodies. Use bodies with threaded hubs for threaded raceways.
  2. Nonmetallic Conduit and Tubing: Use nonmetallic conduit bodies conforming to UL 514 B.
  3. Conduit bodies 1 inch and smaller: Use bodies with compression-type EMT connectors.

#### **2.05 WIREWAYS**

- A. General: Electrical wireways shall be of types, sizes, and number of channels as indicated. Fittings and accessories including but not limited to couplings, offsets, elbows, expansion joints, adapters, hold-down straps, and end caps shall match and mate with wireway as required for complete system. Where features are not indicated, select to fulfill wiring requirements and comply with applicable provisions of the NEC.
- B. Wireway covers shall be hinged type.

### **PART 3 - EXECUTION**

#### **3.01 WIRING METHOD**

- A. Outdoors: Use the following wiring methods:
  1. Exposed or Concealed: Rigid galvanized steel.
  2. Underground: Rigid PVC Schedule 40 conduit encased in reinforced concrete envelope forming duct bank.
  3. Connection to Vibrating Equipment: Including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment: Liquid-tight flexible metal conduit minimum 12". A grounding conductor shall be installed.

- B. Indoors: Use the following wiring methods:
1. Galvanized rigid Steel (GRS): All locations unless otherwise specified below.
  2. Intermediate Metal Conduit (IMC): All locations except wet and hazardous areas as defined in the NEC.
  3. Electrical Metallic Tubing (EMT):
    - a. Concealed as branch circuit conduits above suspended ceilings where conduit does not support fixtures or other equipment.
    - b. Concealed as branch circuit conduits in hollow areas in dry locations.
    - c. Exposed branch conduits in dry, non-hazardous locations at in secured areas, where conduit does not support fixtures or other equipment and is not subjected to physical damage.
  4. Flexible Metal Conduit (FMC or Greenfield):
    - a. Final connection to recessed lighting fixtures, equipment subject to vibration (dry locations), or equipment requiring flexible connection for adjustment or alignment (dry locations).
    - b. may be used as concealed branch circuit or feeder where conduit must be fished through inaccessible spaces.
    - c. Length of conduit not to exceed 24" to 48".
  5. Liquidtight Flexible Metal Conduit (LFMC): Same use as FMC except for damp and wet locations. Length of conduit not to exceed 24" to 48".

### **3.02 INSTALLATION**

- A. General: Install electrical raceways in accordance with manufacturer's written installation instructions, applicable requirements the NEC, and as follows:
1. The raceways and wiring shall be run concealed in new concrete slabs and chopped into and buried in existing slabs. Where raceways are run exposed, they shall be neatly arranged on pipe hangers and supports, as specified, together with fittings designed for the purpose. Raceways in close proximity of existing equipment shall be so arranged as to allow for proper clearance for servicing, headroom

- and the like. Work run exposed shall be installed parallel to walls, floors and ceilings in a neat workmanlike manner.
2. Complete installation of electrical raceways before starting installation of conductors within raceways.
  3. Provide supports for raceways as specified elsewhere in Division 26.
  4. Prevent foreign matter from entering raceways by using temporary closure protection.
  5. Protect stub-ups from damage where conduits rise from floor slabs. Arrange so curved portion of bends is not visible above the finished slab. Provide in all areas at all locations where exposed conduit work enters the floor slab from panels or other equipment, a raised solid concrete "enclosure", minimum 4" height and thickness, with top leveled.
  6. Make bends and offsets so the inside diameter of the raceway is not effectively reduced. Unless otherwise indicated, keep the legs of a bend in the same plane and the straight legs of offsets parallel.
  7. Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location.
  8. Run concealed raceways with a minimum of bends in the shortest practical distance considering the type of building construction and obstructions except as otherwise indicated. This does not apply to conduits in crawl spaces.
  9. Raceways Embedded in Slabs and Cut into Existing Floors: Install in middle third of the slab thickness where practical and leave at least 1 inch concrete cover. Tie raceways to reinforcing rods or otherwise secure them to prevent sagging or shifting during concrete placement. Space raceways laterally to prevent voids in the concrete. Run conduit larger than 1-inch trade size, parallel with or at right angles to the main reinforcement; where at right angles to the reinforcement, the conduit shall be close to one of the supports of the slab.
  10. Conduit shall not be installed in slabs of less than 4" thickness; maximum size conduit installed in slabs shall be 1-1/4" trade size.
  11. Route conduits, which are installed in concrete slabs, in a manner not to interfere with placement of reinforcing steel, insets for setting of equipment supports, door bucks, and the like and which will permit placement of the full concrete cover above reinforcement and/or conduits within the designed structural slab elevations.

12. The routing of conduits as indicated on the plans is diagrammatic. Before installing any work, determine exact location and clearances required. Modifications to conduit runs, as found necessary from the above, shall be made without additional cost to the Owner and shall be subject to the approval of the Design Professional.
13. Install exposed raceways parallel and perpendicular to nearby surfaces or structural members and follow the surface contours as much as practical.
14. Run exposed, parallel, or banked raceways together. Make bends in parallel or banked runs from the same center line so that the bends are parallel. This requires that there be a change in the plane of the run such as from wall to ceiling and that the raceways be of the same size. In other cases, provide field bends for parallel raceways.
15. Join raceways with fittings designed and approved for the purpose and make joints tight. Where joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system. Make raceway terminations tight. Where subject to vibration or dampness, use insulating bushings to protect conductors.
16. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely and install the locknuts with dished part against the box. Where terminations cannot be made secure with one locknut, use two locknuts, one inside and one outside the box.
17. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box, and tighten the chase nipple so no threads are exposed.
18. Install pull wires in empty raceways. Flat woven, polyester tape with four insulated metallic conductors for detection of cables and empty conduits. Tape shall be pre-lubricated for easy installation and reduced friction. Footage and/or meter markings shall be durable printed throughout the length of the tape. Four #22 gauge fine coated copper corrosion-resistant conductors shall be woven into tape, conductors shall be capable of handling a wide range of frequencies (maximum resistivity of 4.4 ohms/mft.) at a maximum of 300-volts for locating and detecting. Tape shall have a tensile strength of 50,000 psi nominal, a break strength of 25lbs nominal, an elongation factor of 20% and a maximum pulling strength of 1250lbs.
19. Install raceway sealing fittings according to manufacturer's written instructions. Locate fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For

concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

- a. Where conduits pass from warm to cold locations, such as the boundaries of refrigerated spaces.
  - b. Where otherwise required by NFPA 70.
20. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment with an adjustable top or coupling threaded inside for plugs and set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; liquidtight flexible metal conduit may be used 6 inches above the floor.
  21. Flexible Connections: Use short length (maximum of 6 ft.) of liquid-tight flexible conduit for equipment subject to vibration, noise transmission, or movement; and for all motors. Install separate ground conductor across flexible connections.
  22. Where conduits pass through cavity wall construction, install a 2" diameter steel flange around conduit, located in center of cavity, to prevent the transmission of moisture to the inside wall construction.
  23. Conduits, 1-1/4" and larger, shall be fitted with insulated bushings, where they terminate in pull boxes, panelboards, or wiring troughs.
  24. Running threads will not be permitted. Conduit unions will not be acceptable.
  25. Conduits passing through building expansion joints shall be fitted with expansion-deflection fittings complete with bonding jumpers.
  26. Conduits passing through wall or floor membrane waterproofing shall be provided with cast iron sleeves having integral flashing and clamping devices and pressure rings. Sleeves shall extend a minimum of 6" above the finished floor.
  27. Identify and color code raceways as specified in Section 260553.

### **3.03 ADJUSTING AND CLEANING**

- A. Upon completion of installation of raceways, inspect interiors of raceways; clear all blockages and remove burrs, dirt, and construction debris.

### **3.04 EXISTING CONDUITS AND RACEWAYS**

- A. Use of existing conduits.

1. Existing conduits run in existing concrete floors and existing exposed raceways to be altered, or modified for reuse with cables, shall be only at locations where called for only the drawings. No other existing conduits may be reused.

**END OF SECTION**

## **CABINETS, BOXES, AND FITTINGS**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Requirements of the following Division 26 Sections apply to this section:
  - 1. Section 230001– General Provisions
  - 2. Section 260100- Basic Electrical Requirements.
  - 3. Section 260500 - Basic Electrical Materials and Methods.
  - 4. Section 260530 – Conduit Raceways
  - 5. Section 260519 – Wires and Cables – Below 600 Volts

#### **1.02 SUMMARY**

- A. This Section includes cabinets, boxes, and fittings for electrical installations and certain types of electrical fittings not covered in other sections. Types of products specified in this Section include:
  - 1. Outlet and device boxes.
  - 2. Pull and junction boxes.
  - 3. Cabinets.
  - 4. Hinged door enclosures.
- B. Conduit-body-type electrical enclosures and wiring fittings are specified in Division 26 Section "Raceways "

#### **1.03 DEFINITIONS**

- A. Cabinets: An enclosure designed either for surface or for flush mounting and having a frame, or trim in which a door or doors may be mounted.
- B. Device Box: An outlet box designed to house a receptacle device or a wiring box designed to house a switch.
- C. Enclosure: A box, case, cabinet, or housing for electrical wiring or components.
- D. Hinged Door Enclosure: An enclosure designed either for surface or flush mounting and having swinging doors or covers secured directly to and telescoping with the walls of the box.
- E. Outlet Box: A wiring enclosure where current is taken from a wiring system to supply utilization equipment.



- F. Wiring Box: An enclosure designed to provide access to wiring systems or for the mounting of indicating devices or of switches for controlling electrical circuits.

#### **1.04 SUBMITTALS**

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for cabinets and enclosures with classification higher than NEMA 1.
- C. Shop drawings for boxes, enclosures and cabinets that are to be shop fabricated, (nonstock items). For shop fabricated junction and pull boxes, show accurately scaled views and spatial relationships to adjacent equipment. Show box types, dimensions, and finishes.

#### **1.05 QUALITY ASSURANCE**

- A. UL Listing and Labeling: Items provided under this section shall be listed and labeled by UL.
- B. National Electrical Code Compliance: Components and installation shall comply with NFPA 70 "National Electrical Code."
- C. NEMA Compliance: Comply with NEMA Standard 250, "Enclosures for electrical Equipment (5000 Volts Maximum)."

### **PART 2 - PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
  - 1. Cabinets, Boxes and Fittings:
    - a. Appleton.
    - b. OZ/Gedney.
    - c. Square D Co.
    - d. Spring City Electrical Mfg. Co.
    - e. Thomas & Betts Corp.

#### **2.02 CABINETS, BOXES, AND WIRING TROUGHS FITTINGS, GENERAL**

- A. Electrical Cabinets, Boxes, Wiring Troughs and Fittings: Of indicated types,

sizes, and NEMA enclosure classes. Where not indicated, provide units of types, sizes, and classes appropriate for the use and location. Provide all items complete with covers and accessories required for the intended use. Provide gaskets for units in damp or wet locations.

### **2.03 MATERIALS AND FINISHES**

- A. Sheet Steel: Flat-rolled, code-gage, galvanized steel.
- B. Fasteners for General Use: Corrosion resistant screws and hardware including cadmium and zinc plated items.
- C. Fasteners for Damp or Wet Locations: Stainless steel screws and hardware.
- D. Cast Metal for Boxes, Enclosures, and Covers: Copper-free aluminum, brass, or cast iron, except as otherwise specified.
- E. Exterior Finish: Gray baked enamel for items exposed in finished locations except as otherwise indicated.
- F. Painted Interior Finish: Where indicated, white baked enamel.
- G. Fittings for Boxes, Cabinets, and Enclosures: Conform to UL 514B. Malleable iron or zinc plated steel for conduit hubs, bushings and box connectors.

### **2.04 METAL OUTLET, DEVICE, AND SMALL WIRING BOXES**

- A. General: Conform to UL 514A, "Metallic Outlet Boxes, Electrical," and UL 514B, "Fittings for Conduit and Outlet Boxes." Boxes shall be of type, shape, size, and depth to suit each location and application.
- B. Steel Boxes: Conform to NEMA OS 1, "Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports." Boxes shall be galvanized sheet steel with stamped knockouts, threaded screw holes and accessories suitable for each location including mounting brackets and straps, cable clamps, exterior rings and fixture studs.
- C. Cast-Aluminum Boxes: Copper free aluminum threaded raceway entries, and features and accessories suitable for each location including mounting ears, threaded screw holes for devices and closure plugs.
- D. Cast-Iron Boxes: Iron alloy, waterproof, with threaded raceway entries and features and accessories suitable for each location, including mounting ears, threaded screw holes for devices and closure plugs.

### **2.05 PULL AND JUNCTION BOXES**

- A. General: Comply with UL 50, "Electrical Cabinets and Boxes", for boxes over 100 cubic inches volume. Boxes shall have screwed or bolted on covers of material same as box and shall be of size and shape to suit application.

- B. Steel Boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing.
- C. Hot-Dipped Galvanized Steel Boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing. Cover shall be gasketed.
- D. Cast-Aluminum Boxes: Molded of copper free aluminum, with gasketed cover and integral threaded conduit entrances.
- E. Cast-Iron Boxes: Molded of cast iron alloy with gasketed cover and integral threaded conduit entrances.
- F. Cable troughs shall be provided where indicated, and shall be of special shapes, design, and construction required to install, support and enclose feeder cable throughout the routing indicated. Troughs shall be constructed as specified above for junction and pull boxes, with required reinforcing, for rigidity, and insulating supports and clamping for the cable installation. Cable shall be continuous throughout the troughs, and shall be racked in distributed phase groupings arranged with phase cables surrounding the neutral conductors.

## **2.06 CABINETS**

- A. Comply with UL 50, "Electrical Cabinets and Boxes."
- B. Construction: Sheet steel, NEMA 1 class except as otherwise indicated. Cabinet shall consist of a box and a front consisting of a one piece frame and a hinged door.

Arrange door to close against a rabbet placed all around the inside edge of the frame, with a uniformly close fit between door and frame. Provide concealed fasteners, not over 24-inches apart, to hold fronts to cabinet boxes and provide for adjustment. Provide flush or concealed door hinges not over 24-inches apart and not over 6-inches from top and bottom of door. For flush cabinets, make the front approximately 3/4 inch larger than the box all around. For surface mounted cabinets, make front same height and width as box.

- C. Doors: Double doors for cabinets wider than 24-inches.
- D. Locks: Combination spring catch and key lock, with all locks for cabinets keyed as per the University Physical Plant. Locks may be omitted on cabinets located within electrical rooms. Locks shall be of a type to permit doors to latch closed without locking.

## **2.07 STEEL ENCLOSURES WITH HINGED DOORS**

- A. Comply with UL 50, "Cabinets and Enclosures" and NEMA ICS 6, "Enclosures for

Industrial Controls and Systems."

- B. Construction: Sheet steel, 16 gage, minimum, with continuous welded seams. NEMA class as indicated; arranged for surface mounting.
- C. Doors: Hinged directly to cabinet and removable, with approximately 3/4-inch flange around all edges, shaped to cover edge of box. Provide handle operated, key locking latch. Individual door width shall be no greater than 24-inches. Provide multiple doors where required.
- D. Mounting Panel: Provide painted removable internal mounting panel for component installation.
- E. Enclosure: NEMA 1 except as indicated. Where door gasketing is required, provide neoprene gasket attached with oil-resistant adhesive, and held in place with steel retaining strips. For all enclosures of class higher than NEMA 1, use hubbed raceway entrances.

## **2.08 CAST METAL ENCLOSURES WITH HINGED DOORS**

- A. Copper free aluminum with bolted, hinged doors. Cast brass or cast iron enclosures are also acceptable.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION, GENERAL**

- A. Locations: Install items where indicated and where required to suit code requirements and installation conditions.
- B. Cap unused knockout holes where blanks have been removed and plug unused conduit hubs.
- C. Support and fasten items securely in accordance with Division 26 Section "Supporting Devices."
- D. Sizes shall be adequate to meet NEC volume requirements, but in no case smaller than sizes indicated.
- E. Remove sharp edges where they may come in contact with wiring or personnel

### **3.02 APPLICATIONS**

- A. Cabinets: Flush mounted, NEMA enclosure Type 1 except as otherwise indicated.
- B. Hinged Door Enclosures: NEMA Type I enclosure except as indicated.

- C. Hinged Door Enclosures Outdoors: NEMA Type 3R, Install drip hood, factory tailored to individual units.
- D. Hinged Door Enclosures in Corrosive Locations: NEMA Type 4X metal enclosure.
- E. Outlet Boxes and Fittings: Install outlet and device boxes and associated covers and fittings of materials and NEMA types suitable for each location and in conformance with the following requirements:
- F. Interior Dry Locations: Galvanized sheet steel, NEMA Type 1.
- G. Locations Exposed to Weather or Dampness: Cast metal, NEMA Type 3R.
- H. Wet Locations: NEMA Type 4 enclosures.
- I. Corrosive Locations: NEMA Type 4X enclosures.
- J. Pull and Junction Boxes: Install pull and junction boxes of materials and NEMA types suitable for each location except as otherwise indicated.

### **3.03 INSTALLATION OF OUTLET BOXES**

- A. Locations in Special Finish Materials: For outlet boxes for receptacles and switches mounted in concrete block, brick, or stone, use rectangular shaped boxes with square corners and straight sides. Install such boxes without plaster rings. Saw cut all recesses for outlet boxes in exposed masonry walls. Where more than one wiring device is indicated, use gang or tandem boxes.
- B. Gasketed Boxes: At the following locations use cast metal, threaded hub type boxes with gasketed weatherproof covers:
  - 1. Exterior locations.
  - 2. Where surface mounted on unfinished walls, columns or pilasters.
  - 3. Where exposed to moisture laden atmosphere.
  - 4. Where indicated.
- C. Cast-Iron Boxes: Iron alloy, waterproof, with threaded raceway entries and features and accessories suitable for each location, including mounting ears, threaded screw holes for devices and closure plugs.
- D. Mounting: Mount outlet boxes for switches with the long axis vertical or as indicated. Mount boxes for receptacles either vertically or horizontally but consistently either way. Three or more gang boxes shall be mounted with the long axis horizontal. Locate box covers or device plates so they will not span different types of building finishes either vertically or horizontally.

- E. Ceiling Outlets: For fixtures, where wiring is concealed, use outlet boxes 4-inches square by 1-1/2-inches deep, minimum.
- F. Cover Plates for Surface Boxes: Use plates sized to box front without overlap.
- G. Protect outlet boxes to prevent entrance of plaster, and debris. Thoroughly clean foreign material from boxes before conductors are installed.
- H. Concrete Boxes: Use extra deep boxes to permit side conduit entrance without interfering with reinforcing, but do not use such boxes with over 6-inch depth.
- I. Existing Outlet Boxes: Where extension rings are required to be installed, drill new mounting holes in the rings to align with the mounting holes on the existing boxes where existing holes are not aligned.
- J. Outlet boxes shall be securely fastened in place flush with finished wall and ceiling surfaces. Boxes at all fixture outlets shall be provided with 3/8" fixture studs, securely fastened to same.

### **3.04 INSTALLATION OF PULL AND JUNCTION BOXES**

- A. Box Selection: For boxes in main feeder conduit runs, use sizes not smaller than 8-inches square by 4-inches deep. Handholes shall be as indicated on drawings. Do not exceed 6 entering and 6 leaving raceways in a single box. Quantities of conductors (including equipment grounding conductors) in pull or junction box shall not exceed the following:

<u>Size of Largest Conductors in Box</u>	<u>Maximum No. of Conductors in Box</u>
No. 4/0 AWG	30
250 MCM	20
500 MCM	15
Over 500 MCM	10

- B. Cable Supports: Install clamps, grids, or devices to which cables may be secured. Arrange cables so they may be readily identified. Support cable at least every 30-inches inside boxes.
- C. Mount pull boxes in inaccessible ceilings with the covers flush with the finished ceiling.

### **3.05 INSTALLATION OF CABINETS AND HINGED DOOR ENCLOSURES**

- A. Mount with fronts straight and plumb.
- B. Install with tops 78-inches above floor.
- C. Set cabinets in finished spaces flush with walls.

**3.06 GROUNDING**

- A. Electrically ground metallic cabinets, boxes, and enclosures. Where wiring to item includes a grounding conductor, provide a grounding terminal in the interior of the cabinet, box or enclosure.

**3.07 CLEANING AND FINISH REPAIR**

- A. Upon completion of installation, inspect components. Remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, abrasions and weld marks.
- B. Galvanized Finish: Repair damage using a zinc-rich paint recommended by the manufacturer.
- C. Painted Finish: Repair damage using matching corrosion inhibiting touch-up coating.

**END OF SECTION**

**260543 - UNDERGROUND CONDUIT SYSTEM**

**PART 1 - GENERAL**

**1.01 RELATED WORK SPECIFIED ELSEWHERE**

- A. Concrete: Section 030550.
- B. Division 26 Sections.

**1.02 SUBMITTALS**

- A. Product Data: Catalog sheets, specifications and installation instructions.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A.
  - 1. Rigid Ferrous Metal Conduit: Steel, galvanized on the inside (conduit enameled on the inside will not be accepted), UL categorized as Rigid Ferrous Metal Conduit (identified on UL Listing Mark as Rigid Metal Conduit-Steel or Rigid Steel Conduit), as manufactured by Allied Tube & Conduit Corp., LTV Steel Tubular Products Co., Triangle Wire & Cable Inc., or Wheatland Tube Co.
  - 2. PVC conduit RNC or Carlon Schedule 40 electric PVC conduit, or approved equal.
  - 3. High Density Polyethylene (HDPE) conduit by Carlon, or approved equal.
- B. Conduit Spacers and Levelers: Commercially manufactured type to suit conduit, installation and spacing requirements.
- C. Duct Seal: Appleton Electric Co.'s DUC Weatherproof Compound, Manville Corp.'s Duxseal, OZ/Gedney Co.'s DUX, or Thomas & Betts Corp.'s DX.
- D. Drag Line: 200 lb. Monofilament line with 36" excess on either side of conduit run in Kelems grip.
- E. Thru Wall Sealing Bushings
  - 1. For Walls Which Have or Will Have Membrane Waterproofing
    - a. Cast-In-Place Installations: OZ/Gedney Co.'s Type FSK thruwall seal and Type FSKA membrane clamp adapter.
    - b. Core Drilled or Sleeved Installations: OZ/Gedney Co.'s Type



CSM and Type CSMC with membrane clamp adapter.

2. For Walls Which Will Not Have Membrane Waterproofing
  - a. Cast-In-Place Installations: OZ/Gedney Co.'s Type FSK.
  - b. Core Drilled or Sleeved Installations: OZ/Gedney Co.'s Type CSM, or Thunderline Corp.'s Link-Seal.
- F. End Bells
  1. For Existing and New Rigid Ferrous Metal Conduit: OZ/Gedney Co.'s Type TNS. (Provide end bells for existing conduits in addition to new conduits.)
  2. For Existing Rigid Nonmetallic Conduit: Conduit manufacturer's standard end bells.
- G. Insulated Grounding Bushings: Appleton Electric Co.'s GIB-50 Series, Crouse Hinds GLL Series, OZ/Gedney Co.'s IBC-50L Series, Raco Inc.'s 1212 Series, or Thomas & Betts Corp.'s 3870 or BG Series.

### **PART 3 - EXECUTION**

#### **3.01 PREPARATION**

- A. Before installing any Work, lay out the proposed course for the conduits, location of manholes, etc. and have same approved by the Director's Representative.

#### **3.02 INSTALLATION**

- A. Spacing
  1. Arrangement for Power and Signal Service: Separate power system conduits from signal system conduits with minimum 6 inches thick concrete wall, unless otherwise noted on drawings.
  2. Conduit Bank: Separate individual conduits a minimum of 3 inches, unless otherwise noted on drawings. Use spacers and levelers located no more than 8 feet apart.
- B. Depth
  1. Existing Grade To Remain: Unless otherwise indicated or directed, install concrete conduit duct banks more than 36 inches below existing finished grade, unless otherwise noted.
  2. Existing Grade To Be Altered: Unless otherwise indicated or directed,

install concrete conduit duct banks more than 24 inches below the existing grade where the finished grade is to be higher than the existing grade. Where the finished grade is to be lower than the existing grade, install conduit more than 24 inches below finished grade.

3. Under Roads and Parking Lots

a. Conduit (Concrete Encased): Unless otherwise indicated or directed, install concrete encased rigid PVC Schedule 40 conduit more than 36 inches below top surface of roads and parking lots, unless otherwise noted.

4. Crossing Obstructions: Contractor shall provide high density Styrofoam sheathing extended 10'-0" on either side of duct bank over/under crossing (steam tunnels, etc.).

5. In Rock

a. Unless otherwise indicated on the drawings install conduit concrete encased, at depths previously specified. Backfill with suitable material in accordance with SECTION 312316 – EARTHWORK for structures and utilities.

C. Pitch

1. Pitch conduit away from buildings.

2. Pitch conduit toward manhole a minimum of 12 inches per 100 feet. On runs where it is impossible to maintain the grade all one way, grade from center so that conduits pitch both directions down toward manholes.

D. Concrete Encasement for Rigid Non-Metallic Conduit Using Either of the Two Methods Indicated Below (Concrete Encasement for Rigid Ferrous Metal Conduit is Required)

1. Two Pour Method

a. Lay conduits on a continuous concrete footing not less than 3 inches thick unless otherwise noted on drawings and as wide as the encasement. Install footings straight and true both in line of run and transversely, and finished with an even surface. Incorporate anchoring devices into the footing for use in tying down the conduits. Grade footings so that conduits maintain required pitch. Before installing spacers, levelers, and conduits, let concrete footings harden as required to prevent damage to the footings.

1) Where conduits enter building or manhole wall, reinforce

footings for 10 feet with No. 4 rods, 4 inches on center.

- b. After conduits have been laid on footing with spacers and levelers (located no more than 8 feet apart), tie conduits down to the footing, then surround the conduits by concrete not less than 2 inches thick on top and 2 inches on each side unless otherwise noted on drawings. Separate individual conduits a minimum of 3 inches so that each conduit is completely enveloped in concrete.
    - 1) Where conduits enter building or manhole walls, reinforce encasement for 10 feet with No. 4 rods, 4 inches on center.
  - c. Form sides of the concrete encasement. Exception: Earth cuts will be permitted as the form where trenches are neatly excavated in stable soils.
- E. Conduits in Filled Ground: Where required, reinforce the footing and encasement for conduits 10 feet beyond limits of fill.
- F. Conduits Entering Buildings and Manholes
- 1. Seal conduit entrances into manholes watertight.
  - 2. Seal conduit entrances into building walls watertight. Exception: Seal is not required in below grade foundation walls associated with slab on grade construction.
  - 3. Install end bells at conduit entrances into new and existing manholes. In existing manholes install missing end bells at existing conduits entrances.
  - 4. Install end bells at conduit entrances into buildings.
    - a. Install insulated grounding bushing on conduit entrance stub up associated with slab on grade construction.
    - b. Install insulated grounding bushing and two (2) locknuts on conduit where conduit is terminated in cabinet, junction or pull box.
- G. Cleaning Conduits: Take precautions to prevent foreign matter from entering conduits during installation. After installation clean conduits with tools designed for the purpose.
- H. Conduit for Future Use (Spare Conduit and Empty Conduit): Demonstrate to the Director's Representative that conduits installed for future use are clear of obstructions (draw mandrel 1/2 inch less in diameter than conduit). Install a

drag line in each conduit.

- I. Contractor shall mandrel existing underground conduits to be reused for pulling new 5 kV cables or left as spare conduit system as shown on site plans. See Paragraph "K" below.
- J. Sealing Ends of Conduits
  1. Occupied Conduits: Seal ends of conduits to be used for Work of this contract until cables are to be installed. After cable installation, seal conduits at building entrances and first manhole outside building with Polywater FST foam duct sealant or approved equal duct seal.
  2. Conduits For Future Use: Seal the ends of existing and new spare and empty conduits at building entrances and manholes. Seal with Polywater FST foam duct sealant or approved equal duct seal.
- K. Using Existing Underground Conduits: Clean the conduits with tools designed for the purpose. The condition of conduits after cleaning may be determined with a mandrel 1/2 inch less in diameter than the conduit, with the sheath painted with black lacquer. Pull mandrel through conduit. Conduit is acceptable when there are no roller marks or scratches on the mandrel. Other methods may be used if approved. Report and demonstrate to the Director's Representative any defect found in the conduit system that cannot be eliminated. The Contractor is held responsible for any damage to cables resulting from imperfections in the conduit.
- L. Damaged conduits are expected but extent is unknown. Contractor shall include a unit price for replacement of damaged conduits.

### **3.03 CONDUIT SCHEDULE - TYPES AND USE**

- A. Rigid Ferrous Metal Conduit: Install in all indoor locations and for Con-Edison incoming electric service feeders unless otherwise specified or indicated on the drawings.
- B. Schedule 40 PVC Conduit: Install for all secondary 5 KV underground feeders unless otherwise specified or indicated.

**END OF SECTION**

## **260544 - UNDERGROUND ELECTRICAL WORK**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Division-26 Basic Electrical Materials and Methods sections apply to work specified in this section.

SECTION 260100 -	BASIC ELECTRICAL REQUIREMENTS
SECTION 260500 -	BASIC ELECTRICAL MATERIALS AND METHODS
SECTION 260513 -	MEDIUM-VOLTAGE CABLES
SECTION 260519 -	WIRES AND CABLES - BELOW 600 VOLTS
SECTION 260526 -	GROUNDING
SECTION 260543 -	UNDERGROUND CONDUIT SYSTEM
SECTION 260530 -	CONDUIT RACEWAYS

#### **1.02 SUMMARY**

- A. Provide all underground electrical work including the following:
  - 1. Underground Conduit System (See Section 260543).

#### **1.03 DEFINITIONS**

- A. Duct: The general term for electrical conduit and other raceway, either metallic or nonmetallic, specified for use underground, embedded in earth or concrete.
- B. Duct Bank: A group of two or more ducts in a continuous run between two points.
- C. Handhole: A below-the-surface enclosure in connection with ducts into which people reach, but do not enter, for the purpose of installing, operating, or maintaining equipment or wiring.
- D. Manhole: A below-the-surface enclosure or chamber, large enough for a person to enter, connecting with ducts, and affording facilities for installing, operating, and maintaining equipment or wiring.

#### **1.04 SUBMITTALS**

- A. Product Data: Submit manufacturer's data on underground distribution including, but not limited to, duct banks, and manholes. Provide application

data for main and branch circuit-breakers, sections, main buses, and basic insulation levels. Submit the following:

1. Conduit.
- B. Shop Drawings: Submit layout drawings of duct banks, and manholes, showing accurately scaled basic equipment sections including auxiliary compartments, section components, and combination sections. Submit the following:
  1. Coordination drawings showing duct profiles and coordination with other utilities and underground structures.
- C. Instructions: Submit instructions for ground megger, with proposed method indicated.
- D. Certificates: Provide certificates for precast concrete structures, and manholes and handhole frames and covers.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications: Firms regularly engaged in the manufacture of manholes of types, sizes and capacities required, and whose products have been in satisfactory use in similar service for not less than five (5) years. Manufacturers of precast manholes and handholes shall be firms regularly engaged in types and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.
- B. Installer's Qualifications: Firm with at least five (5) years of successful installation experience on projects utilizing duct banks, manholes and units similar to that required for this project.
  1. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)  
  
ANSI C2 1993 National Electrical Safety Code  
ANSI C119.1 1986 Electric Connectors - Sealed Insulated Underground Connector Systems Rated 600 Volts  
ANSI C135.30 Galvanized Ferrous Ground Rods for Overhead or Underground Line Construction
  2. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)  
  
ASTM C 478 1990 (Rev. B) Precast Reinforced Concrete Manhole Sections  
ASTM F 512 1989 (Rev. A) Smooth-Wall Poly Vinyl Chloride (PVC) Conduit and Fittings for Underground Installation
  3. FEDERAL SPECIFICATIONS (FS)

- FS RR-F-621 (Rev. E) Frames, Covers, Gratings, Steps, Sump and Catch Basin, Manhole
4. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
- NEMA RN 1 1990 Extra-Strength Rigid Galvanized Steel Conduit Duct for Underground Installation
- NEMA RN 2 1990 Fittings for Rigid Galvanized Steel Conduit Duct for Underground Installation
5. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
- NFPA 70 1993 National Electrical Code
6. UNDERWRITERS LABORATORIES INC. (UL)
- UL 6 1981 (R 1992) Rigid Metal Conduit
- UL 467 1984 (R 1986) Grounding and Bonding Equipment
- UL 486A 1991 (Errata 1992) (R 1992) Wire Connectors and Soldering Lugs for Use with Copper Conductors
- UL 514A 1991 Metallic Outlet Boxes
- UL 514B 1989 (Errata 1991) (Bul. 1991) (R 1992) Fittings for Conduit and Outlet Boxes

#### **1.06 JOB CONDITIONS**

- A. Visit each site where the work is required, survey the existing conditions and become familiar with the difficulties which will affect the execution and completion of the work. Investigation shall be made of the nature and location of the work, the general and local conditions, particularly those bearing upon the work required, transportation, disposal and physical conditions at the site and character of equipment and facilities needed preliminary to and during the prosecution of the work and all other matters upon which information is reasonably obtainable and which can in any way affect the work or the cost thereof under the Contract.
- B. Investigation shall also be made of the character, quality and quantity of electrical system components, arrangement, supports, routing below sidewalks, routing below pavements, routing below parking lots, routing below turf, routing below all types, of landscaping, entry and exit of manholes, entry and exit of buildings and structures attachments to the building structure, and materials to be encountered insofar as this information is reasonably ascertainable from an inspection of the site. Any failure to become acquainted with all the available information will not be considered as a basis for not successfully fulfilling all terms of the Contract, regardless of the difficulty or cost, without extra compensation.
- C. Field Measurements: Verify and check locations of all routing below sidewalks, routing below pavements, routing below parking lots, routing

below turf, routing below all types, of landscaping, entry and exit of manholes, as the new work relates to the existing underground systems and as the new work relates to entry and exit of buildings and structures and all building system components, both new and existing including, but not limited to: Structural systems, walls, floors, ceilings, plumbing systems and fixtures, electrical systems and fixtures, fire protection systems, and heating, ventilating and air conditioning systems and their components. Perform accurate field measurements before preparing shop drawings, and before performing any work record all measurements on shop drawings.

### **1.07 SEQUENCING AND SCHEDULING**

- A. Sequence and coordinate the work of this section of the Project Manual with the scheduling requirements set forth in the Contract Documents. Review the approved schedule with the Design Professional, sub-contractor, manufacturers, vendors, suppliers and all other Contractors. Schedule and sequence all work with the adjoining work and work of others such that the all work can be accomplished concurrently during the same time period.
- B. Deliver ducts to site with ends capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.
- C. Store precast concrete units at site as recommended by manufacturer to prevent physical damage. Arrange so identification markings are visible.
- D. Lift and support precast concrete units only at designated lifting or supporting points.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide components units of one of the following:
  - 11. Nonmetallic Ducts:
    - a. Anamet, Inc.
    - b. Arno Corp.
    - c. Breeze-Illinois, Inc.
    - d. Can-Tex Industries.
    - e. Carlon.
    - f. Certainteed Products Corp.
    - g. Cole-Flex Corp.
    - h. Condux International.
    - i. Electri-Flex Co.
    - j. R&G Sloan Mfg. Co., Inc.
    - k. Spiraduct, Inc.



## **2.02 MATERIALS AND EQUIPMENT**

- A. Conduit (See Section 260530 for conduit specifications).
- B. Fittings
  - 1. Metal fittings, rigid steel or rigid non-metallic conduit shall be cast metal with gasketed closures.
- C. Pull Wire
  - 1. Provide nylon rope having a minimum tensile strength of 500 pounds in each empty duct. Leave a minimum of 24" of slack at each end of the pull wires.

## **2.03 RACEWAY/DUCT SEALING COMPOUND**

- A. Compound: Nonhardening, putty-like consistency workable at temperatures as low as 35 deg F. Compound shall not slump at a temperature of 300 deg F and shall readily adhere to clean surfaces of plastic ducts, metallic conduits conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and the common metals. Compound shall have no injurious effect on worker's hands or materials.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine areas and conditions under which underground systems and components are to be installed, and notify Owner in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

### **3.02 INSTALLATION OF UNDERGROUND SYSTEMS**

- A. Concrete
  - 1. Concrete work for electrical requirements shall conform to the requirements of Specification Section, 033000 "Cast-In-Place Concrete".
- B. Underground Duct Bank (Concrete Encased) (See Section 26043)
  - 2. Connections to Existing Manholes
    - a. For conduit line connections to existing structures, break the

structure wall out to the dimensions required and preserve steel in the structure wall. Cut steel and bend out to tie into the reinforcing of the conduit line encasement. Chip out the structure wall to form a key for the duct line encasement, install bells on conduit ends and grout in place. Where duct lines enter existing manholes, the sections of duct may be either cast in the concrete or may enter the manhole through an existing square or rectangular opening of suitable dimensions in the manhole walls. Where openings are provided for the entrance of duct lines, the space between ducts and between ducts and manhole walls shall be caulked tight.

3. Removal of Ducts: Where duct lines are removed from existing manholes, close openings and waterproof manhole. Chip out the wall opening to provide a key for the new section of wall.
4. Stub-ups: Duct stub-ups to equipment shall be galvanized rigid steel. For equipment mounted on outdoor concrete pads, steel conduit shall extend a minimum of 5 ft. away from edge of pad. Install insulated grounding bushings on the terminations. The steel conduits shall be coupled to the ducts with adapters designed for the purpose and the whole encased with 3 inches of concrete.
5. Sealing: For ducts to be wired in this project, provide temporary closure at terminations. For spare ducts, seal bore of ducts at terminations. Use sealing compound and plugs as required to withstand 15 psi minimum hydrostatic pressure.

B. Cable Pulling

1. Test existing duct lines with a mandrel and thoroughly swab out to remove foreign material before pulling new cables into existing duct runs. Pull cables down grade with the feed-in point at the manhole or buildings of the highest elevation. Use flexible cable feeds to convey cables through manhole opening and into duct runs. Accumulate cable slack at each manhole or junction box where space permits by training cable around the interior to form one complete loop. Maintain minimum allowable bending radii in forming such loops.
2. Cable Lubricants
  - a. Use lubricants that are specifically recommended by the cable manufacturer for assisting in pulling jacketed cables. Cable lubricants shall be soapstone, graphite, or talc for rubber or plastic jacketed cables. Lubricant shall not be deleterious to the cable sheath, jacket, or outer coverings.
3. Cable Pulling Tensions

- a. Tensions shall not exceed the maximum pulling tension recommended by the cable manufacturer. Monitor pulling tension during cable installation.
4. Secondary Cable Runs in Nonmetallic Duct Conduit
  - a. Although not indicated on the drawings, include an insulated copper equipment grounding conductor sized as required by the rating of the overcurrent device supplying the phase conductors, in nonmetallic duct conduit, for cable runs, 600 volts and less.
5. Provide cable markers in manholes (See Section 260513).
6. Conductors Installed in Parallel
  - a. Conductors shall be grouped such that each conduit of a parallel run contains one (1) Phase A conductor, one (1) Phase B conductor, one (1) Phase C conductor, and one (1) neutral conductor (where neutral conductors are applicable). (See Section 260513 for additional requirements.)
- E. Cable Terminating
  1. Protect terminations from accidental contact, deterioration of coverings and moisture by providing terminating devices and materials. Install terminations of insulated cables, cable joints and medium voltage terminations in accordance with the manufacturer's requirements. Make terminations with materials and methods as indicated or specified or as designated by the written instructions of the cable manufacturer and termination kit manufacturer.
  2. Splices for 600 Volt Class Cables
    - a. Splice in underground systems only in accessible locations such as manholes and handholes, with a compression or split bolt connector as indicated on the conductor and by insulating and waterproofing by one of the following methods suitable for continuous submersion in water.
      - 1) Provide cast-type splice insulation by means of molded casting process employing a thermosetting epoxy resin insulating material applied by a gravity poured method or by a pressure injected method. Provide component materials of the resin insulation 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 8 mold suitable for the cables to be spliced. When the mold is in place around the joined conductors, prepare the resin mix and pour into the mold. Do not allow cables to be moved until after the splicing materials have completely set.
- 3) Provide heat shrinkable splice insulation by means of a thermoplastic adhesive sealant material which should be applied by a clean burning propane gas torch. Cables may be moved when joint is cool to the touch.

F. Grounding Systems

1. Shall be as indicated, and as required by NFPA 70 and ANSI C2. Neutral conductors, cable shields, metallic conduits, cable terminations, junction boxes, surge arresters, fencing enclosing electrical equipment, and other noncurrent-carrying metallic parts of equipment shall be grounded. A resistance of not greater than 25 ohms shall be provided, unless otherwise specified. Ground resistances shall be measured in normally dry conditions not less than 48 hours after rainfall. Resistances of systems requiring separate ground rods shall be measured separately before bonding below grade. The combined ground resistance of separate systems bonded together below grade may be used to meet the specified ground resistance, but the minimum number of rods indicated must still be provided. Where the specified ground resistance cannot be met with the indicated number of ground rods, additional ground rods, or longer ground rods, shall be installed and connected until the specified resistance is obtained, except that not more than three (3) additional 8-foot ground rods shall be required at any one installation.
2. Grounding Electrodes
  - a. Provide cone pointed driven ground rods driven full depth plus 150 mm (6"), installed where indicated to provide an earth ground of the value before stated for the particular equipment being grounded. In each electric manhole, at a convenient point close to the wall, a ¾ inch by 10 foot stainless steel ground rod shall be driven into the earth before the floor is poured so that approximately 4 inches of the ground rod will extend above the manhole floor. When precast concrete manholes are used, the top of the ground rod may be below the floor, a 1/0 AWG tinned ground conductor brought into the manhole through a watertight sleeve in the manhole wall.
3. Grounding Connections by Exothermic Type Process

- a. Make grounding connections which are buried or otherwise normally inaccessible, excepting specifically those connections for which access for periodic testing is required, by exothermic type process. Make welds strictly in accordance with the weld manufacturer's written recommendations. Welds which have "puffed up" or which show convex surfaces indicating improper cleaning are not acceptable. Mechanical connectors are not required at exothermic weldments.
4. Compression Ground Grid Connector
    - a. For accessible connections (not in earth) in lieu of an exothermic type process, a compression ground grid connector of a type which uses a hydraulic compression tool to provide the correct circumferential pressure may be used. Tools and dies shall be as recommended by the manufacturer. An embossing die code or other standard method shall provide visible indication that a connector has been adequately compressed on the ground wire.
  5. Grounding Conductors
    - a. Bare soft-drawn copper wire No. 4 AWG minimum unless otherwise indicated or specified.
  6. Ground Rod Connections
    - a. Connect ground rods only to insulated 'XHHW' copper ground conductor and weld the connection. Insulate entire area of the rod in the vicinity of the weld and the connections wire and seal against moisture penetration.
  7. Fence Grounding
    - a. Permanent fences shall be grounded with a ground rod at each fixed gate post and at each corner post. Drive ground rods until the top is 12" below grade. Attach a No. 4 AWG copper conductor, by fusion weld process, to the ground rods and extend underground to the immediate vicinity of fence post. Lace the conductor vertically into 12" of fence mesh and fasten by two approved bronze compression fittings, one to bond wire to post and the other to bond wire to fence. Each gate section shall be bonded to its gatepost by a 1/8" by 1" flexible braided copper strap and ground post clamps. Clamps shall be of the anti-electrolysis type.

### **3.03 FIELD QUALITY CONTROL**

- A. Prior to energization of circuitry, check all accessible connections to

manufacturer's torque tightening specifications.

- B. Prior to energization of component, check with ground resistance tester phase-to-phase and phase-to-ground insulation resistance levels to ensure requirements are fulfilled.

### **3.04 ADJUSTING AND CLEANING**

- A. **Water Tightness:** Make internal inspection of manholes/handholes three months after completion of construction for indications of water ingress. Where leakage is noted, remove any water found and seal leakage sources. Reinspect after two months and reseal any remaining leakage sources. Repeat process at two month intervals until leakage is corrected.
- B. **Clean Ducts:** Clean full length of ducts with a round bristle brush with a diameter 1/2 inch greater than internal diameter of duct.
- C. **Clean Manholes:** Clean all internal surfaces of manholes. Remove all foreign material.

### **3.05 GROUNDING**

- A. Provide equipment grounding connections for components as indicated. Tighten connections to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounds.
- B. **Connections:** Connections above grade shall be made with bolted solderless connectors and those below grade shall be made by a fusion-welding process. In lieu of a fusion-welding process, a compression ground grid connector of a type which uses a hydraulic compression tool to provide the correct circumferential pressure may be used. Tools and dies shall be as recommended by the manufacturer. An embossing die code or other standard methods shall provide visible indication that a connector has been adequately compressed on the ground wire.

**END OF SECTION**

## **260553 - ELECTRICAL IDENTIFICATION**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Requirements of the following Division 26 Sections apply to this section:
  - 1. Section 260100 - Basic Electrical Requirements.
  - 2. Section 260500 - Basic Electrical Materials and Methods.

#### **1.02 SUMMARY**

- A. This Section includes identification of electrical materials, equipment, and installations. It includes requirements for electrical identification components including, but not limited to, the following:
  - 1. Buried electrical line warnings.
  - 2. Identification labeling for raceways, cables, and conductors.
  - 3. Warning and caution signs.
  - 4. Equipment labels and signs.
  - 5. Warning signs for interior and exterior electric room doors.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 26 Section 260519 "Wires and Cables" for requirements for color coding of conductors for phase identification.
- C. Refer to other Division 26 sections for additional specific electrical identification associated with specific items.

#### **1.03 SUBMITTALS**

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified.
- C. Samples of each color, lettering style, and other graphic representation required for identification materials; samples of labels and signs.
- D. Schedule of identification nomenclature to be used for identification signs and labels.

#### **1.04 QUALITY ASSURANCE**

- A. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."

### **PART 2 - PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. American Labelmark Co.
2. Calpico, Inc.
3. Cole-Flex Corp.
4. Emed Co., Inc.
5. George-Ingraham Corp.
6. Ideal Industries, Inc.
7. Kraftbilt
8. LEM Products, Inc.
9. Markal Corp.
10. National Band and Tag Co.
11. Panduit Corp.
12. Radar Engineers Div., EPIC Corp.
13. Seton Name Plate Co.
14. Standard Signs, Inc.
15. W.H. Brady, Co.

#### **2.02 ELECTRICAL IDENTIFICATION PRODUCTS**

- A. Adhesive Marking Labels for Raceway Cable: Pre-printed, flexible, self-adhesive labels with legend indicating voltage and service.
- B. Label size shall be 1-1/8 inches high by 8 inches long.
- C. Color: Black legend on orange background.
- D. Pretensioned Flexible Wraparound Colored Plastic Sleeves for Raceway and Cable Identification: Flexible acrylic bands sized to suit the raceway diameter and arranged to stay in place by pretensioned gripping action when coiled around the raceway or cable.
- E. Underground Line Marking Tape: Permanent, bright-colored, continuous-printed, semi-metallic plastic tape compounded for direct-burial service not less than 6 inches wide by 4 mils thick embedded with the embedded tracer wire. Printed legend indicative of general type of underground line below. (Medium Voltage, electric, telephone below, etc.)



- F. Wire/Cable Designation Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound, cable/conductor markers with preprinted numbers and letters.
- G. Engraved, Plastic-Laminated Labels, Signs, and Instruction Plates: Engraving stock melamine plastic laminate, 1/16-inch minimum thick for signs up to 20 square inches, or 8 inches in length; 1/8-inch thick for larger sizes. Engraved legend in white letters on black face and punched for mechanical fasteners.
- H. Fasteners for Plastic-Laminated and Metal Signs: Self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers.
- I. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking nylon cable ties, 0.18-inch minimum width, 50-lb minimum tensile strength, and suitable for a temperature range from minus 50 deg F to 350 deg F. Provide ties in specified colors when used for color coding.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code.
- B. Install identification devices in accordance with manufacturer's written instructions and requirements of NEC.
- C. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.
- D. Conduit Identification
  - 1. Apply identification to areas as follows:
    - a. Clean surface of dust, loose material, and oily films before painting.
- E. Identify Junction, Pull, and Connection Boxes: Code-required caution sign for boxes shall be pressure-sensitive, self-adhesive label indicating system voltage in black, preprinted on orange background. Install on outside of box cover. Also label box covers with identity of contained circuits. Use pressure-sensitive plastic labels at exposed locations and similar labels or plasticized card stock tags at concealed boxes.
- F. Underground Electrical Line Identification: During trench backfilling, for

exterior underground power lines, install dual continuous underground plastic line markers, located directly above line 12 inches below finished grade. Where multiple lines installed in a common trench or concrete envelope that do not exceed an overall width of 16 inches; install a single line marker.

- G. Install line marker for all underground wiring.
- H. Conductor Color Coding Below 600V: Provide color coding for service, feeder, and branch circuit conductors throughout the project secondary electrical system as follows:

<u>120/208 Volts</u> <u>required</u>	<u>Phase</u>	<u>277/480 Volts (where</u> <u>required)</u>
Black	A	Yellow
Red	B	Brown
Blue	C	Orange
White	Neutral	White
Green	Ground	Green

Use conductors with color factory-applied the entire length of the conductors except as follows:

- 1. The following field-applied color-coding methods may be used in lieu of factory-coded wire for sizes larger than No. 10 AWG.
  - a. Apply colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 8 inches from terminal points and in boxes where splices or taps are made. Apply the last two laps of tape with no tension to prevent possible unwinding. Use 1-inch-wide tape in colors as specified. Do not obliterate cable identification markings by taping. Tape locations may be adjusted slightly to prevent such obliteration.
  - b. In lieu of pressure-sensitive tape, colored cable ties may be used for color identification. Apply three ties of specified color to each wire at each terminal or splice point starting 3 inches from the terminal and spaced 3 inches apart. Apply with a special tool or pliers, tighten for snug fit, and cut off excess length.
- I. Color Coding for Medium Voltage Service Feeders
  - 1. Service and the laterals extended from the service shall be color coded alike to distinguish from underground feeders.

Black and Yellow	Phase A
Red and Yellow	Phase B
Blue and Yellow	Phase C

2. The color coding shall be accomplished by color taping of feeder cables. The tape shall be a minimum of two wrappings of each color side by side at 18" intervals along the cables.
- J. Power Circuit Identification: Securely fasten identifying metal tags or aluminum wraparound marker bands to cables, feeders, and power circuits in manholes, handholes, vaults, pull boxes, junction boxes, and switchboard rooms with 1/4-inch steel letter and number stamps with legend to correspond with designations on Drawings. If metal tags are provided, attach them with approximately 55-lb test monofilament line or one-piece self-locking nylon cable ties.
- K. Tag or label conductors as follows:
1. Future Connections: Conductors indicated to be for future connection or connection under another contract with identification indicating source and circuit numbers.
  2. Multiple Circuits: Where multiple branch circuits are present in the same box or enclosure (except for three-circuit, four-wire home runs), label each conductor or cable. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by means of coded color of conductor insulation. For control and communications/signal wiring, use color coding or wire/cable marking tape at terminations and at intermediate locations where conductors appear in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tapes.
  3. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.
- L. Apply warning, caution, and instruction signs and stencils as follows:
1. Install warning, caution, or instruction signs where required by NEC, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install butyrate signs with metal backing for outdoor items and in manholes.
  2. Install warning, caution signs as required by NEC or where required to assure safe maintenance for all electric room doors, both from the building side and from the exterior side.

- M Install equipment/system circuit/device identification as follows:
1. Apply equipment identification labels of engraved plastic-laminate on each major unit of electrical equipment in building, including central or master unit of each electrical system. This includes communication/signal/alarm systems, unless unit is specified with its own self-explanatory identification. Except as otherwise indicated, provide single line of text, with 1/2-inch-high lettering on 1-1/2-inch-high label (2-inch-high where two lines are required), white lettering in black field. Text shall match terminology and numbering of the Contract Documents and shop drawings. Apply labels for each unit of the following categories of electrical equipment.
    - a. Panelboards, electrical cabinets, and enclosures.
    - b. Electrical switchgear and switchboards.
    - c. Electrical substations.
    - d. Transformers.
    - e. Electrical rooms.
- N. Apply circuit/control/item designation labels of engraved plastic laminate for disconnect switches, and similar items for power distribution.
- O. Install labels at locations indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

**END OF SECTION**

## **262413 - SWITCHBOARDS - BELOW 600 VOLTS**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Division-26 Basic Electrical Materials and Methods and Electrical Identification sections apply to work specified in this section.

#### **1.02 SUMMARY**

- A. Types of switchboards specified in this Section include the following:
  - 1. Circuit breaker switchboards
  - 2. Main Switchboard – Furnish and install the Service Entrance switchboard(s) as herein specified and shown on the associated electrical drawings.
  - 3. Distribution Switchboard – Furnish and install the Distribution Switchboard(s) as herein specified and shown on the associated electrical drawings.

#### **1.03 REFERENCES**

The switchboard(s) and overcurrent protection devices referenced herein are designed and manufactured according to the following appropriate specifications.

- A. ANSI/NFPA 70 - National Electrical Code (NEC).
- B. ANSI/IEEE C12.16 - Solid State Electricity Metering.
- C. ANSI C57.13 - Instrument Transformers.
- D. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
- E. NEMA PB 2 - Deadfront Distribution Switchboards, File E8681
- G. NEMA PB 2.1 - Proper Handling, Installation, Operation and Maintenance of Deadfront Switchboards Rated 600 Volts or Less.
- H. NEMA PB 2.2 - Application Guide for Ground Fault Protective Devices for Equipment.
- I. UL 50 - Cabinets and Boxes.
- J. UL 98 - Enclosed and Dead Front Switches.
- K. UL 489 - Molded Case Circuit Breakers.
- L. UL 891 - Dead-Front Switchboards.
- M. UL 943 - Ground Fault Circuit Interrupters.
- N. Federal Specification W-C-375B/Gen - Circuit Breakers, Molded Case, Branch Circuit And Service.

#### **1.04 QUALIFICATIONS**

- A. To be considered for approval, a manufacturer shall have specialized in the manufacturing and assembly of switchboards for at least fifty (50) years.
- B. Furnish products listed by Underwriters Laboratories Incorporated and in accordance with standards listed in Article 1.03 - References.
- C. The manufacturing facility shall be registered by Underwriters Laboratories Inc. to the International Organization for Standardization ISO 9002 Series Standards for quality.

#### **1.05 SUBMITTALS**

- A. Product Data: Submit manufacturer's data on switchboards including, but not limited to, voltages, number of phases, frequencies, and short-circuit and continuous current ratings. Provide application data for main and branch circuit-breakers, sections, main buses, and basic insulation levels.
- B. Shop Drawings: Submit layout drawings of switchboards showing accurately scaled basic equipment sections including auxiliary compartments, section components, and combination sections.
- C. Wiring Diagrams: Submit wiring diagrams for switchboards showing connections to electrical power feeders and distribution branches. Differentiate between portions of wiring that are manufacturer-installed and portions that are field-installed.

#### **1.06 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications: Firms regularly engaged in the manufacture of switchboards, of types, sizes and capacities required, and whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firm with at least five (5) years of successful installation experience on projects utilizing switchboard units similar to that required for this project.
- C. Codes and Standards
  - 1. Electrical Code Compliance: Comply with applicable local code requirements of the authority having jurisdiction, and that portion of the NEC which pertains to installation and construction of switchboards.
  - 2. UL Compliance: Comply with applicable requirements of UL 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors", UL 489, "Molded-Case Circuit Breakers and Circuit Breaker Enclosures," and UL 891, "Dead-Front Electrical Switchboards," pertaining to installation and construction of switchboards. Provide switchboards

and components which are UL-listed and labeled.

3. IEEE Compliance: Comply with applicable requirements of IEEE Std 241, "Recommended Practice for Electric Power Systems in Commercial Buildings," pertaining to switchboards.
4. ANSI Compliance: Comply with applicable requirements of ANSI standards pertaining to switchboard assemblies.
5. NEMA Compliance: Comply with applicable portions of NEMA Stds Pub/No. PB 2, "Dead-front Distribution Switchboards"; PB 2.1, "General Instruction for Proper Handling, Installation, Operation and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less," and SG 3, "Low-Voltage Power Circuit Breakers," pertaining to switchboard assemblies.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver switchboards and components properly packaged and mounted on pallets, or skids to facilitate handling of heavy items. Utilize factory-fabricated type containers or wrappings for switchboards and components which protect equipment from damage. Install gravity measuring meters in containers which indicate whether container has been bumped or dropped. Return G-meters to manufacturer for reuse upon delivery of switchboards. Inspect equipment to ensure that no damage has occurred during shipment.
- B. Store switchboard equipment in original packaging and protect from weather and construction traffic. Wherever possible, store indoors; where necessary to store outdoors, store above grade and enclose with watertight wrapping.
- C. Handle switchboard equipment carefully to prevent physical damage to equipment and components. Remove packaging, including the opening of crates and containers, avoiding the use of excessive hammering and jarring which would damage the electrical equipment contained therein. Do not install damaged equipment; remove from site and replace damaged equipment with new.

#### **1.08 SEQUENCING AND SCHEDULING**

- A. Schedule delivery of switchboard equipment which permits ready building ingress for large equipment components to their designated installation spaces. Coordinate delivery of equipment with the installation of other building components.
- B. Coordinate the size and location of concrete equipment pads. Cast anchor bolt inserts into pad. Concrete, reinforcement, and formwork requirements are specified in Division 3.

- C. Coordinate with other electrical work including raceways, electrical boxes and fittings, and cabling/wiring work, as necessary to interface installation of switchboards with other work.

#### **1.09 MAINTENANCE**

- A. Maintenance Stock, Fuses and Branch circuit breakers: For types and ratings required, furnish additional fuses, amounting to one unit for every ten (10) installed units, but not less than five (5) units of each. For branch circuit breakers, provide one spare circuit breaker for each frame size but not less than five (5) for each switchboard line-up.
- B. Provide one set of installation and maintenance instructions with each switchboard. Instructions are to be easily identified and affixed within the incoming section of the line-up.

### **PART 2 - PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide switchboard units of one of the following (for each type, and rating of switchboard):
  - 1. General Electric Co.
  - 2. Square D Co.
  - 3. Eaton Cutler Hammer
  - 4. Siemens
  - 5. Engineer approved equal.

#### **2.02 EQUIPMENT SECTIONS AND COMPONENTS**

- A. General: Except as otherwise indicated, provide switchboards and ancillary components of types, sizes, characteristics, and ratings indicated, which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information, and as required for complete installation.
- B. AC Dead-Front Distribution Switchboards: Provide factory-assembled, dead-front, metal-enclosed, self-supporting secondary power switchboards, of types, sizes, electrical ratings and characteristics indicated; consisting of vertical panel units, and containing fusible circuit breakers switch assemblies of quantities, ratings and types indicated on contract documents. Provide copper main bus and connections to switching devices of sufficient capacity to limit rated continuous current operating temperature rise of no greater than 65 deg C above average ambient temperature of 30 deg C; with main bus and tap connections silver-surfaced and bolted tightly according to



manufacturer's torquing requirements for maximum conductivity. Brace bus for short-circuit stresses up to maximum interrupting capacity as indicated on contract documents and as called for by short circuit coordination study. Provide mimic bus on front of each switchboard; prime and coat switchboard with manufacturer's standard finish and color. Equip units with built-in lifting eyes and yokes; and provide vertical individual panel units, suitable for bolting together at project site. Construct switchboard units for the following environment:

1. Installation: Indoors, NEMA Type 1.
- C. Enclosures: Construct switchboards, suitable for floor mounting, with front cabling/wiring accessibility, and conduit accessibility as indicated. Provide welded steel channel framework; hinge wireway front covers to permit ready access to branch load side terminals. Coat enclosures with manufacturer's standard corrosive-resistant finish
- D. Fusible Switches: Provide fusible switch assemblies, 3-pole, quick-make, quick-break types mounted in metal enclosures which are operated by externally located handles which can be locked in ON or OFF positions.
- E. Future Provisions: All unused spaces provided, unless otherwise specified, shall be fully equipped for future devices, including all appropriate connectors and mounting hardware.
- F. Enclosure:
1. Sections shall be aligned front and rear.
  2. Removable steel base channels (1.5 inch floor sills) shall be bolted to the frame to rigidly support the entire shipping section for moving on rollers and floor mounting.
  3. The switchboard enclosure shall be painted on all exterior surfaces. The paint finish shall be a medium gray, ANSI #49, applied by the electro-deposition process over an iron phosphate pretreatment.
  4. All front covers shall be screw removable with a single tool and all doors shall be hinged with removable hinge pins.
  5. Top and bottom conduit areas shall be clearly indicated on shop drawings.
- G. Nameplates: Provide 1 inch high x 3 inches engraved laminated (Gravoply) nameplates for each device.
- H. Bus Composition: Shall be plated copper. Plating shall be applied continuously to all bus work. The switchboard bussing shall be of sufficient cross-sectional area to meet UL Standard 891 temperature rise requirements. The phase and neutral through-bus shall have an ampacity as shown in the plans. For 4-wire systems, the neutral shall be of equivalent ampacity as the phase bus bar. Tapered bus is not acceptable. Full provisions for the addition

of future sections shall be provided. Bussing shall include all necessary hardware to accommodate splicing for future additions.

- I. Bus Connections: Shall be bolted with Grade 5 bolts and conical spring washers.
- J. Ground Bus: Sized per NFPA70 and UL 891 Tables 25.1 and 25.2 and shall extend the entire length of the switchboard. Provisions for the addition of future sections shall be provided.

### **2.03 CIRCUIT BREAKER TYPE SWITCHBOARDS**

- A. Group mounted circuit breakers through 1200A.
  - 1. Circuit breaker(s) shall be group mounted plug-in mechanical restraint on a common pan or rail assembly.
  - 2. The interior shall have three flat bus bars stacked and aligned vertically with glass reinforced polyester insulators laminated between phases. The molded polyester insulators shall support and provide phase isolation to the entire length of bus.
  - 3. Circuit breaker(s) equipped with line terminal jaws shall not require additional external mounting hardware. Circuit breaker(s) shall be held in mounted position by a self-contained bracket secured to the mounting pan by fasteners. Circuit breaker(s) of different frame sizes shall be capable of being mounted across from each other.
  - 4. Line-side circuit breaker connections are to be jaw type.
  - 5. All unused spaces provided, unless otherwise specified, shall be fully equipped for future devices, including all appropriate connectors and mounting hardware.
  - 6. Electronic trip molded case full function 100% rated circuit breakers.
    - a. All electronic circuit breakers shall have the following time/current response adjustments: Long Time Pickup, Long Time Delay, (for 480V systems) Short Time Pickup, Short Time Delay, Ground Fault Pickup (for 480V systems), Ground Fault Delay and Instantaneous settings. Each adjustment shall have discrete settings (fully adjustable) and shall be independent of all other adjustments.
    - b. Circuit breaker trip system shall be a microprocessor-based true rms sensing designed with sensing accuracy through the thirteenth (13<sup>th</sup>) harmonic. Sensor ampere ratings shall be as indicated on the associated schedule and/or drawing.

- c. Local visual trip indication for overload, short circuit and ground fault trip occurrences.
- d. Long Time Pickup indication to signal when loading approaches or exceeds the adjustable ampere rating of the circuit breaker shall be provided.
- e. Trip units shall be able to provide real time metering. Metering functions include current, voltage, power and frequency.
- f. Communications capabilities for remote monitoring of circuit breaker trip system, to include phase and ground fault currents, pre-trip alarm indication, switch settings, and trip history information shall be provided. . Trip units shall be pre-wired at the factory for communications to the main Circuit Monitor and Power Monitoring System see Section 260913.
- g. Circuit breaker shall be provided with Zone selective Interlocking (ZSI) communications capabilities on the short-time and ground fault functions compatible with all other electronic trip circuit breakers and external ground fault sensing systems as noted on schedules and/or drawings.
- g. Furnish thermal magnetic molded case circuit breakers for 250A frames and below.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine areas and conditions under which switchboards and components are to be installed, and notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

#### **3.02 INSTALLATION OF SWITCHBOARDS**

- A. Install switchboards as indicated, in accordance with manufacturer's written instructions, and with recognized industry practices; complying with applicable requirements of NEC, NEMA's Stds Pub/No. PB 2.1, and NECA's "Standard of Installation."
- B. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening

torques specified in UL Std 486, and the National Electrical Code.

- C. Install fuses, of sizes indicated, in switchboards.

### **3.03 FIELD QUALITY CONTROL**

- A. Prior to energization of circuitry, check all accessible connections to manufacturer's torque tightening specifications.
- B. Prior to energization of switchboards, check with ground resistance tester phase-to-phase and phase-to-ground insulation resistance levels to ensure requirements are fulfilled.
- C. Prior to energization, check switchboards for electrical continuity of circuits, and for short-circuits.

### **3.04 ADJUSTING AND CLEANING**

- A. Adjust operating mechanisms for free mechanical movement.
- B. Touch-up scratched or marred surfaces to match original finishes.

### **3.05 GROUNDING**

- A. Provide equipment grounding connections for switchboards as indicated. Tighten connections to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounds.

### **3.06 DEMONSTRATION**

- A. Subsequent to wire and cable hook-ups, energize switchboards and demonstrate functioning in accordance with requirements. Where necessary, correct malfunctioning units, and then retest to demonstrate compliance.

**END OF SECTION**

## **262416 - PANELBOARDS**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Division-26 Basic Electrical Materials and Methods sections apply to work specified in this section.

#### **1.02 SUMMARY**

- A. Extent of panelboard and enclosure work, including cabinets and cutout boxes, is indicated by drawings and schedules, and as specified herein.
- B. Types of panelboards and enclosures required for the project include the following:
  - 1. Main distribution panel.
  - 2. Lighting and appliance panelboards.
- C. Fuses required in connection with installation of panelboards and enclosures are specified in another Division-26 section.
- D. Wires/cables, electrical boxes and fittings, and raceways required in conjunction with the installation of panelboards and enclosures are specified in other Division-16 sections.

#### **1.03 SUBMITTALS**

- A. Product Data: Submit manufacturer's data on panelboards and enclosures for each type of panelboard, accessory item and component specified.
- B. Shop Drawings: For panelboards include dimensioned plans, sections, and elevations. Show tabulations of installed devices, major features, and voltage rating. Include the following:
  - 1. Enclosure type with details for types other than NEMA 250, Type 1.
  - 2. Bus configuration and current ratings.
  - 3. Short-circuit current rating of panelboard.
  - 4. Features, characteristics, ratings, and factory settings of individual protective devices and auxiliary components.

- C. Wiring Diagrams: Submit wiring diagrams for panelboards showing connections to electrical power feeders and distribution branches.

#### **1.04 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of panelboards and enclosures, of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than five (5) years.
- B. Installer's Qualifications: A firm with at least five (5) years of successful installation experience on projects utilizing panelboards similar to those required for this project.
- C. Codes and Standards
  - 1. Electrical Code Compliance: Comply with applicable local code requirements of the authority having jurisdiction and NEC as applicable to installation, and construction of electrical panelboards and enclosures.
  - 2. UL Compliance: Comply with applicable requirements of UL 67, "Electric Panelboards," and UL's 50, 869, 486A, 486B, and 1053 pertaining to panelboards, accessories and enclosures. Provide panelboard units which are UL-listed and labeled as defined in NEC Article 10U.
  - 3. Special-Use Markings: Provide panelboards, constructed for special-use, with appropriate UL markings which indicate that they are suitable for special type of use/application.
  - 4. NEMA Compliance: Comply with NEMA Stds Pub/No. 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)," Pub/No. PB 1, "Panelboards," and Pub/No. PB 1.1, "Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less."

#### **1.05 SEQUENCING AND SCHEDULING**

- A. Coordinate installation of panelboards and enclosures with installation of wires/cables, electrical boxes and fittings, and raceway work.

### **PART 2 - PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements,

manufacturers offering electrical panelboard products which may be incorporated in the work include, but are not limited to, the following:

1. Cutler-Hammer Products, Eaton Corp.
2. General Electric Company.
3. Square D Company.

## **2.02 PANELBOARDS**

A. General: Except as otherwise indicated, provide panelboards, enclosures and ancillary components, of types, sizes, and ratings indicated, which comply with manufacturer's standard materials; with the design and construction in accordance with published product information; equip with proper number of unit panelboard devices as required for complete installation. Where types, sizes, or ratings are not indicated, comply with NEC, UL and established industry standards for those applications indicated including, but not limited to:

1. Outdoor Locations: NEMA 250, Type 3R.
2. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
3. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C.

B. Lighting and Power Panels

1. Panels shall be installed in code gauge galvanized sheet steel cabinets, minimum 16 gauge thickness, flush or surface mounted as indicated on the drawings. The panel sections shall be mounted away from the back of the cabinets in such a manner that there will be no space between the cabinet trims and frames. The gutter spaces on all sides, tops and bottoms, shall be of sufficient ventilation to prevent overheating of the circuit breakers. Each cabinet shall be complete with hinged doors, cylinder lock, directory frame and neatly typed directory charts. All panels shall be keyed alike provide six (6) spare keys. Install an angle piece on inside of each trim for ease of installation. Key system shall match college standard. Coordinate manufacture and type with college facilities department.
2. Each cabinet shall be provided with a steel trim having door-in-door construction. The fixed trim, unless otherwise indicated on the drawings, shall be set flush with wall surface and shall be fastened to the box by means of cadmium plated flat oval head steel machine screws. Trim shall be of same gauge as panel box. Each cabinet with an inner door not greater than 24" wide shall have the switch, fuse or circuit breaker and wiring compartment covered by a single large door attached to one vertical side of the trim by concealed steel hinges, equipped with non-ferrous pins, and shall close against rabbets on the other three sides. A small door less than 48 inches high shall be equipped with a lock having a roset for exposed barrel. A small door

- with vertical dimension greater than 48 inches shall have a vault handle and three-point catch (arranged to fasten door at top, bottom and center) in addition to lock. Column type panelboards shall have bolt-on trim covering wiring trough with hinged door over circuit breakers. Each cabinet with inner door access greater than 24 inches wide shall have the switch, fuse or circuit breaker and wiring compartments covered by double doors. Each door shall be attached to a vertical side of the trim by steel hinges equipped with non-ferrous pins, and shall close against rabbets at top and bottom. Doors shall be fastened to the rabbets by cadmium plated flat over headed steel machine screws. The switch and fuse or circuit breaker compartments shall be covered by double overlapping small doors. Each small door shall be single steel hinges equipped with non-ferrous pins, and shall close against rabbets at the top and bottom. The right hand small door shall be equipped with a vault handle and a three-point (arrange to fasten the small door to the larger door at the top and bottom, and to fasten to the left hand small door at the side) and a lock having a rosette for exposed barrel.
3. The branch circuit breakers, in general, shall be molded case, bolt-on type, rated 10,000 A.I.C. at 120/208V, 100 ampere frame, thermal magnetic trip, single, two or three pole as shown on the drawings. All multiple pole breakers shall be single handle, common trip. Where breakers of larger capacity are required, they shall have circuit characteristics as shown on the drawings. Provide main circuit breakers for panels where indicated on the drawings. Buswork shall be hard drawn 98% conductivity copper. Where indicated on the drawings, provide in all panels in which "green ground" conductors terminate, an isolated copper ground bar with terminals as isolated copper ground bar with terminals as required. All isolated copper ground bars within the panels shall be interconnected as indicated on the drawings.
  4. Provide two (2) tone lamicoid nameplates on each light and power panel indicating voltages. Nameplates shall be screwed on to the exterior of panel door.
  5. Panel sections shall be such that no live parts are exposed after installation. They shall be so arranged that each breaker is readily removable from the panel without disturbing adjacent breakers.
  6. Phase legs shall be alternately bussed to each circuit breaker in a manner to affect balancing the branch circuit connections as nearly as possible over each phase. Submit final version of panel schedule after load balancing.
  7. Circuit breakers for switching lights at panelboards shall be indicated as Type SWD.



8. Circuit breakers for equipment marked Type HACR shall be indicated as Type HACR.
  9. Conductor connectors shall be mechanical type for main, neutral, and ground lugs and buses.
- C. Power Distribution Panelboards
1. Provide dead-front safety type power distribution panelboards as indicated, with panelboard switching and protective devices in quantities, ratings, types, and with arrangement shown; with anti-turn solderless pressure type main lug connectors approved for use with copper conductors. Select unit with feeders connecting at top or bottom of panel.
  2. Equip with copper bus bars with not less than 98-percent conductivity hard drawn copper, and with full-sized neutral bus; provide suitable lugs on neutral bus for outgoing feeders requiring neutral connections. Provide molded-case main and branch circuit-breaker types for each circuit, with toggle handles that indicate when tripped. Where multiple-pole breakers are indicated, provide with common trip so overload on one pole will trip all poles simultaneously. Provide panelboards with bare uninsulated grounding bars bolted to enclosures. Select enclosures fabricated by same manufacturer as panelboards, which mate and match properly with panelboards.
  3. Circuit breakers, 200A and larger shall have trip units interchangeable within frame size.
  4. Circuit breakers, 400A and larger shall be field-adjustable short-time and continuous current settings.
  5. Lugs shall be mechanical lugs and power-distribution connectors for number, size, and material of conductors indicated.
  6. Shunt trip shall be provided where indicated.
  7. Fusible switch shall conform to NEMA KS 1, Type HD with clips to accommodate specified fuses, handle lockable.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine areas and conditions under which panelboards and enclosures are to be installed, and notify Contractor in writing of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory

conditions have been corrected in a manner acceptable to Installer.

### **3.02 INSTALLATION OF PANELBOARDS**

- A. Install panelboards and enclosures as indicated in accordance with manufacturer's written instructions, NEMA PB1.1, applicable requirements of NEC standards and NECA's "Standards of Installation," and in compliance with recognized industry practices to ensure that products fulfill requirements.
- B. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors.
- C. Fasten enclosures firmly to walls and structural surfaces, plumbing and rigid ensuring that they are permanently and mechanically anchored without distorting the box.
- D. Provide properly wired electrical connections for panelboards within enclosures.
- E. Type-up the panelboard's circuit directory card upon completion of installation work and after properly balancing the loads.
- F. Mounting Heights: Top of trim 74 inches above finished floor, unless otherwise indicated.
- G. Install filler plates in unused spaces.
- H. Wiring in Panel Gutters: Arrange conductors into groups, and bundle and wrap with wire ties after completing load balancing.
- I. Identify field-installed wiring and components and provide warning signs as specified in Division 26 Section "Electrical Identification."

### **3.03 GROUNDING**

- A. Provide equipment grounding connections for panelboard enclosures as indicated. Tighten connections to comply with tightening torques specified in UL 486A to assure permanent and effective grounds. Provide ground continuity to main electrical ground bus.

### **3.04 FIELD QUALITY CONTROL**

- A. Prior to energization of electrical circuitry, check all accessible connections to manufacturer's tightening torque specifications.
- B. Prior to energization of panelboards, check with ground resistance tester phase-to-phase and phase-to-ground insulation resistance levels to ensure

requirements are fulfilled.

- C. Prior to energization, check panelboards for electrical continuity of circuits, and for short-circuits.

### **3.05 TESTING**

- A. After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
- B. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
- C. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units, and retest.

### **3.06 BALANCING LOADS**

- A. After substantial completion, but not more than two (2) months after Final Acceptance, conduct load-balancing measurements and make circuit changes as follows:
  - 1. Perform measurements during period of normal working load as advised by Owner.
  - 2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility. Make special arrangements with Owner to avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
  - 3. Recheck loads after circuit changes during normal load period. Record all load readings before and after changes and submit test records.
  - 4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as required to meet this minimum requirement.

### **3.07 INFRARED SCANNING**

- A. After Substantial Completion, but not more than two (2) months after Final Acceptance, perform an infrared scan of each panelboard. Remove fronts to make joints and connections accessible to a portable scanner.
- B. Follow-Up Infrared Scanning: Perform an additional follow-up infrared

scanning of each panelboard eleven (11) months after date of Substantial Completion.

- C. Instrument: Use an approved infrared scanning device designed to measure temperature or detect significant deviations from normal values. Provide calibration record for device used.
- D. Record of Infrared Scanning: Prepare a certified report identifying panelboards checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

### **3.08 ADJUSTING AND CLEANING**

- A. Adjust operating mechanisms for free mechanical movement.
- B. Set field-adjustable switches and circuit-breaker trip ranges as required.
- C. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish.

### **3.09 DEMONSTRATION**

- A. Subsequent to wire and cable hook-ups, energize panelboards and demonstrate functioning in accordance with requirements. Where necessary, correct malfunctioning units, and then retest to demonstrate compliance.

**END OF SECTION**

## **262726 - WIRING DEVICES - UNDER 600 VOLTS**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### **1.02 SUMMARY**

- A. This Section includes the following:
  - 1. Receptacles.
  - 2. Ground Fault Circuit Interrupter Receptacles.
  - 3. Snap Switches.
  - 4. Wall Plates.
- B. Related Sections: The following sections contain requirements that relate to this section:
  - 1. Division 26 Section 262816 - "Circuit Disconnects-Below 600 Volts" for devices other than snap switches and plug/receptacle sets used as disconnects for motors.
  - 2. Division 26 Section 260553 - "Electrical Identification" for requirements for legends to be engraved on wall plates.

#### **1.03 SUBMITTALS**

- A. Product data for each type of product specified.
  - 1. Receptacles
  - 2. Switches
- B. Samples of those products indicated for sample submission in Design Professional comments on product data submittal. Include color and finish samples of device plates and other items per Architect's request.

#### **1.04 QUALITY ASSURANCE**

- A. Regulatory Requirements: Comply with provisions of the following codes.
  - 1. NFPA 70 "National Electrical Code".
    - a. UL and NEMA Compliance: Provide wiring devices which are

listed and labeled by UL and comply with applicable UL and NEMA standards.

### **1.05 SEQUENCE AND SCHEDULING**

- A. Schedule installation of finish plates after the surface upon which they are installed has received final finish.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
  - 1. General Electric
  - 2. Hubbell Inc.
  - 3. Arrow Hart
  - 4. Leviton.

### **2.02 WIRING DEVICES**

- A. General: Provide wiring devices, in types, characteristics, grades, colors, and electrical ratings for applications indicated which are UL listed and which comply with NEMA WD 1 and other applicable UL and NEMA standards. Provide color devices and wall plates except as specified. Verify color selections with Design Professional.
- B. Receptacles: As scheduled in Table 1 in Part 3 below. Comply with UL 498 and NEMA WD1
  - 1. All receptacles installed shall be grounding type, with grounding pin slot connected to device ground screw for ground wire connection to conduit system.
- C. Receptacles, Heavy Duty: Provide pin and sleeve design receptacles conforming to UL 498. Comply with UL 1010 where installed in hazardous locations. Duplex convenience receptacles shall be parallel blade, totally enclosed in moulded composition base, third leg grounded to conduit system.
- D. Ground-Fault Interrupter (GFI) Receptacles: As indicated in Table 1 in Part 3 below. Provide unit designed for installation in a 2-3/4 inch deep outlet box without adapter, grounding type, Class A, Group 1, per UL Standard 943. Device shall be capable of detecting a current leak of 25 milliamperes. Provide feed thru terminals.

- E. Local Switches: Comply with UL 20 and NEMA WD1. Switches shall be toggle type, A.C. rated 20 amperes, 120/277 volts, quiet-type with silent operating mechanism, totally enclosed in a moulded composition base and side wired. Switches shall be single pole, three or four-way as indicated. Where lock type local switches are indicated, these shall be similar to above specification with key operator; provide, to Owner, one (1) key for each switch installed. See Table 2 in Part 3 below.
- F. Where receptacles are indicated on the drawings for connection of specific equipment, provide "Specification Grade" receptacles, of ampere and voltage characteristics, and required number of poles, indicated by data on the drawings. All receptacles shall be triple wipe, copper contacts. For each special receptacle installed, furnish a suitable cord-grip-type attachment cap. These attachment caps shall be connected, under this Section, to the cords when so directed by the Design Professional. It is the intention of this specification to provide connections for, leave systems completely connected and in operating condition.

Therefore, ascertain the particular means of attachment for all portable or permanently mounted electrical devices or equipment, as outlined above, and provide a solid or receptacle connection as determined by the equipment supplied, provide and attach suitable plugs, as specified above and leave equipment ready for operation.

- G. Weatherproof Receptacles: Provide corrosion-resistant receptacle in a cast metal box with a gasketed, weatherproof, cast-metal cover plate and a gasketed cap over each receptacle opening. The cap(s) shall be provided with a spring-hinged flap. Receptacle shall be UL approved for use in "wet location". All weatherproof receptacles shall be protected by a GFC broken whether or not indicated on drawings.

## **2.03 WIRING DEVICE ACCESSORIES**

- A. Wall Plates: Single and combination, of types, sizes, and with ganging and cutouts as indicated. Provide plates which mate and match with wiring devices to which attached. Provide metal screws for securing plates to devices with screw heads to match finish of plates. Provide wall plate to match wiring devices except as otherwise indicated. Provide wall plates with engraved legend where indicated. Conform to requirements of Section "Electrical Identification." Provide plates possessing the following additional construction features:
2. Material and Finish: Steel plate, galvanized.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION OF WIRING DEVICES AND ACCESSORIES**

- A. Install wiring devices and accessories as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and in accordance with recognized industry practices to fulfill project requirements.
- B. Coordinate with other Work, including painting, electrical boxes and wiring installations, as necessary to interface installation of wiring devices with other Work.
- C. Install wiring devices only in electrical boxes which are clean; free from building materials, dirt, and debris.
- D. Install galvanized steel wallplates in unfinished spaces.
- E. Install wiring devices after wiring work is completed.
- F. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486A. Use properly scaled torque indicating hand tool.

**3.02 PROTECTION**

- A. Protect installed components from damage. Replace damaged items prior to final acceptance.

**3.03 FIELD QUALITY CONTROL**

- A. Testing: Prior to energizing circuits, test wiring for electrical continuity, and for short-circuits. Ensure proper polarity of connections is maintained. Subsequent to energizing, test wiring devices and demonstrate compliance with requirements, operating each operable device at least six times.
- B. Test ground fault interrupter operation with both local and remote fault simulations in accordance with manufacturer recommendations.

**3.04 TABLE 1**

**RECEPTACLES**

DESIGN-NATION (1)	CURRENT RATING AMPS	VOLTAGE RATING	SINGLE/ DUPLEX	CONFIG- URATION	UL GRADE	NOTES
-	20	125	DUPLEX	5-20R	HEAVY DUTY	
WP	20	125	DUPLEX	5-20R	HEAVY DUTY WEATHERPROOF	



WP GFI      20                      125                      DUPLEX                      5-20R                      HEAVY DUTY  
 INTEGRAL GFI (2)

NOTES

- (1) Letter designations are used where symbols alone do not clearly designate on plans locations where specific receptacle types are used.
- (2) Protects downstream receptacles on same circuit.

**3.05 TABLE 2**

**LOCAL SWITCHES**

DESIGN-NATION (1)	TYPICAL APPLICATION	RATING	VOLTAGE RATING (AC)	POLES	UL GRADE	NOTES
S	CONTROL LIGHTS	20A	120/277	1	HEAVY DUTY	-
S <sup>3</sup>	CONTROL LIGHTS	20A	120/277	3-way	HEAVY DUTY	-

NOTES

- (1) For Local switches, designation is the same as the symbol used on plans for the device. Type of switch is determined from plan context including type of device or circuit being controlled.

**END OF SECTION**

## **262816 - CIRCUIT DISCONNECTS - BELOW 600 VOLTS**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Requirements of the following Division 26 Sections apply to this section:
  - 1. Section 260500 - Basic Electrical Materials and Methods
  - 2. Section 262813 - Fuses
  - 3. Section 260553 - Electrical Identification.

#### **1.02 SUMMARY**

- A. This Section includes circuit disconnects and related wiring.
- B. Related Sections: The following sections contain requirements that relate to this section:
  - 2. Section 260553 - "Electrical Identification".
  - 3. Section 262813 - "Fuses", for fuses in fusible switches.
  - 4. Section 260500 - "Basic Electrical Materials and Methods".

#### **1.03 SUBMITTALS**

- A. Product data for each type of product specified.
- B. Maintenance data for circuit disconnects for inclusion in Operation and Maintenance Manual specified in Division 1 and Division 26 Section "Basic Electrical Requirements."

#### **1.04 QUALITY ASSURANCE**

- A. Electrical Component Standards: Provide components complying with, NFPA 70 "National Electrical Code" and which are listed and labeled by UL. Comply with UL Standard 98, UL-869, UL-894 and UL-977, and NEMA Standard KS 1.

#### **1.05 JOB CONDITIONS**

- A. Visit each site where the work is required, survey the existing conditions and become familiar with the difficulties which will affect the execution and completion of the work. Investigation shall be made of the nature and location of the work, the general and local conditions, particularly those

bearing upon the work required, transportation, disposal, handling and storage of materials, availability of labor, water, drainage, electric power, and physical conditions at the site and character of equipment and facilities needed preliminary to and during the prosecution of the work and all other matters upon which information is reasonably obtainable and which can in any way affect the work or the cost thereof under the Contract.

- B. Investigation shall also be made of the character, quality and quantity of electric systems components, arrangement, supports, attachments to the building structure, and materials to be encountered insofar as this information is reasonably ascertainable from an inspection of the site. Any failure to become acquainted with all the available information will not be considered as a basis for not successfully fulfilling all terms of the Contract, regardless of the difficulty or cost, without extra compensation.
- C. Field Measurements: Verify and check locations of all building system components, both new and existing including, but not limited to: Structural systems, walls, floors, ceilings, plumbing systems and fixtures, electrical systems and fixtures, fire protection systems, and heating, ventilating and air conditioning systems and their components. Perform accurate field measurements before preparing shop drawings, and before performing any work record all measurements on shop drawings.

#### **1.06 SEQUENCING AND SCHEDULING**

- A. Sequence and coordinate the work of this section of the Project Manual with the scheduling requirements set forth in the Contract Documents. Review the approved schedule with the Design Professional, sub-contractors, manufacturers, vendors, suppliers and all other Contractors. Schedule and sequence all work with the adjoining work, and work of others such that the all work can be accomplished concurrently during the same time period.

#### **1.07 PROTECTIVE COORDINATION STUDY**

- A. The Contractor shall utilize his professional engineers, in coordination with Con-Edison, to prepare and submit a protective coordination study within thirty (30) calendar days following the approval of circuit protective devices, including fuses and overloads. The study shall include calculations and composite time-current characteristic coordination curves to demonstrate proper coordination of protective devices to be installed to protect equipment and conductors against fault currents and sustained overload conditions for conductors and equipment installed under this contract. The study shall further indicate proper coordination with existing protective devices associated with the supply of power to each building and to equipment provided under this Contract.

The Contractor shall test and calibrate all protective devices in accordance with the manufacturers' specification prior to making the proper device

setting and before the initial energization of the conductors and equipment. Field settings of adjustable protective devices shall be shown on electrical drawings that show the proper wiring of the protective devices and the rating and wiring on nonadjustable protective devices.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
1. ITE Gould
  2. Crouse-Hinds Co.
  3. Cutler-Hammer Inc.
  4. General Electric Co.
  5. Square D. Company.

### **2.02 CIRCUIT DISCONNECT SWITCHES**

- A. General: Provide where shown, or as required, heavy-duty, metal enclosed, externally-operated fused, or unfused, safety switches, of such type and size as required to properly protect or disconnect the load for which they are intended. The operating mechanism shall be so designed that the switches may be locked in the "on" or "off" positions. Provide NEMA 1 enclosure, except for outdoor switches and other indicated locations provide NEMA 3R enclosures with raintight hubs. Provide units with horsepower ratings suitable to the loads served.
- B. Fusible Switches: Heavy duty switches, with fuses of current ratings indicated. Each fused safety switch shall be left equipped with a complete set of class RK1 fuses.
- C. Non-fusible Disconnects: Heavy duty switches of classes and current ratings as indicated.
- D. Bolted Pressure Switches: Bolted pressure switches conforming to and listed under UL Standard 977; single or double-throw arrangement as indicated. For fusible units provide fuses as indicated.
- E. Service Switches: Heavy duty fusible switches. UL listed for use as service equipment under UL Standard 98 or 869.

### **2.03 ACCESSORIES**

- A. Electrical Interlocks: Provide number and arrangement of interlock contacts in switches as indicated.

- B. Captive Fuse Pullers: Provide built-in fuse pullers arranged to facilitate fuse removal.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION OF CIRCUIT AND MOTOR DISCONNECTS AND WIRING**

- A. General: Provide circuit disconnect switches as indicated and where required by the above Code. Comply with switch manufacturers' printed installation instructions.
- B. Provide all required conduit, wiring and safety switches for all electrical equipment installed or connected under this Division.
- C. All of the aforementioned devices and equipment, where so indicated, shall be arranged in groups, as shown on the drawings. The equipment shall be neatly wired through rigid conduit or with wiring trough having hinged or screw-on covers. If screw-on covers are used, they shall be in sections which can be easily handled. Submit shop drawings of supports and equipment arrangement for approval, before fabrication and installation.

#### **3.02 FIELD QUALITY CONTROL**

- A. Testing: Subsequent to completion of installation of electrical disconnect switches, energize circuits and demonstrate capability and compliance with requirements. Except as otherwise indicated, do not test switches by operating them under load. However, demonstrate switch operation through six opening/closing cycles with circuit unloaded. Open each switch enclosure for inspection of interior, mechanical and electrical connections, fuse installation, and for verification of type and rating of fuses installed. Correct deficiencies, then retest to demonstrate compliance. Remove and replace defective units with new units and retest.

**END OF SECTION**

## **262913 - ENCLOSED MOTOR CONTROLLERS**

### **PART 1 – GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Requirements of Division 26 sections apply to this section.

#### **1.02 SUMMARY**

- A. This Section includes AC general-purpose controllers rated 600V and less that are supplied as enclosed units.
- B. Related Sections include the following:
  - 1. Division 26 Section "Fuses" for fuses in fusible switches.

#### **1.03 SUBMITTALS**

- A. Product Data: For each type of enclosed controller. Include dimensions and manufacturer's technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each enclosed controller.
  - 1. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:
    - a. Enclosure types and details.
    - b. Nameplate legends.
    - c. Short-circuit current rating of integrated unit.
    - d. UL listing for series rating of overcurrent protective devices in combination controllers.
    - e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices in combination controllers.
  - 2. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
- C. Coordination Drawings: Floor plans showing dimensioned layout, required working clearances, and required area above and around enclosed

- controllers where pipe and ducts are prohibited. Show enclosed controller layout and relationships between electrical components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate field measurements.
- D. Manufacturer Seismic Qualification Certification: Submit certification that enclosed controllers, accessories, and components will withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work." Include the following:
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
    - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
    - b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
  2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- F. Field Test Reports: Written reports specified in Part 3.
- G. Manufacturer's field service report.
- H. Maintenance Data: For enclosed controllers and components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Closeout Procedures," include the following:
1. Routine maintenance requirements for enclosed controllers and all installed components.
  2. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
- I. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.

- J. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed and arrange to demonstrate that dip switch settings for motor running overload protection suit actual motor to be protected.

#### **1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Maintain, within 100 miles (160 km) of Project site, a service center capable of providing training, parts, and emergency maintenance and repairs.
- B. Testing Agency Qualifications: An independent testing agency with the experience and capability to satisfactorily conduct the testing indicated, as documented according to ASTM E 548.
- C. Source Limitations: Obtain enclosed controllers of a single type through one source from a single manufacturer.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Comply with NFPA 70.
- F. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed controllers, including clearances between enclosed controllers, and for adjacent surfaces and other items. Comply with indicated maximum dimensions.

#### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Store enclosed controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect enclosed controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.
- B. If stored in areas subjected to weather, cover enclosed controllers to protect from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside controllers; install electric heating of sufficient wattage to prevent condensation.

#### **1.6 PROJECT CONDITIONS**

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:



1. Notify Architect at least two days in advance of proposed utility interruptions. Identify extent and duration of utility interruptions.
2. Indicate method of providing temporary utilities.
3. Do not proceed with utility interruptions without Architect's written permission.

#### **1.07 COORDINATION**

- A. Coordinate layout and installation of enclosed controllers with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."
- C. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 7 Section "Roof Accessories."
- D. Coordinate features of enclosed controllers and accessory devices with pilot devices and control circuits to which they connect.
- E. Coordinate features, accessories, and functions of each enclosed controller with ratings and characteristics of supply circuit, motor, required control sequence, and duty cycle of motor and load.

#### **1.08 EXTRA MATERIALS**

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Spare Fuses: Furnish one spare for every five installed, but not less than one set of three of each type and rating.
  2. Indicating Lights: Two of each type installed.

### **PART 2 - PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Manual and Magnetic Enclosed Controllers:
  - a. Square D Co.
  - b. ABB Power Distribution, Inc.; ABB Control, Inc. Subsidiary.
  - c. Eaton Corp.; Cutler-Hammer Products.
  - d. General Electrical Distribution & Control.
  - e. Rockwell Automation Allen-Bradley Co.; Industrial Control Group.
  - f. Siemens/Furnas Controls.
  
2. Variable-Frequency Controllers:
  - a. Square D Co.
  - b. ABB Power Distribution, Inc.; ABB Control, Inc. Subsidiary.
  - c. Danfoss Inc.; Danfoss Electronic Drives Div.
  - d. Eaton Corp.; Cutler-Hammer Products.
  - e. General Electrical Distribution & Control.
  - f. MagneTek Drives and Systems.
  - g. Rockwell Automation Allen-Bradley Co.; Industrial Control Group.
  - h. Siemens/Furnas Controls.

## **2.02 MANUAL ENCLOSED CONTROLLERS**

- A. Description: NEMA ICS 2, general purpose, Class A, with toggle action and overload element.

## **2.03 MAGNETIC ENCLOSED CONTROLLERS**

- A. Description: NEMA ICS 2, Class A, full voltage, nonreversing, across the line, unless otherwise indicated.
  
- B. Control Circuit: 120 V; obtained from integral control power transformer of sufficient capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity.
  
- C. Combination Controller: Factory-assembled combination controller and disconnect switch.
  1. Fusible Disconnecting Means: NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 947-4-1, as certified by a nationally recognized testing laboratory.
  2. Nonfusible Disconnecting Means: NEMA KS 1, heavy-duty, nonfusible switch.
  3. Circuit-Breaker Disconnecting Means: NEMA AB 1, motor-circuit protector with field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.

- D. Overload Relay: Ambient-compensated type with inverse-time-current characteristic and NEMA ICS 2, Class 20 tripping characteristic. Provide with heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect and with appropriate adjustment for duty cycle.
- E. Adjustable Overload Relay: Dip switch selectable for motor running overload protection with NEMA ICS 2, Class 20 tripping characteristic, and selected to protect motor against voltage and current unbalance and single phasing. Provide relay with Class II ground-fault protection, with start and run delays to prevent nuisance trip on starting.
- F. Multispeed Enclosed Controller: Match controller to motor type, application, and number of speeds; include the following accessories:
  - 1. Compelling relay to ensure motor will start only at low speed.
  - 2. Accelerating relay to ensure properly timed acceleration through speeds lower than that selected.
  - 3. Decelerating relay to ensure automatically timed deceleration through each speed.
- G. Star-Delta Controller: NEMA ICS 2, closed transition with adjustable time delay.
- H. Part-Winding Controller: NEMA ICS 2, closed transition with separate overload relays for starting and running sequences.
- I. Autotransformer Reduced-Voltage Controller: NEMA ICS 2, closed transition.
- J. Solid-State, Reduced-Voltage Controller: NEMA ICS 2, suitable for use with NEMA MG 1, Design B, polyphase, medium induction motors.
  - 1. Adjustable acceleration rate control utilizing voltage or current ramp, and adjustable starting torque control with up to 500 percent current limitation for 20 seconds.
  - 2. Surge suppressor in solid-state power circuits providing 3-phase protection against damage from supply voltage surges 10 percent or more above nominal line voltage.
  - 3. LED indicators showing motor and control status, including the following conditions:
    - a. Control power available.
    - b. Controller on.
    - c. Overload trip.
    - d. Loss of phase.
    - e. Shorted silicon-controlled rectifier.

4. Automatic voltage-reduction controls to reduce voltage when motor is running at light load.
5. Motor running contactor operating automatically when full voltage is applied to motor.

#### **2.04 VARIABLE-FREQUENCY CONTROLLERS**

- A. Description: NEMA ICS 2, pulse-width-modulated, variable-frequency controller; listed and labeled as a complete unit and arranged to provide variable speed of a NEMA MG 1, Design B, 3-phase, induction motor by adjusting output voltage and frequency.
- B. Design and Rating: Match load type such as fans, blowers, and pumps; and type of connection used between motor and load such as direct or through a power-transmission connection.
- C. Isolation Transformer: Match transformer voltage ratings and capacity to system and motor voltages; and controller, motor, drive, and load characteristics.
- D. Output Rating: 3-phase; 6 to 60 Hz, with voltage proportional to frequency throughout voltage range.
- E. Starting Torque: 100 percent of rated torque or as indicated.
- F. Speed Regulation: Plus or minus 1 percent.
- G. Ambient Temperature: 0 to 40 deg C.
- H. Efficiency: 95 percent minimum at full load and 60 Hz.
- I. Minimum Displacement Power Factor at Input Terminals: 95 percent.
- J. Isolated control interface allows controller to follow control signal over an 11:1 speed range.
  1. Electrical Signal: 4 to 20 mA at 24 V.
  2. Pneumatic Signal: 3 to 15 psig (20 to 104 kPa).
- K. Internal Adjustability: Include the following internal adjustment capabilities:
  1. Minimum Speed: 5 to 25 percent of maximum rpm.
  2. Maximum Speed: 80 to 100 percent of maximum rpm.
  3. Acceleration: 2 to 22 seconds.
  4. Deceleration: 2 to 22 seconds.
  5. Current Limit: 50 to 110 percent of maximum rating.

- L. Multiple-Motor Capability: Controller suitable for service to multiple motors and having a separate overload relay and protection for each controlled motor. Overload relay shall shut off controller and motors served by it when overload relay is tripped.
- M. Self-protection and reliability features shall include the following:
  - 1. Input transient protection by means of surge suppressors.
  - 2. Snubber networks to protect against malfunction due to system voltage transients.
  - 3. Motor Overload Relay: Adjustable and capable of NEMA 250, Class 10 performance.
  - 4. Notch filter to prevent operation of the controller-motor-load combination at a natural frequency of the combination.
  - 5. Instantaneous overcurrent trip.
  - 6. Loss-of-phase protection.
  - 7. Reverse-phase protection.
  - 8. Under- and overvoltage trips.
  - 9. Overtemperature trip.
  - 10. Short-circuit protection.
- N. Automatic Reset/Restart: Attempt three restarts after controller fault or on return of power after an interruption and before shutting down for manual reset or fault correction. Restarting during deceleration shall not damage controller, motor, or load.
- O. Power-Interruption Protection: Prevents motor from re-energizing after a power interruption until motor has stopped.
- P. Status Lights: Door-mounted LED indicators shall indicate the following conditions:
  - 1. Power on.
  - 2. Run.
  - 3. Overvoltage.
  - 4. Line fault.
  - 5. Overcurrent.
  - 6. External fault.
- Q. Panel-Mounted Operator Station: Start-stop and auto-manual selector switches with manual speed control potentiometer and elapsed time meter.
- R. Indicating Devices: Meters or digital readout devices and selector switch, mounted flush in controller door and connected to indicate controller output current, voltage, and frequency.

- S. Manual Bypass: Magnetic contactor shall be arranged to safely transfer motor between controller output and bypass controller circuit when motor is at zero speed. Controller-off-bypass, selector-switch indicator lights set and indicate mode selection.
- T. Integral Disconnecting Means: NEMA KS 1, nonfusible switch with lockable handle.
- U. Bypass Controller: NEMA ICS 2, full-voltage, nonreversing enclosed controller with across-the-line starting capability in manual-bypass mode. Provide motor overload protection under both modes of operation with control logic that allows common start-stop capability in either mode.
- V. Isolating Switch: Non-load-break switch arranged to isolate variable-frequency controller and permit safe troubleshooting and testing, both energized and de-energized, while motor is operating in bypass mode.
- W. Remote Indicating Circuit Terminals: Mode selection, controller status, and controller fault.

## **2.5 ENCLOSURES**

- A. Description: Flush- or surface-mounted cabinets as indicated. NEMA 250, Type 1, unless otherwise indicated to comply with environmental conditions at installed location.
  - 1. Outdoor Locations: NEMA 250, Type 3R.
  - 2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
  - 3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
  - 4. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C.

## **2.6 ACCESSORIES**

- A. Devices shall be factory installed in controller enclosure, unless otherwise indicated.
- B. Pushbutton Stations, Pilot Lights, and Selector Switches: NEMA ICS 2, heavy-duty type.
- C. Stop and Lockout Pushbutton Station: Momentary-break, push-button station with a factory-applied hasp arranged so padlock can be used to lock push button in depressed position with control circuit open.
- D. Control Relays: Auxiliary and adjustable time-delay relays.
- E. Elapsed Time Meters: Heavy duty with digital readout in hours.

- F. Meters: Panel type, 2-1/2-inch (64-mm) minimum size with 90- or 120-degree scale and plus or minus 2 percent accuracy. Where indicated, provide transfer device with an off position. Meters shall indicate the following:
1. Ammeter: Output current, with current sensors rated to suit application.
  2. Voltmeter: Output voltage.
  3. Frequency Meter: Output frequency.
- G. Multifunction Digital-Metering Monitor: UL-listed or -recognized, microprocessor-based unit suitable for three- or four-wire systems and with the following features:
1. Inputs from sensors or 5-A current-transformer secondaries, and potential terminals rated to 600 V.
  2. Switch-selectable digital display of the following:
    - a. Phase Currents, Each Phase: Plus or minus 1 percent.
    - b. Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent.
    - c. Phase-to-Neutral Voltages, Three Phase: Plus or minus 1 percent.
    - d. Three-Phase Real Power: Plus or minus 2 percent.
    - e. Three-Phase Reactive Power: Plus or minus 2 percent.
    - f. Power Factor: Plus or minus 2 percent.
    - g. Frequency: Plus or minus 0.5 percent.
    - h. Integrated Demand with Demand Interval Selectable from 5 to 60 Minutes: Plus or minus 2 percent.
    - i. Accumulated energy, in megawatt hours (joules), plus or minus 2 percent; stored values unaffected by power outages for up to 72 hours.
  3. Mounting: Display and control unit flush or semiflush mounted in instrument compartment door.
- H. Phase-Failure and Undervoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connection. Provide adjustable undervoltage setting.
- I. Current-Sensing, Phase-Failure Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connection; arranged to operate on phase failure, phase reversal, current unbalance of from 30 to 40 percent, or loss of supply voltage; with adjustable response delay.

## **2.07 FACTORY FINISHES**

- A. Manufacturer's standard prime-coat finish ready for field painting.

- B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested enclosed controllers before shipping.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine areas and surfaces to receive enclosed controllers for compliance with requirements, installation tolerances, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.02 APPLICATIONS**

- A. Select features of each enclosed controller to coordinate with ratings and characteristics of supply circuit and motor; required control sequence; duty cycle of motor, drive, and load; and configuration of pilot device and control circuit affecting controller functions.
- B. Select horsepower rating of controllers to suit motor controlled.

#### **3.03 INSTALLATION**

- A. See Division 16 Section "Basic Electrical Materials and Methods" for general installation requirements.
- B. For control equipment at walls, bolt units to wall or mount on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Division 26 Section "Basic Electrical Materials and Methods."
- C. Install freestanding equipment on concrete bases complying with Division 3 Section "Cast-in-Place Concrete."
- D. Comply with mounting and anchoring requirements indicated on Drawings for seismic.
- E. Enclosed Controller Fuses: Install fuses in each fusible switch. Comply with requirements in Division 26 Section "Fuses."

#### **3.04 IDENTIFICATION**



- A. Identify enclosed controller components and control wiring according to Division 26 Section "Basic Electrical Materials and Methods, Electrical Identification."

### **3.05 CONTROL WIRING INSTALLATION**

- A. Install wiring between enclosed controllers according to Division 26 Section "Conductors and Cables."
- B. Bundle, train, and support wiring in enclosures.
- C. Connect hand-off-automatic switch and other automatic-control devices where applicable.
  - 1. Connect selector switches to bypass only manual- and automatic-control devices that have no safety functions when switch is in hand position.
  - 2. Connect selector switches with enclosed controller circuit in both hand and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

### **3.06 CONNECTIONS**

- A. Conduit installation requirements are specified in other Division 16 Sections. Drawings indicate general arrangement of conduit, fittings, and specialties.
- B. Ground equipment.
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### **3.07 FIELD QUALITY CONTROL**

- A. Prepare for acceptance tests as follows:
  - 1. Test insulation resistance for each enclosed controller bus, component, connecting supply, feeder, and control circuit.
  - 2. Test continuity of each circuit.
- B. Testing: Owner will engage a qualified testing agency to perform the following field quality-control testing:
- C. Testing: Engage a qualified testing agency to perform the following field quality-control testing:

- D. Testing: Perform the following field quality-control testing:
1. Perform each electrical test and visual and mechanical inspection indicated in NETA ATS, Sections 7.5, 7.6, and 7.16.
  2. Certify compliance with test parameters.
  3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- E. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including pretesting and adjusting solid-state controllers.
- F. Test Reports: Prepare a written report to record the following:
1. Test procedures used.
  2. Test results that comply with requirements.
  3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

**3.08 ADJUSTING**

- A. Set field-adjustable switches and circuit-breaker trip ranges.

**3.09 CLEANING**

- A. Clean enclosed controllers internally, on completion of installation, according to manufacturer's written instructions. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

**3.10 STARTUP SERVICE**

- A. Engage a factory-authorized service representative to perform startup service.
- B. Verify that enclosed controllers are installed and connected according to the Contract Documents.
- C. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 16 Sections.
- D. Complete installation and startup checks according to manufacturer's written instructions.

**3.11 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain enclosed controllers [and variable-frequency drives].
1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.
  2. Review data in maintenance manuals. Refer to Division 1 Section "Closeout Procedures."
  3. Review data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
  4. Schedule training with Owner, through Architect, with at least seven days' advance notice.

**END OF SECTION**

## **262923 VARIABLE FREQUENCY DRIVES**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION**

- A. Provide all materials, equipment and perform all operations for the complete installation of Variable Frequency Drives (VFD's) for use on AC circuits rated 600 V or less and the related Work as indicated on the Drawings, specified herein and required for the project.

#### **1.02 RELATED SECTIONS**

- A. Section 260100- "Electrical General Requirements" applies to Work specified in this Section.

#### **1.03 REFERENCES**

- A. All materials and Work shall conform to the latest industry standards, all applicable requirements included in the below references, specification requirements, and all applicable codes and requirements of the local authorities having jurisdiction, whichever are more stringent. 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.
  1. IEEE C62.41 - Recommended Practice for Surge Voltages in Low Voltage (1000 Volt and Less) Power Systems.
  2. IEEE 519 - Guidelines for Harmonic Content and Control.
  3. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
  4. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
  5. NEMA ICS 7 - Industrial Controls and Systems; Adjustable Speed Drives.
  6. NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems.
  7. NETA Standard ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
  8. NFPA 70 - National Electrical Code (NEC).
  9. UL 486A - Wire Connectors and Soldering Lugs for Use With Copper Conductors.
  10. UL 508 - Industrial Control Equipment.
  11. UL 508C - Power Conversion Equipment.
  12. UL 1449, 2<sup>nd</sup> Edition - Transient Voltage Surge Suppressors.

#### **1.04 SUBMITTALS**

- A. Submit manufacturer's latest published literature for approval under the provisions of Section 260100 - "Electrical General Requirements".
- B. Product Data: Provide catalog sheets showing enclosure type, voltage, controller size, ratings and size of switching and overcurrent protective devices (including

factory settings), short circuit ratings, dimensions, and enclosure details. Submit typical efficiency vs. speed graphs for a variable torque load.

- C. Shop Drawings: Include front and side views of enclosures with overall dimensions and weights shown, and conduit entrance locations and requirements. Show accurately scaled equipment locations and spatial relationships to associated motors and equipment.
- D. Wiring Diagrams: Submit power and control wiring diagrams for variable frequency drives showing connections to electrical power panels, feeders, and equipment. Differentiate between portions of wiring which are manufacturer-installed and portions which are field-installed. Submit comprehensive wiring diagrams of all drives with terminals clearly marked to show proper connection of control wires from temperature control systems. Typical or standard wiring diagrams will not be acceptable. Wiring diagrams shall be submitted with the temperature control shop drawings.
- E. Design Calculations: The manufacturer shall provide documentation, prior to installation, showing total harmonic voltage distortion of the VFD exceeds the requirements of IEEE 519 limits.
- F. Seismic Qualification Certification: Submit certification that variable frequency drives, accessories, and components will withstand seismic forces. Include the basis for certification indicating whether the withstand certification is based on actual testing of assembled components or based on calculation.
- G. Manufacturer's Performance Certification: Provide a clear statement of compliance that the variable frequency drives comply with the requirements.
- H. Factory Test Certification: Submit copies of factory test reports certified by the manufacturer.
- I. Field Test Certification: Submit certification that required field tests have been performed and that the installation complies with the field test requirements. Include certification of the testing agency qualifications.
- J. Start-up Instruction Manuals: Submit two (2) sets of complete instruction manuals at the time the equipment is shipped to the Project site. Manuals shall include a functional description of the equipment with block diagrams, safety precautions, instructions, step-by-step operating procedures and routine maintenance guidelines, including illustrations. These are separate from the manuals required to be submitted at project close-out as part of the Operating and Maintenance Instruction Manuals.
- K. Installation Instructions: Prior to shipping the equipment to the Project site, submit manufacturer's detailed installation instructions indicating application conditions and limitations of use. Include instructions for handling, protection, preparation and step-by-step installation procedures, including illustrations.

- L. Operations and Maintenance Data: Submit maintenance data, including a "troubleshooting" maintenance guide to be included in the Operating and Maintenance Instruction Manuals. Include a list of spare parts and replacement components. Submit routine maintenance requirements. Include all programming guides and instructions and final settings of all devices, overloads, and switches.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications: A company specializing in manufacturing variable frequency drives with a minimum ten years experience, and with service facilities within 50 miles of the Project to provide start-up service, emergency service calls, repair work, parts, service contracts, maintenance, and training of the Owner's personnel. When requested by the Design Professional, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement. Manufacturers shall also be ISO 9001 or 9002 certified.
- B. Installer's Qualifications: Firm with at least 5 successful installation experiences with projects utilizing variable frequency drives similar to that required for this Project. When requested by the Design Professional, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- C. Testing Agency Qualifications: A full-time member company of NETA. All field testing shall be supervised by an employee of the testing firm certified by NETA or by the National Institute for Certification in Engineering Technologies.
- D. Source Limitations: The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- E. Comply with the requirements of IEEE, NEMA, NETA, and NFPA.
- F. UL Compliance: Provide products that are UL-listed and labeled for the installed environment and comply with the listed UL standards.
- G. Seismic Qualifications: Variable frequency drives, accessories, and components shall withstand the seismic forces for the project location. The term "withstand" shall mean the unit will remain in place without separation of any parts from the device when subjected to the seismic forces. Further, the definition for "withstand" shall include that the unit will be fully operational after the seismic event, when required by the seismic classification of the project.
- H. Source Quality Control: Inspect and production-test each product specified in this Section.

#### **1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, protect and handle products in accordance with Section 260100 -

"Electrical General Requirements" in addition to the requirements below.

- B. Deliver drives and components properly packaged in factory-fabricated type containers.
- C. Store drives and components in original packaging and in a clean dry space; protect from weather, construction traffic, and physical damage. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units. If drives must be installed in areas that are temporarily unheated or otherwise subject to moisture and condensation, remove loose packing and flammable material from inside unit and provide electric heating sufficient to prevent condensation.
- D. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish and to avoid breakages, impacts, denting and scoring finishes. Do not install damaged equipment; replace and return damaged units to equipment manufacturer.

### **1.07 COORDINATION**

- A. Coordinate with other electrical Work including wires/cables, electrical boxes and fittings, and raceways, to properly interface installation of drives with other Work.
- B. Sequence drive installation Work with other Work to minimize possibility of damage and soiling during remainder of construction period.
- C. Electrical contractor shall reference the mechanical drawings for power requirements to control panels, 120 volt interlock wiring, schematics for VFD's and motor starters, and coordination of mechanical equipment requiring power.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Subject to compliance with requirements, manufacturers offering motor controllers which may be incorporated in the Work include, but are not limited to, the following:
  - 1. Rockwell Automation/Allen-Bradley.
  - 2. Reliance.
  - 3. Square 'D' Co.
  - 4. Safronics.
  - 5. ABB

### **2.2 VARIABLE FREQUENCY DRIVES, GENERAL**

- A. Provide enclosed VFD suitable for operating the indicated loads. Conform to requirements of NEMA ICS 7 and test the VFD per UL 508C. Unit must be selectable for constant or variable torque applications.
- B. Rated Input Voltage: 208 [480] volts, + 10 percent/-15 percent, three phase, 60 Hertz.
- C. The VFD shall limit harmonic distortion reflected onto the electrical distribution system, to voltage and current distortion levels defined by IEEE 519. As a minimum, provide a 3 percent AC line or DC bus reactor or equal form of filtering based on the proposed manufacturer's preference.
- D. The VFD shall be capable of operating any NEMA B squirrel cage induction motor, regardless of manufacturer, with a load rating equivalent to the capacity of the VFD. Match the load type, such as fans, blowers and pumps, and the type of connection used between motor and load.
- E. Standard Operating Conditions:
  - 1. Ambient Service Conditions: 0 degrees Celsius to +40 degrees Celsius, self-cooled enclosure. Provide environmental controls such as air conditioning unit and enclosure heater suitable in areas that are not environmentally controlled.
  - 2. Humidity: 0 to 95 percent (non-condensing).
  - 3. Altitude: 0 to 3,300 feet above sea level.
  - 4. Storage Temperature: -20 to +70 degrees Celsius.

### **2.03 VARIABLE FREQUENCY DRIVES**

- A. VFD's shall employ microprocessor based inverter logic isolated from power circuits with a pulse width modulated (PWM) inverter system to convert the utility input voltage and frequency to a variable voltage and frequency output. The unit shall have a full-wave rectifier and be 6 pulse type when utilized with motors below 75 HP and 12 pulse (through the use of an input phase shift transformer) when utilized with motors 75 HP and above. The switching power supply shall operate off a DC link. Insulated gate bipolar transistors (IGBT's) shall be used in the inverter section. Bipolar transistors, GTO's and SCR's are not acceptable. Unit shall employ sensorless torque vector control to regulate motor flux to optimize motor torque. Drives requiring voltage, dwell and current adjustments to achieve improved torque control are not acceptable.
- B. Rated Output Frequency: 0-120 Hz. (Operation above 60 Hz shall require programming changes to prevent inadvertent high-speed operation.
- C. Rated Output Current: The continuous rated full load output current of the drive, shall be equal to 1.05 times the full load current of the motor based on 40 degrees



Celsius ambient and 12 kHz switching frequency for 15 and 20 HP, 6 kHz for 30 through 100 HP, and 3 kHz for 125 through 200 HP.

- D. Control Speed Range: Isolated control interface to allow controller to follow a control signal over a 40:1 range for variable torque applications and 50:1 range for constant torque applications.
- E. Displacement Power Factor at Input Terminals: Minimum of 0.95 over the entire range of operating speed and load.
- F. Minimum Efficiency at Full Load: Minimum of 98 percent at full speed and load. The efficiency shall exceed 96 percent at 1/2 speed and load.
- G. Speed Regulation: The VFD shall regulate motor speed within 1 percent.
- H. Carrier Frequency: Six field adjustable settings up to 12 kHz.
- I. Starting Torque: 100 percent at 3Hz.
- J. The VFD shall have a one (1) minute overload current rating of 150 percent for constant torque drives and 110 percent for variable torque drives (150 percent peak). This rating shall be based on an overload occurrence every ten minutes.
- K. Power Loss Ride-through: The VFD shall be capable of continued operation during an intermittent loss of power for 0.1 seconds (6 cycles) based on full load and no inertia.
- L. Auto Restart: The VFD shall be designed to attempt five automatic restarts (adjustable including the delay time between start attempts) following selected or programmed fault conditions before locking out and requiring manual restart.
- M. PID Control: The VFD shall include PID control logic to provide closed loop control capability from a feedback signal from the building automation system without the need for a closed loop output from the building automation system. The PID controller shall have a differential feedback capability for closed loop control. The VFD shall have a minimum of 250 mA of 24 VDC auxiliary power and be capable of loop powering a transmitter. The PID setpoint shall be adjustable from the VFD keypad.
- N. The VFD shall be able to start into a spinning motor at any speed or direction and be able to determine the motor speed in any direction and accelerate or decelerate to the set speed without tripping or component loss. If the motor is spinning in the reverse direction, the VFD shall start into the motor in the reverse direction, bring the motor to a controlled stop, and then accelerate the motor to the preset speed.
- O. Manual Bypass: Provide a three (3) contactor bypass arrangement including a drive input, bypass input, and a drive output contactor to disconnect power and

isolate the VFD and allow maintenance of the inverter when the unit is in bypass. This circuit shall include control logic, status lights and motor over-current relays. The complete bypass system and an Inverter-Off-Bypass selector switch shall be packaged in the VFD enclosure. Include fuse or circuit breaker protection and thermal overload protection while in the bypass mode. Provide push-to-test pilot lights for each mode of operation.

- P. Motor Overload Protection: Electronic motor protection capable of predicting motor winding temperature based on inputting specific parameters such as motor design type but as a minimum, capable of NEMA 250, Class 10 performance. On first stage over-temperature the drive shall be programmed to fold back the switching frequency to a minimum of 3 kHz or reduce the current limit setting automatically, without shutdown. It shall automatically return to the primary settings upon cooler temperature. Second stage over-temperature shall stop the motor. Minimum adjustment range shall be from 45 percent to 115 percent of the nominal current rating of the VFD. Provide bimetallic Class 20 thermal overloads to protect the motor when the drive is in the bypass position.
- Q. Voltage Protection: Provide overvoltage trip set to 130 percent, and undervoltage trip set at 65 percent, of VFD input voltage.
- R. Over-temperature Protection: Provide over-temperature protection set to 90 degrees Celsius.
- S. AC Input Protection: Provide a door interlocked thermal-magnetic circuit breaker which will disconnect the input power from the drive and all internally mounted components. The disconnect handle shall be through-the-door type and padlockable on the "off" position with up to three padlocks. In addition, provide AC input line current limiting fuses rated 200,000 AIC as the means of disconnecting the controller from the line under fault conditions.
- T. Short-circuit and Ground-fault Protection: The VFD shall have an instantaneous electronic trip circuit to protect the VFD from output line-to-line and line-to-ground short circuits. The VFD must be capable of withstanding short circuits available at the drive plus 10 percent but with a minimum rating of 50k AIC without the benefit of filters, fuses, or reactors. Use of isolation transformers for ground fault protection reduces systems efficiency should be avoided. The VFD supplier must demonstrate ground fault and short circuit protection at time of start up or plant witness test. The VFD shall be capable of providing 110 percent motor current intermittently. The VFD shall include an instantaneous overcurrent trip. The VFD shall not restart after electronic over-current trip until reset through the run/stop circuit or unless the auto-restart function has been enabled.
- U. Transient and Surge Voltage Protection: Provide transient and surge voltage protection through the use of Metal Oxide Varistors (MOV's) to withstand a 6,000 volt, 80 joule surge voltage when tested in accordance with ANSI/IEEE C62.41 with the test circuit adjusted for a 2,100 amp peak 8 x 20 microsecond short circuit discharge current pulse.

- V. Loss of Follower Signal: In the event of loss of input signal, VFD shall go to a user-selected option of preset speed or last signal received. The VFD shall open a relay output for customer use to indicate loss of reference condition.
- W. Safety Interlocks: Provide terminals for remote contact to inhibit starting under both manual and automatic mode.
- X. Stall Protection: Provide a stall function to adjust supervision limits and choose how the drive reacts to a motor stall condition where low frequency, high torque, and time limits have been reached.
- Y. Braking: DC injection braking shall be included.
- Z. Motor Preheat: The VFD shall have a motor preheat function to prevent moisture accumulation in an idle motor.
- AA. Sleep Function: The VFD shall have programmable sleep and wake functions to allow the driven equipment to be started and stopped from the level of a process feedback signal. When the sleep function senses a minimal deviation of a feedback signal from setpoint, or low demand if employing open loop control, the system shall stop the driven equipment and restart upon receiving an increase in speed command signal deviation to resume normal operation.
- BB. Provide a 120-Vac control power (with control power transformer) from the VFD with a terminal board to allow the VFD to interface with remote dry contacts and for connection of all field wiring including drive inputs and outputs. Provide a separate terminal strip for connection of the safety devices (freezestats, firestats, limit switches, etc.).
- CC. The inverter shall provide at least three selectable skip frequencies with programmable band widths, adjustable, which will not allow operation at or near mechanical resonance speeds.
- DD. Fieldbus Gateway: Provide an RS 485 gateway and protocol mode to suit the facility automation system. This interface must be coordinated with the facility personnel. In the event, that the facility does not have a standard interface, provide Modbus Plus. The communication capabilities shall include, but not be limited to, run-stop control, speed set adjustment, PID control adjustments, current limit and acceleration and deceleration times. The drive shall be capable of allowing a facility automation system to monitor feedback such as output speed, frequency, current, torque (percent), power, kilowatt-hours, relay outputs, and diagnostic warning and fault information.
- EE. Input Signals: Provide a minimum of seven (7) programmable digital inputs and two (2) programmable analog inputs with the following available as a minimum:
  - 1. Remote manual/auto contacts.

2. Remote start and stop contacts.
3. Remote preset speed contacts.
4. Remote external fault contact.
5. Remote reset contact.
6. Remote run permissive (enable).
7. Remote safety alarms (firestat, freezestat, limits switches, etc.) to operate in normal and bypass positions.
8. Process control speed reference interface (analog).
9. Process feedback if employing PID control (analog).

The analog inputs shall be capable of accepting a current or voltage signal. Analog inputs shall include a filter, programmable from 0.01 to 10 seconds to remove any oscillation in the input signal. The values shall be adjustable within the range 0-20 mA or 0-10 volts as applicable. The analog inputs shall also be capable of being inverted so that maximum reference corresponds to minimum speed and vice versa and shall be capable of being scaled so that maximum reference can represent a frequency less than 60 Hz without lowering the drive maximum frequency below 60 Hz.

FF. Digital Outputs: Provide a minimum of three (3) discrete programmable relay outputs (two Form "A" and one Form "C") rated at 2 amps at 115 VAC minimum (open collector outputs are not acceptable). Relays shall be programmed to indicate drive "Run", drive "Fault", and drive "Ready" but capable of being programmed to also indicate:

1. Stopped.
2. Current limit reached.
3. Auto reference.

GG. Analog Outputs: Provide a minimum of two (2) programmable analog output signals programmed to indicate output load, and motor speed, but capable of being programmed to also indicate:

1. Output kilowatts.
2. Output frequency.
3. DC bus voltage.

HH. Display/Operator Panel: Provide a minimum two line by 16-character digital operator keypad located on the front door of the VFD capable of programming all programmable parameters. The panel keypad shall meet NEMA 12 requirements

and be soft-touch type with LCD backlit display.

1. The VFD shall be programmable via the operator panel to provide the following features:

- a. Volts/Hertz adjustment: A minimum of six selectable factory profiles and one user definable preset profile selectable while the VFD is running.
- b. Current limit adjustment: 50 - 120 percent of maximum rating.
- c. Acceleration rate adjustment: Adjustable from 0.1 - 3000 seconds.
- d. Deceleration rate adjustment: Adjustable from 0.1 - 3000 seconds.
- e. Maximum speed: Adjustable from 80 to 100 percent.
- f. Minimum speed: Adjustable from 5 to 25 percent.
- g. Critical frequency avoidance lockout zones.
- h. Electronic overload and under/over-torque limits.
- i. Multiple restart attempts.
- j. Signal loss detection and response strategy.
- k. Bidirectional "catch a spinning motor" functions including speed search.
- l. Digital output relay functions.
- m. Analog output relay functions.
- n. DC injection braking time.
- o. Motor pre-heat function.

2. Provide indication for the following functions, which shall be selectable to display only those functions desired:

- a. Output voltage.
- b. Output frequency.
- c. Output current.
- d. Output speed (in rpm).
- e. Calculated motor torque.
- f. Heatsink temperature.
- g. Elapsed run time of motor (not the drive energized elapsed time).
- h. Kilowatt-hours.
- i. Kilowatts.
- j. DC Bus voltage.
- k. Analog input and output values.
- l. Digital input and output status.
- m. Trip cause including external fault.

3. The operator panel shall provide the following additional features:

- a. LED's for indicating drive status including "Run", "Over-current", "Over-voltage", "Ground Fault", and "Input power ON".
- b. Hand-Off-Automatic control switch: In "Hand" mode, the VFD shall be started and stopped from the operator's panel. In the "Auto" mode, the VFD shall be started, stopped and controlled by either the network communication or by remote analog and digital signals from control

devices and/or the building automation system. In the "Off" mode, the VFD shall be locked out. The drive shall incorporate logic to have a "bumpless" transfer of speed reference when switching between "Auto" and "Hand" positions.

- c. Selector switch for Manual reference/Auto reference. In the Manual reference mode, the VFD speed reference shall be set from the operator's panel. In the Auto reference mode, the VFD speed reference shall be set by the external source analog signal.
- d. Increase/Decrease buttons to change speed.
- e. Normal/Test selector switch to allow testing and adjustment of the VFD in the Bypass Mode.

II. Provide the following diagnostic features:

- 1. Fault History: Record and log faults in English language, most recent first, by date, time, item, and description of that item. Store up to 15 faults.
- 2. Warning History: Record and log the last 15 warnings by date, time, item, and description of that item.
- 3. Event History: Record and log the last 15 command events by date, time, command, and description of that command.
- 4. I/O Monitor: Provide a monitor to aid in troubleshooting by showing digital I/O status.

JJ. Software and Connection Cables: Provide all required software for operating, programming, monitoring, diagnosing faults, and uploading and downloading information. Include the connector cable required to connect the VFD to a PC.

KK. Control Power

- 1. Variable frequency drives serving fans shall have a 120 volt output available to power a fan isolation damper upon a signal to start (hand or auto mode). VFD shall also have input terminals for the damper end switch, fan shall not start until the damper end switch proves open. Functionality shall be the same whether the VFD is running in bypass or drive mode.

**2.04 FABRICATION**

- A. Wiring Terminations: Match conductor materials and sizes indicated.
- B. Enclosure: NEMA 250, Type 1.
- C. Finish: Manufacturer's standard enamel.

- D. Enclosure air conditioner, heater and fan shall be provided to maintain proper operating ambient conditions.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine areas and conditions under which VFD's are to be installed, and notify Design Professional in writing of conditions detrimental to proper completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner.
- B. Do not install controller until building environment can be maintained within the service conditions required by the manufacturer.

#### **3.02 INSTALLATION OF VARIABLE FREQUENCY DRIVES**

- A. Install drives where indicated, in accordance with equipment manufacturer's written instructions and with recognized industry practices; complying with applicable requirements of NEC, UL and NEMA standards, to insure that products fulfill requirements.
- B. Drives shall generally be installed at the motor load. Where drives with an input supply voltage greater than 240V must be installed more than 100 feet from the motor, provide a filter or line reactor to prevent damage from transients. Filter shall be as selected by the VFD manufacturer.
- C. Provide nameplates for all drives including all selector switches.
- D. Each enclosure shall be furnished with a schematic wiring diagram pasted on the inside of the door.
- E. Provide concrete bases for freestanding drives.

#### **3.03 INSTALLATION OF CONTROL WIRING**

- A. Bundle, train, ty-wrap and support wiring within enclosures.
- B. Tie the "enable" circuit of the drive to the auxiliary contacts on the disconnect switch at the motor to alert the VFD of disconnect status.
- C. Coordinate the drive wiring with the temperature control system to coordinate the system including the controls and actions required to be performed by the temperature control system for controlling dampers, valves, etc. when the drive is placed in the "Hand" position.

- D. Control cabling shall be separated from the power wiring sufficiently enough to prevent any electromagnetic coupling effects.

### **3.04 FACTORY TESTS**

- A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.
1. All printed circuit boards shall be functionally tested via fault finder bench equipment prior to unit installation.
  2. All final assemblies shall be tested at full load with application of line-to-line and line-to-ground bolted faults. The variable frequency controller shall trip electronically without device failure.
  3. After all tests have been performed, each VFD shall undergo a burn-in test. The drive shall be burned in at 100 percent inductive or motor load without an unscheduled shutdown. After the burn-in cycle is complete, each controller shall be put through a motor load test before inspection and shipping.

### **3.05 FIELD QUALITY CONTROL**

- A. Perform visual and mechanical inspection and electrical tests according to NETA ATS, Section 7.17. Certify compliance with requirements including, but not limited to:
1. Inspect physical and mechanical condition.
  2. Inspect anchorage, alignment, and grounding.
  3. Ensure vent path openings are free from debris and that heat transfer surfaces are clean.
  4. Verify correct connections of circuit boards, wiring, disconnects, and ribbon cables.
  5. Verify drive overcurrent setpoints are correct for their application.
  6. Apply minimum and maximum speed setpoints. Verify setpoints are within limitations of the load coupled to the motor.
  7. Inspect bolted electrical connections for high resistance using low-resistance ohmmeter.
  8. Verify correct fuse sizing in accordance with manufacturer's published data.
  9. Test the motor overload relay elements by injecting primary current through the



overload circuit and monitoring trip time of the overload element.

10. Test input circuit breaker by primary injection.
  11. Test for input phase loss protection.
  12. Test for input overvoltage protection.
  13. Test for output phase rotation.
  14. Test for overtemperature protection.
  15. Test for DC overvoltage protection.
  16. Test for overfrequency protection.
  17. Test for drive overload protection.
  18. Test fault alarm outputs.
  19. Perform startup of drive in accordance with manufacturer's published data. Calibrate drive to the system's minimum and maximum speed control signals.
  20. Perform operational tests by initiating control devices.
  21. Slowly vary drive speed between minimum and maximum. Observe motor and load for unusual noise or vibration.
  22. Verify operation of drive from remote start/stop and speed control signals.
  23. Verify fieldbus communication.
- B. Motor Parameters: Check the horsepower, voltage, phase, speed, service factor, full load amperes and frame size from the motor nameplate and record the values.
- C. Miscellaneous Tests: Prior to operation, the Contractor shall check each motor for proper rotation and lubrication. In addition, motors shall have insulation resistance and continuity tests similar to those for cables. Inspect for physical damage, proper alignment, anchorage, and grounding prior to energizing.
- D. Prior to energizing motor controller equipment, check with ground resistance tester, phase-to-phase and phase-to-ground insulation resistance levels to ensure requirements are fulfilled.
- E. Prior to energizing, check circuitry for electrical continuity, and for short-circuits.
- F. Ensure that direction of rotation of each motor fulfills requirements.

- G. Manufacturer's Field Service: Engage the services of a factory-authorized service representative to inspect field assembled components and equipment, to provide technical direction and assistance to the Contractor, and to pretest and adjust each drive. Manufacturer shall fully prepare and start systems including inspection and final adjustments and operational and functional checks of the VFD. Provide a certified start-up form filled out for each drive.

### **3.06 CONNECTIONS**

- A. Ground and bond all variable frequency drives.
- B. Tighten connector and terminal bolts according to the manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A.

### **3.07 PERSONNEL TRAINING**

- A. Engage the services of a factory-authorized service representative to train the Owner's personnel on procedures and schedules for starting, stopping, troubleshooting, servicing, and maintaining equipment. Schedule training with Owner with at least seven days notice. Training shall include 4 hours for each different type drive. Demonstrate all functions of controllers during the training in both automatic and manual modes. Provide a videotape for facilities personnel.

### **3.08 MAINTENANCE**

- A. Furnish routine service, maintenance and adjustment of controller for one year from date of start-up.

### **3.09 WARRANTY**

- A. The manufacturer shall warrant all parts and labor for a period of 24 months from the date of certified start-up. Warranty shall include all expenses and travel time.

### **3.10 ADJUSTING AND CLEANING**

- A. Make final adjustments to installed drive to assure proper operation of system. Obtain performance requirements from installer of driven loads.
- B. Touch up scratched or marred surfaces to match original finish.

**END OF SECTION**

**263216 – STAND-BY NATURAL GAS-GENERATOR SETS**

**PART 1 - GENERAL**

**1.01 GENERAL**

- A. Furnish and install a stand-by natural gas engine driven generator with weatherproof sound attenuation enclosure with the following characteristics:
  - 1. 125 kW, 147, KVA, 277/480V, 3 Phase, 4-Wire gas engine driven generator.
- B. The Contractor shall be responsible for furnishing and installing the natural gas-generator accessories as described herein, controls, sound attenuated enclosure, and monitor software kit with modules as a matched unit and delivery and rigging at site, so that there is one (1) source responsibility for warranty, parts, and service through the local representative or vendor.
- C. Acoustical performance of individual components is for initial selection and guidelines. Final acceptance will be based on field test of system for the levels specified.

**1.02 DESCRIPTION OF WORK**

- A. Work includes providing all materials, equipment, accessories, services of an erection superintendent employed for a period of time sufficient to assure satisfactory operation of the unit, pre-installation coordination meetings, and tests necessary to complete and make ready for operation a standby natural gas engine generator set complete with engine driven radiator, batteries, charger, silencer, engine block heater, weatherproof sound attenuated enclosure, seismic vibration isolators, controls, control wiring with all connections, software for monitoring engine generator performance. Refer to appropriate sections of Specification for additional requirements.

**1.03 SUBMITTALS**

- A. Prior to shipping the generator, submit the factory test report for approval. Do not ship the generator prior to approval of the test report. Submit a certified factory test report showing serial number of the engine, generator, and all accessories furnished, and actual readings taken during the factory-conducted full load test.
- B. Submit shop drawings to scale, within twenty (20) days of notice to proceed, showing the layout of the generator enclosure, and showing all

equipment in enclosures. Drawing should show elevations and sections to fully depict the engine-generator arrangement including engine generator set, sound attenuated generator enclosure. Shop drawings should contain enough information to indicate the engine-generator set meets these specifications. The shop drawings shall consist of the following information:

1. Outline drawings of unit and accessories with dimensions.
2. Weight of unit assembled completely.
3. Weight of batteries and accessories.
4. Detailed description of unit features, including schematic diagrams and complete bill-of-material.
5. Complete engine characteristics, including field rates, speed regulations and torsional analysis calculations. Torsional data may be submitted later but at least ten (10) weeks before delivery. Also furnish the following information:
  - a. Manufacturer of Engine
  - b. Model
  - c. Serial Number
  - d. Bore and Stroke
  - e. Horsepower
  - f. Speed, RPM
  - g. 4 Cycle
  - h. Single or Double Acting
  - i. Make of Governor and Model Number
  - j. Type of Governor
6. Complete generator and exciter characteristics, including efficiency, voltage regulation and complete reactance values. Also furnish the following generator information:
  - a. Manufacturer
  - b. Serial Number
  - c. KVA Rating
  - d. Voltage
  - e. Phase and Number of Wires
  - f. Hertz
  - g. Speed RPM
  - h. Synchronizing Coefficient
  - i. Rotor  $WK^2$ , lb-ft<sup>2</sup>
  - j. Damper Windings
7. Information on control and instrument panels, including main circuit breaker, manufacturer's names, capacities, ranges, catalog numbers, etc.
8. Complete cooling equipment calculations.

9. Complete operation and service manuals.
  10. Complete interconnection wiring diagrams.
  11. When shipped, fabricator shall furnish a breakdown of every loose item shipped, including spare parts. Identify items and container or containers containing them and locations where items are used.
  12. Batteries and battery charger, and battery rack.
  13. Complete exhaust system including silencer (in enclosure), with OSHA approved cover blankets.
  14. Weatherproof sound attenuated enclosure.
  15. Water-cooled radiator.
  16. Block heater.
  17. Main circuit breaker.
  18. Generator remote annunciator.
  19. Enclosure panelboard and internal wiring.
  20. Remote annunciator.
  21. Two (2) fire extinguishers.
  22. Two (2) manual stations factory provided and mounted on generator enclosure.
- C. Submit a certified Installation Acceptance Test report showing actual test results obtained during field testing of the generator.
- D. Submit test results of oil sampling test performed.
- E. Submit oil sampling test kit to the Owner.
- F. Submit sound level performance test results.
- G. Submit test results in recorded form for all parameters including voltage, current and frequency, etc.
- H. Prior to issuance of the certificate of final completion, prepare and submit to the Owner for approval Operation and Maintenance Manuals.
- I. Crank case vending filter kit shall be included.

#### **1.04 DEFINITIONS**

- A. Company Field Advisor: An employee of the Company which lists and markets the primary components of the system under their name who is certified in writing by the Company to be technically qualified in design, installation, and servicing of the required products or an employee of an organization certified by the foregoing Company to be technically qualified in design, installation and servicing of the required products. Personnel involved solely in sales do not qualify.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturers: Firms regularly engaged in the manufacture of natural gas engine generator sets of the types and capacities required, whose products have been in satisfactory use in similar service for not less than ten (10) years. Provide natural gas engine generator sets produced by a manufacturer listed as an Acceptable Manufacturer in this Section.
- B. List of Completed Installations: If brand names other than those specified are proposed for use, furnish the name, address and telephone number of a least 5 comparable installations which can prove the proposed products have operated satisfactorily for 5 years.
- C. Company Field Advisor: Secure the services of a Company Field Advisor for a minimum of 24 working hours for the generator set for the following:
  - 1. Render advice regarding installation and final adjustment of the system.
  - 2. Witness final system test and then certify with an affidavit that the system is installed in accordance with the contract documents and is operating properly.
  - 3. Train facility personnel on the operation and maintenance of the system for a minimum of two 4 hour sessions.
  - 4. Explain available service programs to facility supervisory personnel for their consideration.
  - 5. Provide on-site technical supervision and assistance during installation and interconnection of the system equipment installed. Said supervision is to insure the safety of the proper installation and operation of the system equipment.
- D. Standards Compliance: Comply with requirements of applicable local codes, NEC, UL, NEMA, ANSI and IEEE Standards, pertaining to natural gas generator sets. The generator shall be U.L. 2200 listed.
- E. NFPA Compliance: Comply with applicable requirements of NFPA 37, "Installation and Use of Stationary Combustion Engines and Gas Turbines; NFPA 99, NFPA 101, "Life Safety Code" and NFPA 110, "Standard for Emergency and Standby Power Systems."
- F. Service:
  - 1. Manufacturer must have a factory warehouse located within 50 miles of the job site, at which spare parts are stocked and where a field service engineer who is a full-time employee of the manufacturer permanently resides, and who is a factory trained and qualified individual whose primary duty is field service.
  - 2. Service Availability: A fully equipped service organization capable of guaranteeing response time within 8 hours to service calls shall be

- available 24 hours a day, 7 days a week to service the completed work.
3. The supplier of the generator set package shall guarantee 24 hour availability for 100% of all engine parts via a worldwide computerized warehouse and distribution system. Proof of this capability shall be shown and demonstrated via a computerized in-house terminal hook-up system in the facility the company operates.
- G. Equipment shall be capable of continuous operation at rated output for the duration of any utility power failure. Net rating of natural gas engine-generator set shall be based on operation of the set at rated generator RPM when equipped with all necessary operating accessories, such as air cleaners, radiator fans, lubricating oil pump, jacket water pump, governor alternating current generator and exciter. All ratings must be factory certified, or as published in the Diesel and Gas Turbine Worldwide Catalog.
- H. One manufacturer shall build, test and ship the entire engine-generator set (engine, generator, enclosure). Suppliers who purchase the engine, generator and auxiliary equipment and then assemble them together relying on the equipment manufacturers for their supply of spare parts and engineering expertise and are subject to normal vendor uncertainties contributing to product design fluctuations do not meet the one-source supply criteria of the Specification.
- I. All equipment shall be made in the USA.

#### **1.06 FACTORY TESTS**

- A. **Prototype Tests:** The natural gas-generator set design shall have been tested as a complete unit, on representative engineering prototype models, in conformance to the requirements of NFPA 110, IEEE 43, IEEE 115 and MIL STD 705. Certified test data shall be submitted to the Engineer. The complete generator set assembly must have been prototyped tested by the manufacturer of the engine before the series was mass produced for worldwide distribution.
- B. **Production Tests:** Fully test the natural gas-generator set with all mounted appurtenances prior to the shipment to the job site. Natural gas-generator set shall receive the manufacturer's standard production test of the completely assembled engine, generator, radiator, control panel, and mounting base. The manufacturer shall provide written certification and documentation supporting compliance with test requirements. The following equipment shall be tested at the manufacturer's plant before shipment:

1. Natural gas-generator Set: Natural gas-generator production test procedure shall be submitted for approval. The natural gas-generator set shall be tested under balanced, rated load and 80% power factor for performance and functioning of control and interfacing circuits. Testing at unity power factor only is not acceptable. Test shall include:
  - a. Steady state voltage and speed (frequency) checks.
  - b. Visual inspection and functional test for lube-oil pump, cooling system, exhaust system, and starting system.
  - c. Record voltage, current, frequency, power factor, and engine coolant temperatures every 30 minutes. Submit test report.
2. Generator Control Panel: Control panel production test procedure shall be approved by Engineer.
3. Factory test, as outlined above, may be witnessed by the Engineer. The manufacturer shall notify the Engineer two (2) weeks prior to the date the tests are to be performed. Provide alternate price to include all travel costs associated with witnessing the test.

#### **1.07 EQUIPMENT WARRANTY**

- A. Guarantee equipment furnished under these specifications against defective parts and workmanship under terms of the manufacturer's and dealer's standard warranties for a period of not less than five (5) years or 400 hours, whichever comes first, from Owner acceptance of the system. The warranty shall include labor and travel time for necessary repairs at the job site.

### **PART 2 - PRODUCTS**

#### **2.01 GENERAL**

- A. Furnish and install a natural gas engine generator set to consist of a natural gas-fueled engine coupled to a single bearing generator, all mounted on a common base of welded fabricated structural steel with weatherproof enclosure.

#### **2.02 NATURAL GAS ENGINE**

- A. The engine shall be a stationary, liquid-cooled, four cycle design, vertical in-line or V-type with solid case iron or steel block. The cylinder block shall be cast iron with replaceable wet liners, and have four valves per cylinder. The engine shall be capable of starting automatically at



temperatures up to 122°F (125kW). It shall start without the use of mechanical prime movers. Engine shall be EPA SI NSPS emission certified.

B. Engine Equipment: The engine shall be equipped with:

1. Air filters, fuel filters, fuel pressure gauge, lubricating oil cooler, oil filters and pressure gauge, water pump and temperature gauge, service hour meter, flywheel, flywheel housing, voltage adjust rheostat, frequency meter, voltmeter ammeter phase selector switch, battery charging voltmeter, dual range voltmeter and ammeter, tachometer and place to check speed with a hand-held tachometer.

C. Structure/Metallurgy

1. The design of the basic engine shall provide for maximum structural integrity to extend service life. Materials used in the engine shall incorporate the highest level of proven metallurgical and manufacturing technology.
2. Block shall be one piece design and cast of tensile strength iron.
3. Crankshaft shall be a one piece forging with wear surfaces hardened through heat treat methods.
4. The engine shall be equipped with replaceable full-length, wet type, heat-treated cylinder liners.
5. Valves shall be hard-faced with replaceable inserts.

D. Lubrication System

1. The lubrication oil pump shall be a positive displacement type, mechanical, full pressure pump.
2. Filter and strainer provided by the engine manufacturer of record to provide adequate filtration for the prime mover to be used.
3. Crankcase drain arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

E. Natural Gas Fuel System

1. The engine shall be fueled by natural gas, direct injection, with forged steel crankcase and connecting rods. Compression ratio shall be 8:5:1.

F. Fuel System Maintenance

1. The fuel filter shall not require changing more frequently than once per year or every 250 hours, whichever comes first. Fuel water

separators shall not require draining more frequently than once per month.

G. Governor

1. The engine governor shall be electronic and shall control engine speed and transient load response within commercial and ISO 8528 tolerances. It shall be selected, installed and tested by the generator set manufacturer.

**2.03 MISCELLANEOUS REQUIREMENTS**

- A. The engine's exhaust manifold risers shall be located at the top of the engine and positioned in the center of the V of a Vee cylinder engine. Engines that utilize side mounted exhaust manifold risers obstructing the ease of accessibility to the side of the engine, as well as creating a hazard to operating personnel safety are not acceptable. The engine must be able to be overhauled in place without taking the enclosure apart.
- B. Air intake manifold filters shall be replaceable dry type. Filters shall provide for optimum silencing, shall be accessible for easy removal, and shall be of capacity as recommended by engine manufacturer.
- C. Engine overspeed shutdown device with automatic shutdown and manual reset shall be separate from the regular governing mechanism.
- D. Fully enclose or properly guard all rotating or reciprocating parts. Properly insulate all parts subject to high temperatures so that surface temperatures will not exceed OSHA limits.
- E. The engine shall be provided with thermostatically controlled coolant heater with pump to maintain engine block coolant temperatures in the range of 100 - 120°F for reliable automatic starting at the ambient temperature range stated herein. The heaters shall automatically disconnect when the engine starts and shall be provided with hand shut-off valves to facilitate service without draining cooling system.

**2.04 STARTING SYSTEM**

- A. The engine starting system shall include 12 volt DC starting motor, starter relay, and automatic reset circuit breaker to protect against butt engagement. Batteries shall be lead acid type mounted near the starting motor. A corrosion-resistant or coated steel battery rack shall be provided for battery mounting. Required cables will be furnished and sized to satisfy starting current requirements.

**2.05 BATTERIES (LEAD ACID)**

- A. Starting batteries shall be 12 volt, sized as recommended by engine manufacturer, to provide 60 seconds of continuous cranking at 0 degrees F. and shall include electrolyte, battery cables, a battery rack and hydrometer recombination plugs.

## **2.06 BATTERY CHARGER**

- A. Battery charger shall automatically charge and maintain the charge on the engine starting batteries with transistor controlled magnetic amplifier circuits to provide continuous taper charging and to include:
  - 1. Automatic AC line compensation.
  - 2. Surge compressors.
  - 3. Overload protection and DC voltage regulation.
  - 4. Silicone diode full-wave rectifier.
  - 5. Power failure relay with remote indication terminals.
  - 6. DC ammeter and voltmeter.
  - 7. Fused AC input and DC output.
  - 8. DC output not less than 10 amperes.
  - 9. DC voltage, 12 volt.
  - 10. AC input, 120 volt, single phase, 60 cycles.
  - 11. Supply a combination high/low voltage alarm with a remote annunciator.

\*Battery warranty shall be the responsibility of the generator set manufacturer.

## **2.07 GENERATOR**

- A. The equipment shall be rated for continuous emergency use in the event of utility power outage. The generator shall develop its rated output at a temperature rise of 80°C (125kW).
- B. Generator shall be a single ball bearing, salient pole, revolving field alternator of drip-proof and weatherproof construction. The stator frame shall be bolted to the engine flywheel housing and the rotor shall be connected by a flexible plate type coupling to the engine flywheel. The rotor shall consist of an internal pole laminated steel assembly, keyed directly to the shaft. The pole faces shall contain complete amortisseur windings. The rotor assembly shall demonstrate 125% overspeed capability. Rotor dynamic, two-plate balance shall not exceed 0.002 inch peak to peak amplitude at operating speed.
- C. A louver ventilated oversized steel cabinet shall house the independently shock mounted regulator assembly and the generator line leads. The construction must provide vibration isolation for the regulation unit, as well

as a solid cabinet to which electrical rigid, galvanized conduit may be attached. Flexible connections shall be used to prohibit transfer of normal engine vibration.

- D. The rotating brushless exciter shall be mounted within generator stator frame. The stationary-exciter field shall be a 4 pole distributive winding on a core that is integral with the generator and bracket. The generator windings shall not exceed 80 degrees (125kW Celsius temperature rise over 40 degrees Celsius ambient when operating at specified load. The generator set shall be capable of sustaining a minimum of 90% of rated no load voltage with the specified kVA load at near zero power factor applied to the generator set.
- E. Class 200 magnet wire shall be used for all rotor and stator windings insulation materials shall be Class H in accordance with NEMA standards. No materials shall be used which support fungus growth, and shall be impervious to oil, dirt and fumes encountered in diesel and natural gas engine operating environments.
- F. All low voltage windings for revolving field coils shall be precision wet layer wound with epoxy based material applied to each layer of magnetic wire. Stator shall have at least two dips and bakes using Class H impregnating varnish and bakes to provide complete drying after each process. Windings shall be tested at 3000 volts A.C.
- G. The generator excitor shall be brushless with the circuit consisting of a three-phase armature and a three-prong full wave bridge rectifier mounted on the rotor shaft. Surge suppressor shall be included to protect the rotating diodes from voltage. Provide permanent magnet or AREP type excitation.
- H. Voltage Regulator-Sealed
  - 1. Generator output voltage shall be maintained within  $\pm 1\%$  of rated value for any load variation between no load and full load.
  - 2. Generator output voltage drift no more than  $\pm \frac{1}{2}\%$  of rated value at constant temperature.
  - 3. Generator output voltage drift no more than  $\pm 1\%$  of rated value over ambient temperature range of  $-40^{\circ}\text{C}$ . to  $70^{\circ}\text{C}$ .
  - 4. Telephone Influence Factor (TIF) of less than 50.
  - 5. Electro-Magnetic Interference Radio Frequency Interference (EMI/RFI) suppressed to commercial standards.
- I. The digital voltage regulator shall include the following features:
  - 1. Voltage level shall provide generator output voltage adjustment of  $-25\%$  to  $+10\%$  of nominal.

2. Gain adjustment shall provide output voltage compensation for changes in load or frequency.
  3. At full throttle, engine starting, output voltage shall not overshoot more than 5% of its rated value, with respect to the volts/Hz curve.
  4. Response time shall be less than twenty (20) milliseconds.
  5. Protection shall be provided against loss of voltage sensing and long-term overcurrent conditions. The overcurrent protection function shall automatically reset when the regulator is de-energized. The regulator shall not be damaged or result in unsafe operation when subjected to open or shortened input due to sensing loss, or a short to ground or adjacent conductor. Fast blow fuses shall be included in two (2) of the sensing leads to fully protect the regulator.
  6. The regular module shall be sealed in a waterproof and airproof shock resistant plastic housing and shall withstand:
    - a. Temperatures between  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .
    - b. Vibration of 4.5 G's (peak) between frequencies of 18 to 2000 Hz in three (3) perpendicular planes, and mechanical shock of 20 G's in all three (3) planes.
- J. The installation, compatibility, logic, coordination of the control, protection and monitoring systems of the generator set and its operation shall be the responsibility of the engine-generator set manufacturer.

## **2.08 CONTROLS AND MONITORING**

- A. The generator set shall be provided with a microprocessor-based control system which is designed to provide automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification.
- B. The control shall be mounted on the generator set. The control shall be vibration isolated and prototype tested to verify the durability of all components in the system under the vibration conditions encountered.
- C. The control shall be UL508 listed, CSA282-M1989 certified, and meet IEC8528 part 4. All switches, lamps and meters shall be oil-tight and dust-tight, and the enclosure door shall be gasketed. There shall be no exposed points in the control (with the door open) that operate in excess of 50 volts. The controls shall meet or exceed the requirements of Mil-Std 461C part 9, and IEC Std 801.2, 801.3., and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions. The entire control shall be tested and meet the requirements of IEEE587 for voltage surge resistance.

- D. The generator set mounted control shall include the following features and functions:
1. Three Position Control Switch Labeled RUN/OFF/AUTO: In the RUN position the generator set shall automatically start, and accelerate to rated speed and voltage. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.
  2. Red "Mushroom-head" Pushbutton EMERGENCY STOP Switch: Depressing the emergency stop switch shall cause the generator set to immediately shut down, and be locked out from automatic restarting.
  3. Pushbutton RESET Switch: The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.
  4. Pushbutton PANEL LAMP Switch: Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.
  5. Generator Set AC Output Metering: The generator set shall be provided with a metering set including the following features and functions: 2.5-inch, 90 degree scale analog voltmeter, ammeter, frequency meter, and kilowatt (KW) meter. These meters shall be provided with a phase select switch and an indicating lamp for upper and lower scale on the meters. Ammeter and KW meter scales shall be color coded in the following fashion: readings from 0-90% of generator set standby rating: green; readings from 90-100% of standby rating: amber; readings in excess of 100%: red. Digital metering set, 0.5% accuracy, to indicate generator RMS voltage and current, frequency, output current, output KW, KW-hours, and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three phase voltages (line to neutral or line to line) simultaneously.
  6. Generator Set Alarm and Status Message Display: The generator set shall be provided with alarm and status indicating lamps to indicate non-automatic generator status, and existing alarm and shutdown conditions. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. The generator set control shall indicate the existence of the following alarm and shutdown conditions on a digital display panel:
    - a. Low oil pressure (alarm)

- b. Low oil pressure (shutdown)
- c. Oil pressure sender failure (alarm)
- d. Low coolant temperature (alarm)
- e. High coolant temperature (alarm)
- f. High coolant temperature (shutdown)
- g. Engine temperature sender failure (alarm)
- h. Low coolant level (alarm or shutdown--selectable)
- i. Fail to crank (shutdown)
- j. Overcrank (shutdown)
- k. Overspeed (shutdown)
- l. Low DC voltage (alarm)
- m. High DC voltage (alarm)
- n. Weak battery (alarm)
- o. Low fuel-daytank (alarm)
- p. High AC voltage (shutdown)
- q. Low AC voltage (shutdown)
- r. Under frequency (shutdown)
- s. Over-current (warning)
- t. Over-current (shutdown)
- u. Short circuit (shutdown)
- v. Ground fault (alarm)
- w. Over-load (alarm)
- x. Emergency stop (shutdown) mounted on control panel and two (2) manual pull stations mounted on generator enclosure.

- y. In addition, provisions shall be made for indication of two customer-specified alarm or shutdown conditions. Labeling of the customer-specified alarm or shutdown conditions shall be of the same type and quality as the above specified conditions. The non-automatic indicating lamp shall be red, and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.
7. Engine Status Monitoring: The following information shall be available from a digital status panel on the generator set control :
- a. Engine oil pressure (psi or kPA)
  - b. Engine coolant temperature (degrees F or C) Both left and right bank temperature shall be indicated on V-block engines.
  - c. Engine oil temperature (degrees F or C)
  - d. Engine speed (rpm)
  - e. Number of hours of operation (hours)
  - f. Number of start attempts
  - g. Battery voltage (DC volts)
  - h. The control system shall also incorporate a data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set, as well as total time of operation at various loads, as a percent of the standby rating of the generator set.
- E. Control Functions: The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and # of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15 second rest period between cranking periods.
- F. The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled.
- G. The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit



exhaust smoke while the unit is starting. The governor control shall be suitable for use in paralleling applications without component changes.

- H. The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.
- I. The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and engine temperature which is capable of discriminating between failed sender or wiring components, and an actual failure conditions.
- J. Alternator Control Functions: The generator set shall include an automatic voltage regulation system which is matched and prototype tested with the governing system provided. It shall be immune from misoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below a threshold of 59 HZ. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with alpha-numeric LED readout to indicate setting level. The voltage regulation system shall include provisions for reactive load sharing and electronic voltage matching for paralleling applications. Motorized voltage adjust pot is not acceptable for voltage matching.
- K. Controls shall be provided to monitor the output current of the generator set and initiate an alarm when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator.
- L. Controls shall be provided to monitor the KW load on the generator set, and initiate an alarm condition when total load on the generator set exceeds the generator set rating for in excess of 5 seconds.
- M. An AC over/under voltage monitoring system which responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Under voltage shutdown shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds.
- N. A battery monitoring system shall be provided which initiates alarms when the DC control and starting voltage is less than 25VDC or more than 32

VDC. During engine starting, the low voltage limit shall be disabled, and if DC voltage drops to less than 14.4 volts for more than two seconds a "weak battery" alarm shall be initiated.

- O. Provide an alarm horn with silencing switch.
- P. The control System shall include a ground fault monitoring relay if required by code, or shown on the drawings. The relay shall be adjustable from 100-1200 amps, and include adjustable time delay of 0-1.0 seconds. The relay shall be for indication only and not trip or shut down the generator set. Note bonding and grounding requirements for the generator set, and provide relay which will function correctly in system as installed.
- Q. Control Interfaces for Remote Monitoring:
  - 1. All control and interconnection points from the generator set to remote components shall be brought to a separate connection box. No field connections shall be made in the control enclosure or in the AC power output enclosure. Provide the following features in the control system:
    - a. Form "C" dry common alarm contact set rated 2A @ 30VDC to indicate existence of any alarm or shutdown condition on the generator set.
    - b. One set of contacts rated 2A @ 30VDC to indicate generator set is ready to load. The contacts shall operate when voltage and frequency are greater than 90% of rated condition.
    - c. A fused 10 amp switched 24VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit whenever the generator set is running.
    - d. A fused 20 amp 24VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit at all times from the engine starting/control batteries.
    - e. The control shall be provided with a direct serial communication link.
- R. Controls, Protection and Monitoring
  - 1. The controls, protection and monitoring systems of the generator set and its operation shall be the responsibility of the generator set manufacturer. All subsystem components interfaces, and logic shall be compatible with engine-mounted devices.

T. Alarm Module

1. NFPA-110 requirements shall be satisfied by a solid state microprocessor alarm module mounted in the panel and including red and yellow flashing LEDs and silenceable alarm horn to annunciate alarm conditions for high and low coolant temperature, low oil pressure, low DC voltage, and system not in automatic. The horn shall resound on subsequent alarms after silencing/acknowledgement, with the flashing LED displaying a solid light until the condition is corrected. Low fuel level, battery charger malfunction, and engine inlet air damper closed alarms shall be available to accept remote switch inputs.
2. Indicating and protective devices and controls shall include those required by NFPA 110 for a Level 1 system, and the following:
  - a. Indicating and Protective Devices and Controls:
    - 1) AC voltmeter.
    - 2) AC ammeter.
    - 3) AC frequency meter.
    - 4) DC voltmeter (alternator battery charging).
    - 5) Engine-coolant temperature gage.
    - 6) Engine lubricating-oil pressure gage.
    - 7) Running-time meter.
    - 8) Ammeter-voltmeter, phase-selector switch.
    - 9) Generator-voltage adjusting rheostat.
    - 10) Generator overload.
3. Remote Emergency-Stop Switches: Flush enclosure mounted and labeled. Push button shall be protected from accidental operation and be factory installed and wired.

- U. Controls shall be provided to monitor the output current of the generator set and initiate an alarm when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator.

**2.09 REMOTE ANNUNCIATOR**

- A. Provide a remote annunciator located as shown on the drawings to satisfy NFPA 110 Level 1 requirements, with the following features:
1. Solid state microprocessor alarm module.
  2. Red and yellow flashing LED's, and a silenceable alarm horn to annunciate alarm conditions for the following:

- a. Not-in-Auto (flashing red)
- b. Overcrank (red)
- c. Emergency Stop (red)
- d. High Engine Temperature (red)
- e. Overspeed Trip (red)
- f. Low Oil Pressure (red)
- g. \*Low Fuel (red)
- h. \*Auxiliary pre-alarm (yellow)
- i. \*Auxiliary Fault (red)
- j. \*System ready (green)
- k. Pre-alarm High Engine Temperature (yellow)
- l. Low Coolant Temperature (red)
- m. Natural Gas Leak Detection Alarm
- n. Ground fault.

\*Required to meet NFPA 110 Regulations Level 1.

3. Alarm Horn with Silencer Switch: The horn shall resound on subsequent alarms after silencing/acknowledgement, with the flashing LED displaying a solid light until the condition is corrected. Low fuel level and engine inlet air damper closed alarms shall be available to accept remote switch inputs.

## **2.10 SAFETY DEVICES**

A. Safety circuit devices and wiring arranged to stop the unit under conditions of:

1. Depressing EMERGENCY STOP button or operation of any of the safety devices listed under the "Engine Control Panel Shutdowns and Alarms" Paragraph 2.7.K.10.a.
2. Provide lubricating oil alarm bypass means when starting engine.
3. Operation of main breaker due to electric faults shall stop engine.

B. Furnish and install two (2) EMERGENCY STOP breakglass stations outside the enclosure housing generator set to shut down generator.

## **2.11 FIRE EXTINGUISHERS**

A. Contractor shall provide and mount two (2) fire extinguishers on the exterior of the enclosure.

## **2.12 GENERATOR CIRCUIT BREAKERS**

A. Provide one (1) mainline breaker, rated as per NEC requirements and manufacturer's recommendations. The enclosed generator mounted main line circuit breaker shall be provided within the generator set

terminal box to protect the unit from overcurrent and short circuit conditions. The breaker shall be installed within an enclosure, of suitable size which shall allow for proper bending radius of all conductors as per National Electrical Code. Lugs and supports shall be included. Installation shall comply with NEMA SG3 and NEMA SG4.

### **2.13 CRITICAL SILENCER**

- A. The exhaust silencer, when coupled with the engine in the configuration required for the project, shall be a Critical Silencer, and be installed inside the generator enclosure, and be insulated as per OSHA.
- B. Provide a stainless steel exhaust flexible fitting companion flange kit, gas-proof gaskets, and bolts.
- C. Provide exhaust silencing as needed to meet the sound criteria of the enclosure.

### **2.14 VIBRATION ISOLATORS**

- A. Spring Seismic Isolators: Freestanding and laterally stable with housings that include vertical resilient limit stops to prevent spring extension when weight is removed. The isolators shall be complete with minimum of one (1) neoprene acoustical friction pads between the baseplate and supports. The static deflection requirement of the isolators is to be one (1) inch. Isolators shall be seismic zone 2 compliant.
- B. All mounting leveling bolts rigidly bolted to the equipment; spring diameters no less than 0.8 of the compressed height of the spring at rated load; springs to have a minimum additional travel to solid equal to 50% of the rated deflection.
- C. The load on the seismic isolator and the selected isolator shall be provided with submittal information.

### **2.15 COOLING SYSTEM**

- A. The Contractor shall provide an engine-mounted radiator complete with fan sized to provide a minimum of 104 degrees F (250kW) 122 degrees F (30kW). Provide manufacturer's data sheet within the submittal package, and if required by the review engineer, provide detailed calculations. Closed cooling system shall be complete with expansion tank. Provide coolant which shall be rust-inhibited ethylene glycol solution to maintain non-freezing temperature at -20°F.

### **2.16 WEATHER-RESISTANT, SOUND ATTENUATED, GENERATOR SET ENCLOSURE**

- A. Generator set housing shall be provided factory-assembled to generator set base and radiator cowling. Housing shall provide ample airflow for generator set operation at rated load in the ambient conditions previously specified. The housing shall have hinged side-access doors and rear control door. All doors shall be lockable and hinged. Provide zinc phosphate pretreatment, e-coat primer and super durable powder topcoat print which minimizes corrosion and color fade.
- B. Provide floor under the entire enclosure. Provide bird screen on the air openings. Enclosure shall be built and warranted by the generator set manufacturer.
- C. Critical Grade Silencer, mounted within the enclosure. Provide rain cap at the exhaust outlet, and a rain shield where exhaust penetrates the enclosure roof.
- D. Enclosure to reduce the average sound level of the engine generator while operating at full rated load to a maximum of 73.4 dBA (250kW) and 64.9 30kW measured at 7 meters from the engine generator in a free field environment.

## 2.17 **ACCEPTABLE MANUFACTURERS**

- A. Natural Gas Engine Generator Sets:
  - 1. Cummins
  - 2. Kohler
  - 3. Caterpillar (Basis of Design)
- B. Enclosures:
  - 1. Caterpillar- DG125-2
- C. Governors:
  - 1. Cummins EFC
  - 2. Caterpillar
  - 3. Electronic Barber-Colman
- D. Exhaust Silencers:
  - 1. EM Products
  - 2. Nelson
  - 3. Harco
  - 4. Maxim
  - 5. Universal

6. Silex
7. GT Exhaust

E. Chargers:

1. Cummins Onan
2. Nife
3. Charles
4. LaMarche Mfg. Co.

F. Batteries: (Lead Acid)

1. Nife
2. NAPA
3. Exide
4. Sears

G. Isolators:

1. Ace Mountings
2. Mason
3. Vibration Mountings
4. Silex
5. Vibration Eliminator

H. Radiators:

1. Amercool
2. Modine
3. Perfex
4. Young
5. IEA

I. Generators

1. Cummins Onan
2. Century
3. Kato
4. Marathon
5. General Motors
6. Leroy Somers

J. Regulators

1. Cummins
2. Caterpillar
3. Basler

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. After the system equipment has been delivered, an on-site inspection will be made by the Engineer. If any equipment has been damaged or for any reason does not comply with the requirements of this Section, the Contractor will be notified in writing and shall be required to replace the equipment at his own cost and expense, even though the equipment has been previously inspected, tested, and approved for shipment. After such satisfactory replacement, the system shall be installed by the Contractor.

#### **3.02 PREPARATION**

- A. The Contractor shall be responsible for field verification of dimensions and coordination of conduit entry and all other mounting conditions with the entity manufacturing the equipment.
- B. The Company Field Advisor shall provide on-site technical supervision and assistance during installation and interconnection of the system. Said supervision is to insure the safety of the proper installation and operation of the system equipment.

#### **3.03 INSTALLATION**

- A. Install natural gas-generator, auxiliaries and appurtenances as shown on the Contract Drawings, in accordance with manufacturer's instructions, NFPA 70, NFPA 30, NFPA 37, NFPA 110, NEMA MG2, other applicable codes and standards, and as specified herein. In case of conflict, consult the manufacturer before proceeding with installation.
- B. Interconnect all equipment for proper operation.
- C. Install a complete grounding system for the natural gas-generator set and enclosure as shown on the Contract Drawings and as specified in the Specifications.

#### **3.04 FIELD TESTS**

- A. The complete installation shall be initially started and checked out for operational compliance by factory-trained representative of the natural gas-generator set manufacturer. The engine lubrication oil recommended by the manufacturer shall be provided and installed.
- B. Acceptance Testing



1. Pre-Acceptance Test: At least two weeks prior to scheduling the Installation Acceptance Test, perform a pre-acceptance test of the entire system including the generator, transfer switches, load management system, and automatic transfer switch monitoring system. Test all system features and verify that the systems are operating properly and ready for the Installation Acceptance Test. This test may be used to set and adjust equipment. This test will be witnessed by the Owner's field representative.
  2. Installation Acceptance Test: Upon successful completion of the Pre-Acceptance Test, perform Installation Manufacturers Acceptance Testing. The work of the project must be substantially complete before this test may be scheduled. This test will consist of a one hour operational test with building load followed immediately by a one hour full load test. Furnish a resistive load bank for the full load test that is equal to or greater than the rated load of the generator. Do not use building load for the full load test. The Installation Acceptance Test shall be witnessed by a representative from the Owner's Quality Assurance Unit.
- C. Provide all labor and materials for functional and operational tests required and load testing.
- D. Should the tests reveal any defects in the natural gas-generator equipment or auxiliaries installed under this Contract, promptly correct such defects and rerun the tests until the entire installation is satisfactory to the Owner in all respects.
- E. Report immediately to the Owner any defect found in portions of the natural gas-generator system not installed under this Contract. Do not attempt to rectify any defect found in a component of the system not installed under this Contract unless specifically instructed to do so by the Owner.
- F. Submit all the test results to the Owner for final approval.

**END OF SECTION**

## **263623 – AUTOMATIC TRANSFER SWITCH**

### **PART 1 - GENERAL**

#### **1.01 SCOPE**

- A. Furnish and install Automatic Transfer switch with number of poles, amperage, voltage, and withstand and close-on ratings as shown on the plans. Each automatic transfer shall consist of an inherently double throw power transfer switch mechanism and a microprocessor controller to provide automatic operation. All transfer switches and controllers shall be the products of the same manufacturer.
- B. Furnish an enclosure for the service entrance rated ATS (3AUS). It shall provide all of the proper disconnecting, protection, grounding and bonding required for service entrance equipment.
- C. Where specified on the drawings furnish an enclosure for the service entrance rated ATS with a second breaker on the Emergency source (3APS). The service entrance breaker shall provide all of the proper disconnecting, protection, grounding and bonding required for service entrance equipment.

#### **1.02 RELATED SECTIONS**

- A. Section 260100- "Electrical General Requirements" applies to Work specified in this Section.
- B. Section 263216 – "Stand-BY Natural Gas Generator Sets".

#### **1.03 REFERENCES**

The automatic transfer switch(es) and controls shall conform to the requirements of:

- A. UL 1008 - Standard for Transfer Switch Equipment
- B. CSA C22.2 No.178 – 1978
- C. NFPA 70 - National Electrical Code
- D. NFPA 110 - Emergency and Standby Power Systems
- E. IEEE Standard 446 - IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
- F. NEMA Standard ICS10-2005 (formerly ICS2-447) - AC Automatic Transfer Switches
- G. NEC Articles 700, 701 & 702
- H. International Standards Organization ISO 9001: 2008
- I. IEC 60947-6-1
- J. UL 891 According to this UL standard the equipment shall be labeled: "Suitable for use only as service equipment."

K. UL 508 Industrial Control Equipment

#### **1.04 ACCEPTABLE MANUFACTURERS**

A. Transfer switch shall be:

- a. Service entrance automatic transfer switch shall be ASCO Series 3AUS (or 3APS where specified)
- b. Substitutions: Proposed substitutions shall include complete submittal data, as specified herein, clearly denoting any and all deviations and/or exceptions to the equipment specified. The complete proposal must be submitted to the engineer or architect for approval/disapproval not less than 10 days prior to the scheduled bid date. If approved, the Contractor is responsible for the charges for all necessary revisions.

### **PART 2 PRODUCTS**

#### **2.01 MECHANICALLY HELD TRANSFER SWITCH**

- A. The transfer switch shall be electrically operated and mechanically held. The electrical operator shall be a momentarily energized, single-solenoid mechanism. Main operators which include overcurrent disconnect devices, linear motors or gears shall not be acceptable. The switch shall be mechanically interlocked to ensure only two possible positions, normal or emergency.
- B. The switch shall be positively locked and unaffected by momentary outages, so that contact pressure is maintained at a constant value and contact temperature rise is minimized for maximum reliability and operating life.
- C. All main contacts shall be silver composition. Switches rated 800 amperes and above shall have segmented, blow-on construction for high withstand and close-on capability and be protected by separate arcing contacts.
- D. Designs, where the wiring harness, controller, and contactor are not all fabricated and assembled by one manufacturer are not acceptable.
- E. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. Switches rated 600 amps and higher shall have front removable and replaceable contacts. All stationary and moveable contacts shall be replaceable without removing power conductors and/or bus bars.
- F. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof, which are not intended for continuous duty, repetitive switching or transfer between two active power sources are not acceptable.
- G. The ATS shall be provided with fully-rated, 4 pole neutral transfer contacts.

#### **2.03 MICROPROCESSOR CONTROLLER**

- A. The controller shall be connected to the transfer switch by an interconnecting wiring harness. The harness shall include a keyed disconnect plug to enable the controller to be disconnected from the transfer switch for routine maintenance.
- B. The controller shall direct the operation of the transfer switch. The controller's sensing and logic shall be controlled by a built-in microprocessor for maximum reliability, minimum maintenance, inherent serial communications capability, and the ability to communicate via the Ethernet through optional communications module.
- C. A single controller shall provide single and three phase capability for maximum application flexibility and minimal spare part requirements. Voltage sensing shall be true RMS type and shall be accurate to  $\pm 1\%$  of nominal voltage. Frequency sensing shall be accurate to  $\pm 0.1\text{Hz}$ . Time delay settings shall be accurate to  $\pm 0.5\%$  of the full scale value of the time delay. The panel shall be capable of operating over a temperature range of  $-20$  to  $+ 70$  degrees C, and storage from  $-55$  to  $+ 85$  degrees C.
- D. The controller shall be enclosed with a protective cover and be mounted separate from the transfer switch unit for safety and ease of maintenance. Sensing and control logic shall be provided on printed circuit boards.
- E. The controller shall meet or exceed the requirements for Electromagnetic Compatibility (EMC) as follows:
  1. CISPR 11 – Conducted RF Emissions and Radiated RF Emissions
  2. IEC 60947 – 6 – 1 Multiple Function Equipment Transfer Switching Equipment, 61000-4 Testing And Measurement Techniques - Overview:
    - a. IEC 61000 – 4 - 2 Electrostatic Discharge Immunity
    - b. IEC 61000 – 4 - 3 Radiated RF Field Immunity
    - c. IEC 61000 – 4 - 4 Electrical Fast Transient/Burst Immunity
    - d. IEC 61000 – 4 - 5 Surge Immunity
    - e. IEC 61000 – 4 – 6 Conducted RF Immunity

#### **2.04 ENCLOSURE**

- A. The switch shall be furnished in a NEMA Type 1 or Type 3R enclosure as shown on the plans. Provide strip heater with thermostat for all NEMA Type 3R enclosures.
- B. The complete assembly shall be degreased, and thoroughly cleaned through a five-stage aqueous process. The finish shall be ANSI-61, light gray, electrostatically-charged polyester powder paint over a phosphate coating, at a minimum of 2.0 mils in density. Finish shall be suitable for indoor and outdoor environments.
- C. For those automatic transfer switches that are less than 1000 amperes, the connection between the normal disconnecting device and the ATS shall be

made with the appropriate size cable. Bus shall be silver plated copper rated no less than 1000 amps per square inch.

- D. A pressure disconnect link shall be provided to disconnect the normal source neutral connection from the emergency and load neutral connections for 4-wire applications. A ground bus shall be provided for connection of the grounding conductor to the grounding electrode. A pressure disconnect link for the neutral to ground bonding jumper shall be provided to connect the normal neutral connection to the ground bus.
- E. Control wiring shall be rated for 600 volt, UL 1015. Wires shall be placed in wire duct or harnessed, and shall be supported to prevent sagging or breakage from weight or vibration. All wiring to hinged doors shall be run through door terminal blocks or connection plugs.

**PART 3 OPERATION**

**3.01 CONTROLLER DISPLAY AND KEYPAD**

A. A 128\*64 graphical LCD display and keypad shall be an integral part of the controller for viewing all available data and setting desired operational parameters. Operational parameters shall also be available for viewing and limited control through communications port. The following parameters shall only be adjustable via DIP switches on the controller

- 1. Nominal line voltage and frequency
- 2. Single or three phase sensing on Normal
- 3. Operating parameter protection
- 4. Transfer operating mode configuration: (Open Transition or Delayed Transition)

All instructions and controller settings shall be easily accessible, readable and accomplished without the use of codes, calculations, or instruction manuals.

**3.02 VOLTAGE, FREQUENCY AND PHASE ROTATION SENSING**

A. Voltage and frequency on both the normal and emergency sources (as noted below) shall be continuously monitored, with the following pickup, dropout and trip setting capabilities (values shown as % of nominal unless otherwise specified):

<u>Parameter</u>	<u>Sources</u>	<u>Dropout / Trip</u>	<u>Pickup / Reset</u>
Undervoltage	N&E	70 to 98%	85 to 100%
Overvoltage	N&E	102 to 115%	2% below trip
Underfrequency	N&E	85 to 98%	90 to 100%
Overfrequency	N&E	102 to 110%	2% below trip

B. Repetitive accuracy of all settings shall be within ± 1% at an operating temperature range of +25°C.

- C. Voltage and frequency settings shall be field adjustable in 1% increments either locally with the display and keypad or remotely via serial communications port access.
- D. Source status screens shall be provided for both normal & emergency to provide digital readout of voltage and frequency. NOTE: Single phase on Emergency.
- E. The backlit 128\*64 graphical display shall have multiple language capability. Languages can be selected from the user interface.

### **3.03 TIME DELAYS**

- A. A time delay shall be provided to override momentary normal source outages and delay all transfer and engine starting signals, adjustable 0 to 6 seconds. It shall be possible to bypass the time delay from the controller user interface.
- B. A time delay shall be provided on transfer to emergency, adjustable from 0 to 60 minutes 59 seconds for controlled timing of transfer of loads to emergency. It shall be possible to bypass the time delay from the controller user interface.
- C. A generator stabilization time delay shall be provided after transfer to emergency adjustable 0 or 4 seconds.
- D. A time delay shall be provided on retransfer to normal, adjustable 0 to 9 hours 59 minutes 59 seconds. Time delay shall be automatically bypassed if emergency source fails and normal source is acceptable.
- E. A cool down time delay shall be provided on shutdown of engine generator, adjustable 0 to 60 minutes 59 seconds.
- F. All adjustable time delays shall be field adjustable without the use of special tools.
- G. A time delay activated output signal shall also be provided to drive an external relay(s) for selective load disconnect control. The controller shall have the ability to activate an adjustable 0 to 5 minutes 59 seconds time delay in any of the following modes:
  - 1. Prior to transfer only.
  - 2. Prior to and after transfer.
  - 3. Normal to emergency only.
  - 4. Emergency to normal only.
  - 5. Normal to emergency and emergency to normal.
  - 6. All transfer conditions or only when both sources are available.

- H. In the event that the alternate source is not accepted within the configured Failure to accept time delay, the common alert shall become active.

**3.04 ADDITIONAL FEATURES**

- A. The user interface shall be provided with soft keys for the test/reset modes. The test mode will simulate a normal source failure. The reset mode shall bypass the time delays on either transfer to emergency or retransfer to normal.
- B. A set of contacts rated 5 amps, 30 VDC shall be provided for a low-voltage engine start signal. The start signal shall prevent dry cranking of the engine by requiring the generator set to reach proper output, and run for the duration of the cool down. setting, regardless of whether the normal source restores before the load is transferred.
- C. Auxiliary contacts, rated 10 amps, 250 VAC shall be provided consisting of one contact, closed when the ATS is connected to the normal source and one contact closed when the ATS is connected to the emergency source.
- D. A single alarm indication shall light up the alert indicator, and de – energize the configured common alarm output relay for external monitoring.
- E. LED indicating lights shall be provided; one to indicate when the ATS is connected to the normal source (green) and one to indicate when the ATS is connected to the emergency source (red).
- F. LED indicating lights shall be provided and energized by controller outputs. The lights shall provide true source availability of the normal (green) and emergency (red) source, as determined by the voltage sensing trip and reset settings for each source.
- G. LED indicating light shall be provided to indicate switch not in automatic mode (manual); and blinking (amber) to indicate transfer inhibit.
- H. LED indicating light shall be provided to indicate any alarm condition or active time delay (red).
- I. Provide the ability to select "commit/no commit to transfer" to determine whether the load should be transferred to the emergency generator if the normal source restores before the generator is ready to accept the load.
- J. An engine generator exercising timer shall be provided to configure weekly and biweekly automatic testing of an engine generator set with or without load for 2 minutes fixed. It shall be capable of being configured to indicate a day of the week, and time weekly testing should occur.
- K. Terminals shall be provided for a remote contact to signal the transfer switch

to transfer to emergency and for remote contacts which open to inhibit transfer to emergency This inhibit signal can be activated through the keypad or serial port.

- L. System Status – The controller LCD display shall include a "System Status" screen which shall be readily accessible from any point in the menu by depressing the "ESC" key a maximum of two times. This screen shall display a clear description of the active operating sequence and switch position. For example,

*Normal Failed*  
*Load on Normal*  
*TD Normal to Emergency*  
*2min15s*

Controllers that require multiple screens to determine system status or display "coded" system status messages, which must be explained by references in the operator's manual, are not permissible.

- M. Self Diagnostics – The controller shall contain a diagnostic screen for the purpose of detecting system errors. This screen shall provide information on the status input signals to the controller which may be preventing load transfer commands from being completed.

- N. Communications Interface – The controller shall be capable of interfacing, through an optional serial communication module, with a network of transfer switches, locally (up to 4000 ft.) or remotely through modem serial communications. Standard software specific for transfer switch applications shall be available by the transfer switch manufacturer. This software shall allow for the monitoring, control and setup of parameters.

- O. Data Logging – The controller shall have the ability to log data and to maintain the last 300 events, even in the event of total power loss. The following events shall be time and date stamped and maintained in a non-volatile memory:

1. Event Logging

- a. Data and time and reason for transfer normal to emergency.
- b. Data and time and reason for transfer emergency to normal.
- c. Data and time and reason for engine start.
- d. Data and time engine stopped.
- e. Data and time emergency source available.
- f. Data and time emergency source not available.

2. Statistical Data

- a. Total number of transfers.
- b. Total number of transfers due to source failure.



- c. Total number of days controller is energized.
- d. Total number of hours both normal and emergency sources are available.
- e. Total time load connected to Normal.
- f. Total time load connected to Emergency.
- g. Last engine start.
- h. Last engine start-up time.
- i. Input and output status.

#### **PART 4 ADDITIONAL REQUIREMENTS**

##### **4.01 OPTIONAL FEATURES**

- A. Accessory Package – An accessory bundle shall be provided that includes the below features (This package shall be equal to ASCO accessory 11BE, and shall be capable of being activated for existing switches through optional accessory dongle):
  - 1. A fully programmable engine exerciser with seven independent routines to exercise the engine generator, with or without load on a daily weekly, bi – weekly, or monthly basis.
  - 2. Event log display that shows event number, time and date of events, event type, and reason (if applicable). A minimum of 300 events shall be stored.
  - 3. RS – 485 communications port enabled.
  - 4. Common alarm output contact.
- B. Expansion Module – A relay expansion module (REX) is a standard feature when delayed transition transfer is specified. A REX module shall also be provided for open transition transfer that includes one form C contact for source availability of the normal (18G) and emergency (18B) sources. Additional output relay shall be provided to indicate a common alarm. The REX module shall have the capability of being daisy chained for multiple sets of contacts. (This feature shall be equal to ASCO accessory 18RX, and shall be capable of being added to existing switches without modification).
- C. Accessory 44 Strip heater (For NEMA 3R Enclosures) - Designed to keep humidity and or temperature within the ATS enclosure at acceptable levels. This accessory consists of a mounting bracket with strip heater, thermostat and terminal block.

##### **4.02 DISCONNECTING AND OVERCURRENT PROTECTION DEVICE**

- A. For those automatic transfer switches less than 1000 amperes, the normal connection shall be provided with a thermal magnetic rated molded case circuit breaker with current ratings as shown on the plans. It shall have a thermal magnetic trip unit.
- B. For those automatic transfer switches rated above 1000 amperes, the normal

connection shall be provided with a stationary mount, insulated case circuit breaker with a solid-state trip unit. The trip unit shall have an adjustable long time, short time, instantaneous, and ground fault trip settings. The insulated case circuit breaker shall trip open when the ground fault setting is exceeded.

**4.03 DISCONNECTING AND OVERCURRENT PROTECTION DEVICE**

- A. The maximum short circuit current the breaker shall be required to interrupt is as follows:

<u>Switch Rating (A)</u>	<u>AIC Rating</u>	<u>Voltage</u>
70-225	25,000A	480V
250, 400	35,000A	480V
600	50,000A	480V
800-2000	65,000A	480V
2500, 3000	100,000A	480V

**4.04 TESTS AND CERTIFICATION**

- A. The complete transfer switch shall be factory tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.
- B. Upon request, the manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards, and withstand and closing ratings. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.
- C. The ATS manufacturer shall be certified to ISO 9001:2008 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation, and servicing in accordance with ISO 9001:2008.

**4.04 SERVICE REPRESENTATION**

- A. The ATS manufacturer shall maintain a national service organization of company-employed personnel located throughout the contiguous United States. The service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.
- B. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.

**4.04 WARRANTY**

- A. Manufacturer shall warrant that the ATS be free from defects in material and

workmanship and will conform to manufacturer's standard specifications for the ATS for a period of five (5) years from the date of owners acceptance upon completion of installation and testing. This Limited Warranty does not extend to subsequent owners of the structure during the Warranty Period.

**END OF SECTION**

## **264313 - SURGE PROTECTION**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### **1.02 SUMMARY**

- A. Section includes field-mounted SPDs for low-voltage (120 to 600 V) power distribution and control equipment.
- B. Related Requirements:
  - 1. Section 262416 "Panelboards" for factory-installed SPDs.

#### **1.03 DEFINITIONS**

- A. Inominal: Nominal discharge current.
- B. MCOV: Maximum continuous operating voltage.
- C. Mode(s), also Modes of Protection: The pair of electrical connections where the VPR applies.
- D. MOV: Metal-oxide varistor: An electronic component with a significant non-ohmic current-voltage characteristic.
- E. OCPD: Overcurrent protective device.
- F. SCCR: Short-circuit current rating.
- G. SPD: Surge protective device.
- H. VPR: Voltage protection rating.

#### **1.04 SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

2. Copy of UL Category Code VZCA certification, as a minimum, listing the tested values for VPRs, Inominal ratings, MCOVs, type designations, OCPD requirements, model numbers, system voltages, and modes or protection.
- B. Field quality-control reports.
  - C. Sample Warranty: for manufacturer's special warranty.
  - D. Maintenance Data: For SPDs to include in maintenance manuals.

### **1.05 WARRANTY**

- A. Manufacturer's Warranty: Manufacturer agrees to replace or replace SPDs that fail in materials or workmanship within specified warranty period.
  1. Warranty Period: Five (5) years from the date of Substantial Completion.

## **PART 2 – PRODUCTS**

### **2.01 GENERAL SPD REQUIREMENTS**

- A. SPD with Accessories: Listed and labeled as defined in NFPA 70, by a qualified agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Comply with UL 1449.
- D. MCOV of the SPD shall be the nominal system voltage.

### **2.02 TRANSFER SWITCH SUPPRESSOR**

- A. Manufacturers: Subject to compliance with requirements, manufacturers, but are not limited to, the following:
  1. Eaton
  2. Square D
  3. Current Technology Inc.
  4. Liebert
  5. Siemens
- B. SPDs: Comply with UL 1449, Type 2.
- C. SPDs: Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1449, Type 2.
  1. SPDs with the following features and accessories:

- a. Integral disconnect switch.
  - b. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.
  - c. Indicator light display for protection status.
  - d. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status.
  - e. Surge counter.
- D. Comply with UL 1283.
- E. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 200 kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.
- F. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V, 208Y/120 V, three-phase, four-wire circuits shall not exceed the following:
1. Line to Neutral: 1200 V for 480Y/277 V, 700 V for 208Y/120 V.
  2. Line to Ground: 1200 V for 480Y/277 V, 1200 V for 208Y/120 V.
  3. Line to Line: 2000 V for 480Y/277 V, 1000 V for 208Y/120 V.
- G. Protection modes and UL 1449 VPR for 240/120 V, single-phase, three-wire circuits shall not exceed the following:
1. Line to Neutral: 700 V.
  2. Line to Ground: 700 V.
  3. Line to Line: 1000 V
- H. SCCR: Equal or exceed 100 kA.
- I. Inominal Rating: 20 kA,

### **2.03 PANEL SUPPRESSORS**

- A. Manufacturers: Subject to compliance with requirements, manufacturers, but are not limited to, the following:
1. Eaton
  2. Square D
  3. Current Technology Inc.
  4. Liebert
  5. Siemens
- B. SPDs: Comply with UL 1449 Type 2.
1. Include LED indicator lights for power and protection status.

2. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.
  3. Include Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status.
- C. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 100 kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.
- D. Comply with UL 1283.
- E. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V, 208Y/120 V, three-phase, four-wire circuits shall not exceed the following:
1. Line to Neutral: 1200 V for 480Y/277 V, 700 V for 208Y/120 V.
  2. Line to Ground: 1200 V for 480Y/277 V, 700 V for 208Y/120 V.
  3. Neutral to Neutral: 1200 V for 480Y/277 V, 700 V for 208Y/120 V.
  4. Line to Line: 2000 V for 480Y/277 V, 1200 V for 208Y/120 V.
- F. Protection modes and UL 1449 VPR for 240/120-V, single-phase, three-wire circuits shall not exceed the following:
1. Line to Neutral: 700 V.
  2. Line to Ground: 700 V.
  3. Neutral to Ground: 700 V.
  4. Line to Line: 1200 V.
- G. SCCR: Equal or exceed 100 kA.
- H. Inominal Rating: 20 kA.

## **2.04 ENCLOSURES**

- A. Indoor Enclosures: NEMA 250, Type 1.
- B. Outdoor Enclosures: NEMA 250, Type 3R.

## **2.05 CONDUCTORS AND CABLES**

- A. Power Wiring: Same size as SPD leads, complying with Section 260519 "Low Voltage Electrical power Conductors and Cables."
- B. Class 2 Control Cables: Multiconductor cable with copper conductors not smaller than No. 18 AWG, complying with Section 260519 "Wires and Cables."
- C. Class 1 Control Cables: Multiconductor cable with copper conductors not smaller than No. 14 AWG, complying with Section 260519 "Wires and Cables."

### **PART 3 – EXECUTION**

#### **3.01 INSTALLATION**

- A. Comply with NECA 1.
- B. Install an OCPD or disconnect as required to comply with the UL listing of the SPD.
- C. Install SPDs, with conductors between suppressor and points of attachment as short and straight as possible, and adjust circuit-breaker positions to achieve shortest and straightest leads. Do not splice and extend SPD leads unless specifically permitted by manufacturer. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.
- D. Use crimped connectors and splices only. Wire nuts are unacceptable.
- E. Wiring:
  - 1. Power Wiring: Comply with wiring methods in Section 260519 "Wires and Cables."
  - 2. Controls: Comply with wiring methods in Section 260519 "Wires and Cables."

#### **3.02 FIELD QUALITY CONTROL**

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative.
  - 1. Compare equipment nameplate data for compliance with Drawings and Specifications.
  - 2. Inspect anchorage, alignment, grounding, and clearances.
  - 3. Verify that electrical wiring installation complies with manufacturer's written installation requirements.
- B. An SPD will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

#### **3.03 STARTUP SERVICE**

- A. Complete startup checks according to manufacturer's written instruction.
- B. Do not perform insulation-resistance tests of the distribution wiring equipment with SPDs installed. Disconnect SPDs before conducting insulation-resistance tests, and reconnect them immediately after the testing is over.
- C. Energize SPDs after power system has been energized, stabilized, and tested.



**3.04 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate and maintain SPDs.

**END OF SECTION**

## **267210 - ADDRESSABLE FIRE ALARM SYSTEMS**

### **PART 1 - GENERAL**

#### **1.01 SCOPE**

- A. Provide all labor, material, tools and equipment required for the complete installation of work of fire alarm system called for in the contract documents.
- B. The system shall be in full compliance with National and Local Codes.
- C. The requirements of the specification shall be considered minimum for the system supplied. The system shall include all required hardware, raceways, interconnecting wiring and software to accomplish the requirements of this section and the contract drawings, whether or not specifically itemized herein.
- D. All equipment furnished is based upon Simplex fire alarm equipment and as distributed by Simplex. All equipment shall be new and the latest state of the art products of a single manufacturer, engaged in the manufacturing and sale of analog fire detection devices for over ten years.
- E. The system as specified shall be supplied, installed, tested, and approved by the local Authority Having Jurisdiction, and turned over to the Owner in an operational condition.
- F. In the interest of job coordination and responsibilities the installing contractor shall contract with a single supplier for fire alarm equipment, engineering, programming, inspection and tests, and shall be capable of providing a "UL Listing Certificate" for the complete system.
- G. Provide notification appliance expansion panel as required to support new notification devices.
- H. Add additional notification and initiation devices to existing point addressable Simplex 4100U.
- I. Provide fan shut-down and door hold open relay connections to new devices.

#### **1.02 STANDARDS, CODES & APPROVALS**

- A. The publications listed below form a part of this publication to the extent referenced. The publications are referenced in the text by the basic designation only. The latest version of each listed publication shall be used as a guide unless the authority having jurisdiction has adopted an earlier version.
- B. Factory Mutual (FM):

1. FM AG Approval Guide.
- C. National Fire Protection Association (NFPA):
1. NFPA 13 Standard For the Installation of Sprinkler Systems.
  2. NFPA 13A Recommended Practice For the Inspection, Testing and Maintenance of Sprinkler Systems.
  3. NFPA 70 National Electrical Code.
  4. NFPA 72, National Fire Alarm Code.
  5. NFPA 90A Standard For the Installation of Air Conditioning and Ventilating Systems.
  6. NFPA 101 Life Safety Code.
  7. NFPA 170 Standard Fire Safety and Hazmat Symbols
- D. Underwriters' Laboratories, Inc. ("UL") Appropriate "UL" equipment standards:
1. "UL" 864 Control Panels.
  2. "UL" 268 Smoke Detectors.
  3. "UL" 268A Smoke Detectors (HVAC).
  4. "UL" 1076 Security.
  5. "UL" 1971, Standard for Visual Signaling Appliances.

### **1.03 QUALIFICATIONS OF INSTALLERS**

- A. Before commencing work, submit data showing that the manufacturer has successfully installed fire alarm systems of the same scope, type and design as specified.
- B. The Contractor shall submit copies of all required Licenses and Bonds as required in the State having jurisdiction.
- C. The Contractor shall employ on staff, a minimum of one NICET Level 2 technician or a professional engineer, registered in the State of the installation.
- D. The Contractor shall be qualified by the Underwriter's Laboratories. Upon completion of the installation the Contractor shall certify the final system meets "UL" ongoing maintenance.
- E. Contractors unable to comply with the provisions of shall present proof of engaging the services of a subcontractor qualified to furnish the required services.

### **1.04 MANUFACTURER'S REPRESENTATIVE**

- A. Provide the services of a factory trained and certified technician, experienced in the installation and operation, maintenance and service of the type of system

provided. The representative shall be licensed in the State if required by law. The technician shall supervise installation, software documentation, adjustment, preliminary testing, final testing and certification of the system. The technician shall provide the required instruction to the Owner's personnel in the system operation, maintenance and programming.

#### **1.05 SUBMITTAL**

- A. The Contractor shall include the following information in the equipment submittal:
1. Riser Diagram showing point to point for each type of device being provided.
  2. Catalog cut sheets of all equipment being furnished.
  3. Battery calculations.
  4. Equipment List & legend - showing the device symbol, model number and MEA number.
  5. Power Calculations: Battery capacity calculations. Battery size shall be a minimum of 125% of the calculated requirement.
  6. Supervisory power requirements for all equipment.
  7. Alarm power requirements for all equipment.
  8. Power supply rating justification showing power requirements for each of the system power supplies.
  9. Justification showing power requirements of the system amplifiers. Amplifiers shall be sized for a minimum of 2 watts per connected speaker on every circuit.
  10. Voltage drop calculations for NAC wiring runs demonstrating worst-case condition. Show capability of 25 or 70.7 vrms circuits for wire runs.
  11. NAC circuit design shall incorporate a 15% spare capacity for future expansion.
  12. Submit manufacturer's requirements for testing Device Loop Card circuits and device addresses prior to connecting to control panel. At a minimum the following tests shall be required; device address, the address settings, the type of device (smoke detector, manual station, thermal detector, etc.), summary of all devices on each circuit-by type, confirmation that no devices are set with the same address and that the circuit is free from

ground faults and short circuits. This requirement shall need approval before any wiring is connected to the control panel.

13. Complete manufacturers' catalog data including supervisory power usage, alarm power usage, physical dimensions, and finish and mounting requirements.
14. Complete drawings covering the following shall be submitted by the Contractor for the proposed system:
  - a. Floor plans in a CAD compatible format showing all equipment and raceways, marked for size, conductor count with type and size, showing the percentage of allowable National Electric Code fill used.

## **PART 2 – PRODUCTS**

### **2.01 MANUFACTURERS**

- A. The catalog numbers used are those of Simplex without substitutions. For a list of Simplex authorized fire alarm vendors, contact Simplex.

### **2.02 MANUAL PULL STATIONS**

- A. Semi-flush, single action, break glass type.
- B. Constructed of red lexan with raised white lettering reading "Pull For Fire".
- C. Upon activation, handle shall lock in the alarm condition. A key shall be required to reset the manual pull station. Cylinders shall be keyed to match the fire alarm control panel.
- D. Provide intelligent monitor module.
- E. Design Make: Simplex

### **2.03 PHOTOELECTRIC SMOKE SENSOR**

- A. Detector shall operate on a light scattering principal. The detector shall have a photo-optic chamber with an infrared light emitting diode and a high speed light sensing phot diode. Capable of sensing visible products of combustion.
- B. Alarm conditions shall be indicated by a steady red flow from the LED mounted on the sensor.

- C. Sensors shall be twist lock mounted to a separate base provided with screw terminals for field wiring. The detector shall be tamper resistant and shall be removable only with a special tool.
- D. Provide wire guards as shown on plans.
- E. Design Make: Simplex

#### **2.04 ADDRESSABLE CONTROL MODULE**

- A. Addressable device with a form "C" dry relay contact used to control external appliances such as door closers, fans, dampers, etc.
- B. Relay contact rating:
  - 1. 24 VDC = 2 amps (pilot duty)
  - 2. 120 Vac = .5 amps
- C. Polling and alarm/active status provided by on board red and green LEDs.
- D. Design Make: Simplex

#### **2.05 ADDRESSABLE MONITOR MODULE**

- A. Addressable device used to connect 2 class B analog initiating device circuits.
- B. Input circuit wiring requirements
  - 1. Maximum allowable wire resistance – 50 ohms per circuit
  - 2. Maximum allowable wire capacitance - .1uF per circuit
- C. Polling and alarm/active status provided by on board red and green LEDs.
- D. Design Make: Simplex

#### **2.06 FIXED TEMPERATURE THERMAL DETECTOR**

- A. Self-restoring thermal detector.
- B. Rated at 135°F fixed temperature
- C. Design Make: Simplex

#### **2.07 VISUAL SIGNAL DEVICE**

- A. Provide backbox for recessed installations except for installations on existing walls.

- B. 24 VDC
- C. Visual strobe shall have the following characteristics:
  - 1. ADA compliant.
  - 2. White light output adjustable to 15, 30, 75, 110 candela. Set to 75 candela unless noted otherwise.
  - 3. Flash rate from 1 Hz to 3 Hz.
  - 4. Pulse duration of 0.2 seconds.
  - 5. Reflector and lexan lens with the word "Fire" imprinted.
- D. Design Make: Simplex

### **2.08 AUDIO-VISUAL SIGNAL DEVICE**

- A. Provide backbox for recessed installations except for installations on existing walls.
- B. 24 VDC.
- C. Horn shall be rated for 93 dB at 10' and tone shall match existing devices
- D. Visual strobe shall have the following characteristics:
  - 1. ADA compliant
  - 2. White light output adjustable to 15, 30, 75, 110 candela. Set to 75 candela unless noted otherwise.
  - 3. Flash rate from 1 Hz to 3 Hz.
  - 4. Pulse duration of 0.2 seconds.
  - 5. Reflector and lexan with the word "Fire" imprinted.
- E. Design Make: Simplex.

### **2.09 MAGNETIC DOOR HOLDERS**

- A. Magnetic door holders shall be furnished and installed as part of the hardware specifications.
- B. Electrical Contractor shall connect all magnetic door holders.

### **2.10 BATTERIES AND CHARGER**

- A. Provide battery and charger to provide 24 VDC standby power for the alarm system.
- B. Provide lead-calcium maintenance free batteries. Size batteries to permit 8 hours under supervisory condition, and then sound all alarms for 5 minutes.

- C. Cell reversal protection.
- D. 10 year minimum life expectancy.
- E. Battery charger shall be self-regulating, solid state type, capable of full charging a depleted battery within five hours.
- F. Install battery charger within the fire alarm control panel.
- G. Install batteries with fire alarm control panel or in a vented enclosure located adjacent to the fire alarm control panel.
- H. Design Make: Simplex.
- I. Accepted Manufacturers:
  - 1. Approved Equal.

### **PART 3 – EXECUTION**

#### **3.01 INSTALLATION:**

- A. Perform work in accordance with the requirements of NFPA 70 and NFPA 72.
- B. Fasten equipment to structural members of building or metal supports attached to structure, or to concrete surfaces.
- C. Conduit shall be run straight and parallel to walls and ceilings. Fastening shall be by the requirements of the NEC. Conduit fills shall not exceed the NEC requirements.
- D. Where approved, limited energy cable installation shall be used. All cable runs shall be run at right angles to building walls, supported from structure at intervals not exceeding 3 feet and where installed in environmental air plenums, be rated for such use and tied/supported by components listed for environmental air plenums installation.

#### **3.02 BOXES, ENCLOSURES AND WIRING DEVICES**

- A. Boxes shall be installed plumb and firmly in position.
- B. Extension rings with blank covers shall be installed on junction boxes where required.
- C. Junction boxes served by concealed conduit shall be flush mounted.



- D. Upon initial installation, all wiring outlets, junction, pull and outlet boxes shall have dust covers installed. Dust covers shall not be removed until wiring installation when permanent dust covers or devices are installed.
- E. "Fire Alarm System" decal or silk-screened label shall be applied to all junction box covers.

### **3.03 CONDUCTORS**

- A. Each conductor shall be identified as shown on the drawings at each with wire markers at terminal points. Attach permanent wire markers within 2 inches of the wire termination. Marker legends shall be visible.
- B. All wiring shall be supplied and installed in compliance with the requirements of the National Electric Code, NFPA 70, Article 760, and that of the manufacturer.
- C. Wiring for signal line circuits shall be minimum 16 AWG, strobe circuits shall be a minimum 14 AWG, speaker circuits shall be minimum 16 AWG twisted (and meet "UL" 2196 requirements), telephone circuits shall be a minimum 18 AWG twisted.
- D. All splices shall be made using solderless connectors. All connectors shall be installed in conformance with the manufacturer recommendations.
- E. Crimp-on type spade lugs shall be used for terminations of stranded conductors to binder screw or stud type terminals. Spade lugs shall have upset legs and insulation sleeves sized for the conductors.
- F. Permanently label or mark each conductor at both ends with permanent alphanumeric wire markers.
- G. A consistent color code for fire alarm system conductors throughout the installation.
- H. The installation contractor shall submit for approval prior to installation of wire, a proposed color code for system conductors to allow rapid identification of circuit types.
- I. Wiring within sub panels shall be arranged and routed to allow accessibility to equipment for adjustment and maintenance.

### **3.04 DEVICES**

- A. Relays and other devices to be mounted in auxiliary panels are to be securely fastened to avoid false indications and failures due to shock or vibration.
- B. Wiring within sub-panels shall be arranged and routed to allow accessibility to equipment for adjustment and maintenance.

- C. All devices and appliances shall be mounted to or in an approved electrical box.

### **3.05 CERTIFICATE OF COMPLIANCE**

- A. Complete and submit to the Project Engineer in accordance with NFPA 72, 1999 Edition Section 1-6.2.

### **3.06 FIELD QUALITY CONTROL**

- A. Testing, General

1. All Alarm Initiating Devices shall be observed and logged for correct zone and sensitivity. These devices and their bases shall be tagged with adhesive tags located in an area not visible when installed, showing the initials of the installing technician and date.
2. Wiring runs shall be tested for continuity, short circuits and grounds before system is energized. Resistance, current and voltage readings shall be made as work progresses.
3. A systematic record shall be maintained of all readings using schedules or charts of tests and measurements. Areas shall be provided on the logging form for readings, dates and witnesses.
4. The acceptance inspector shall be notified before the start of the required tests. All items found at variance with the drawings or this specification during testing or inspection by the acceptance inspector shall be corrected.
5. Test reports shall be delivered to the acceptance inspector as completed.
6. The installing contractor shall make instruments, tools and labor required to conduct the system tests available.
7. The following equipment shall be a minimum for conducting the tests:
  - a. Ladders and scaffolds as required to access all installed equipment.
  - b. Multimeter for reading voltage, current and resistance.
  - c. Two way radios, and flashlights.
  - d. A manufacturer recommended device for measuring airflow through air duct smoke detector sampling assemblies.
  - e. Decibel meter.

- B. In addition to the testing specified to be performed by the installing contractor, the installation shall be subject to test by the Engineer of Record and the AHJ.

### **3.07 ACCEPTANCE TESTING**

- A. A written acceptance test procedure (ATP) for testing the fire alarm system components and installation will be prepared by the engineer in accordance with NFPA 72 and this specification. The Contractor shall be responsible for the performance of the ATP, demonstrating the function of the system and verifying the correct operation of all system components, circuits, and programming.
- B. A program matrix shall be prepared by the installing contractor referencing each alarm input to every output function affected as a result of an alarm condition on that input.
- C. The installing contractor prior to the ATP shall prepare a complete listing of all device labels for alphanumeric annunciator displays.
- D. The acceptance inspector shall use the system record drawings in combination with the documents specified under paragraph 3.01 during the testing procedure to verify operation as programmed. In conducting the ATP, the acceptance inspector shall request demonstration of any or all input and output functions.
- E. The items tested shall include but not be limited to the following:
  - 1. System wiring shall be tested to show the following results and the system subsequence operation:
    - a. Open, Shorted or Grounded Circuits.
    - b. Primary and Battery power disconnected.
  - 2. System notification circuits and appliances operate as programmed. Audibility and Visual levels meet required standards.
  - 3. System shall demonstrate the correct messages at the FACP and Remote Annunciator.
  - 4. System off site reporting shall be verified for alarm, supervisory and trouble.
  - 5. System shall be tested for stand-by battery back up as outline in this specification.

### **3.08 DOCUMENTATION**

- A. System documentation shall be supplied to the Owner and shall include but not be limited to the following:

1. System record drawings and wiring details including one set of reproducible drawings, and a CD ROM with copies of the record drawings in DXF format for use in a CAD drafting program.
2. System Operating, Installation and Maintenance Manuals.
3. System matrix showing input signals to output commands.
4. Provide a copy of the system program on a 3 1/2 floppy disk or a CD ROM.

### **3.09 WARRANTY AND SERVICES**

- A. The Contractor shall warranty the entire system for electrical and mechanical failures for a period one year. The warranty shall begin with the completion of the acceptance testing or when beneficial use to the Owner is determined.
- B. The fire alarm system subcontractor or manufacturer shall offer for the Owner's consideration at the time of system submittal a priced inspection, maintenance, testing and repair contract in full compliance with the requirements of NFPA 72.
- C. The Contractor performing the contract services shall be qualified and listed to maintain ongoing certification of the completed system to the "UL" installed system listing.
- D. The installation contractor shall furnish training as follows:
  1. Training in the receipt, handling and acknowledgment of alarms.
  2. Training in the system operation including manual control of output functions from the system control panel.
  3. The total training requirement shall be a minimum of 2 hours, but shall be sufficient to cover all items specified. The Contractor shall provide two such training sessions.

**END OF SECTION**

DIVISIONS 31-33

SITE WORK AND RESTORATION

**DIVISIONS 31-33 – SITE WORK AND RESTORATION**

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## **311110 - SITE CLEARING**

### **PART 1 – GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this Section.
- B. Related Sections:
  - SECTION 311316 - TREE AND SHRUB PROTECTION AND TRIMMING
  - SECTION 312316 - EARTHWORK FOR STRUCTURES AND UTILITIES
  - SECTION 321216 - REMOVAL AND RESTORATION OF EXISTING ASPHALT CONCRETE PAVEMENT DISTURBED BY THE WORK OF THE CONTRACT
  - SECTION 321313 - REMOVAL AND RESTORATION OF PORTLAND CEMENT CONCRETE PAVING DISTURBED BY THE WORK OF THE CONTRACT
  - SECTION 330130 - REPLACEMENT AND RESTORATION OF EXISTING UNDERGROUND SANITARY AND STORM DRAINAGE SYSTEMS DISTURBED BY THE WORK OF THE CONTRACT
  - SECTION 323113 - CHAIN LINK FENCES AND GATES
  - SECTION 329113 - RESTORATION OF LANDSCAPE WORK DISTURBED BY THE WORK OF THE CONTRACT

#### **1.02 SUMMARY**

- A. This Section generally includes, but is not necessarily limited to, the following site clearing work:
  - 1. Protection of existing trees.
  - 2. Removal of trees and other vegetation.
  - 3. Clearing and grubbing.
  - 4. Removing and restoration above-grade improvements.
  - 5. Removing and restoration below-grade improvements.
  - 6. Stripping topsoil.
  - 7. Removal and restoration of existing sidewalks, roads and pavement.

#### **1.03 PROJECT CONDITIONS**

- A. Traffic: Conduct site clearing operations to ensure minimum interference with roads, streets, walks, pavements and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, pavements or other occupied or used facilities without permission from authorities having jurisdiction.
- B. Protection of Existing Improvements: Provide protections necessary to

prevent damage to existing improvements.

1. Protect improvements adjoining the work site.
  2. Restore damaged improvements to their original condition, as acceptable to Design Professional.
- C. Protection of Existing Trees and Vegetation: Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide 4' high snow fence to protect trees and vegetation to be left standing. Install fence at drip line of trees.
1. Water trees and other vegetation to remain within limits of contract work as required to maintain their health during course of construction operations.
  2. Provide protection for roots over 1-1/2 inch diameter that are cut during construction operations. Cover exposed roots with earth as soon as possible.
  3. Repair or replace trees and vegetation indicated to remain which are damaged by construction operations, in a manner acceptable to Design Professional. Employ a qualified, arborist to repair damages. See Section 311316, Paragraph 1.04A for qualifications.
  4. Replace trees which cannot be repaired and restored to full-growth status, as determined by arborist.

## **PART 2 - PRODUCTS (Not applicable)**

## **PART 3 - EXECUTION**

### **3.01 SITE CLEARING**

- A. General: Remove trees, shrubs, grass and other vegetation, improvements, or obstructions as required to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. "Removal" includes digging out and off-site disposing of stumps and roots.
1. Cut minor roots and branches of trees indicated to remain in a clean and careful manner, where such roots and branches obstruct installation of new construction.
- B. Topsoil: Topsoil is defined as friable clay loam surface soil found in a depth of



not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.

1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.
    - a. Remove heavy growths of grass from areas before stripping.
    - b. Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to prevent damage to root system.
  2. Stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water. Cover storage piles, if required, to prevent wind erosion.
  3. Dispose of unsuitable or excess topsoil, same as specified for disposal of waste material.
- C. Clearing and Grubbing: Where shown, clear site of trees, shrubs and other vegetation, which may interfere with the new construction indicated to be left standing.
1. Completely remove stumps, roots, and other debris protruding through ground surface.
  2. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
    - a. Place fill material in horizontal layers not exceeding 6 inches loose depth, and thoroughly compact to a density equal to adjacent original ground.
- D. Removal and Restoration of Improvements: Remove and restore existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.
1. Abandonment or removal of certain underground pipe or conduits may be indicated on mechanical or electrical drawings, and is included under work of related Division 23 and 26 sections. Removal of abandoned underground piping or conduit interfering with construction is included under this Section.

### **3.02 DISPOSAL OF WASTE MATERIALS**

- A. Burning on Owner's Property: Burning is not permitted on Owner's property.

- B. Removal from Owner's Property: Remove waste materials from Owner's property.
- C. Debris removal shall be performed by the close of the work date that debris was unearthed.

**END OF SECTION**

## **311316 - TREE AND SHRUBS PROTECTION AND TRIMMING**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this Section.
- B. Related Sections:
- |                  |   |
|------------------|---|
| SECTION 311110 - | SITE CLEARING   |
| SECTION 312316 - | EARTHWORK FOR STRUCTURES AND UTILITIES  |
| SECTION 321216 - | REMOVAL AND RESTORATION OF EXISTING ASPHALT<br>CONCRETE PAVEMENT DISTURBED BY THE WORK OF THE<br>CONTRACT                           |
| SECTION 321313 - | REMOVAL AND RESTORATION OF PORTLAND CEMENT<br>CONCRETE PAVING DISTURBED BY THE WORK OF THE<br>CONTRACT                              |
| SECTION 323113 - | CHAIN LINK FENCES AND GATES   |
| SECTION 329113 - | RESTORATION OF LANDSCAPE WORK DISTURBED BY THE<br>WORK OF THE CONTRACT  |
| SECTION 330130 - | REPLACEMENT AND RESTORATION OF EXISTING<br>UNDERGROUND SANITARY AND STORM DRAINAGE<br>SYSTEMS DISTURBED BY THE WORK OF THE CONTRACT |

#### **1.02 SUMMARY**

- A. This Section generally includes, but is not necessarily limited to, trimming and protection of trees that are indicated to remain but interfere with or are close to new construction, as herein specified.
1. Trees which are to be removed are generally indicated on the drawings.
  2. Trees which are to remain and must be protected are generally indicated on the drawings.
  3. No tree is to be removed except within the footprint of the new above and underground construction.
  4. Removal, storing and replanting of shrubs.

#### **1.03 SUBMITTALS**

- A. Certification: Submit written certification by qualified arborist that trees and shrub indicated to remain have been protected during the course of construction in accordance with recognized standards and that where damage did occur, trees and shrubs were promptly and properly treated.

Indicate which damaged trees and shrubs (if any) are incapable of retaining full growth potential and are recommended to be replaced.

#### **1.04 QUALITY ASSURANCE**

- A. Arborist Qualifications: Engage a qualified arborist who has successfully completed tree and shrubs protection and trimming, to perform the following work:
1. Remove branches from trees and trimming that are to remain, if required.
  2. Recommend procedures to compensate for loss of roots and perform initial pruning of branches and stimulation of root growth where removed to accommodate new construction.
  3. Recommend procedures for excavation and grading work juxtaposed to established plants.
  4. Perform tree repair work for damage incurred by new construction.

#### **1.05 PROJECT CONDITIONS**

- A. Temporary Protections: Provide temporary fencing, barricades, or other suitable guards located outside drip-line (outer perimeter of branches) to protect trees and other plants that are to remain from damage.
- B. Protect Root Systems: Do not store construction materials, debris, or excavated material within drip line of trees to remain.

Do not permit vehicles within drip line. Restrict foot traffic to prevent excessive compaction of soil over root systems within drip line.

### **PART 2 - PRODUCTS**

#### **2.01 PRODUCTS**

(Not Used)

### **PART 3 - EXECUTION**

#### **3.01 GENERAL**

- A. Protect tree root systems from damage due to noxious materials caused by run-off or spillage during mixing, placement, or storage of construction materials. Protect root systems from flooding, eroding, or excessive wetting resulting from dewatering operations.

- B. Do not allow fires under or adjacent to trees or other plants that are to remain.
- C. Remove branches from trees that are to remain, if required to clear new construction.
  - 1. Where directed by Design Professional, extend pruning operation to restore natural shape of entire tree.
  - 2. Cut branches and roots, if required, with sharp pruning instruments; do not break or chop.

### **3.02 EXCAVATION AROUND TREES**

- A. Excavate within proximity of trees only where indicated. Do not machine excavate within drip-line.
- B. Where excavating for new construction is required within drip line of trees, hand excavate to minimize damage to root systems. Provide sheeting at excavations if required. Use narrow-tine spading forks and comb soil to expose roots.
  - 1. Relocate roots in backfill areas wherever possible. If large, main lateral roots are encountered, expose beyond excavation limits as required to bend and relocate without breaking. If encountered immediately adjacent to location of new construction and relocation is not practical, cut roots approximately 3 inches back from new construction.
- C. Do not allow exposed roots to dry out before permanent backfill is placed; provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in moist condition and temporarily support and protect from damage until permanently relocated and covered with earth.
- D. Where trenching for utilities is required within drip line, tunnel under or around roots by hand digging. Do not cut main lateral roots or tap roots; cut only smaller roots that interfere with installation of new work. Cut roots with sharp pruning instruments; do not break or chop.
- E. Prune branches to balance loss to root system caused by damage or cutting of root system.

### **3.03 GRADING AND FILLING AROUND TREES AND SHRUBS**

- A. Maintain and restore existing grade within drip-line of trees.

### **3.04 REPAIR AND REPLACEMENT OF TREES**

- A. Repair trees damaged by construction operations. Make repairs promptly after damage occurs to prevent progressive deterioration of damaged trees.
- B. Remove and replace dead and damaged trees that arborist determines to be incapable of restoration to normal growth pattern.
  - 1. Provide new trees and shrubs of same size and species as those being replaced.
  - 2. If trees over 6 inches in caliper measurement (taken 12 inches above grade) are required to be replaced, provide new trees of 6-inch caliper size and of species selected by the Design Professional.

**3.05 DISPOSAL**

- A. Burning on Owner's property of removed trees and branches is not permitted on site.
- B. Removal from Owner's Property: Remove excess excavation, displaced trees, and trimmings and dispose of off Owner's property.

**END OF SECTION**

## **312316 - EARTHWORK FOR STRUCTURES AND UTILITIES**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Sections:
  - SECTION 311110 - SITE CLEARING
  - SECTION 321316 - REMOVAL AND RESTORATION OF EXISTING ASPHALT CONCRETE PAVEMENT DISTURBED BY THE WORK OF THE CONTRACT
  - SECTION 323113 - CHAIN LINK FENCES AND GATES
  - SECTION 329113 - RESTORATION OF LANDSCAPE WORK DISTURBED BY THE WORK OF THE CONTRACT
  - SECTION 330130 - REPLACEMENT AND RESTORATION OF EXISTING UNDERGROUND SANITARY AND STORM DRAINAGE SYSTEMS DISTURBED BY THE WORK OF THE CONTRACT

#### **1.02 SUMMARY**

- A. This Section includes: Earthwork related to furnishing and installing underground electric work, utilities, structures, conduits, or other related appurtenances, more specifically, requirements for trench excavation, refilling, bedding, backfill construction and restoration of existing pavements, turf and grades. It does not include specific material requirements or fabrication instructions for underground electrical conduit bank, structures, and appurtenances which are covered in other sections of the project specifications.
- B. This Section includes the following:
  - 1. Preparing of subgrade for building slabs, areaways, walks, and pavements.
  - 2. Drainage fill course for support of building slabs and areaways are included as part of this work.
  - 3. Subbase course for walks, areaways and pavements.
  - 4. Subsurface drainage backfill for walls, areaways and trenches.
  - 5. Excavating and backfilling of trenches.
  - 6. Excavating and backfilling for underground mechanical and electrical

utilities and buried mechanical and electrical appurtenances.

- C. This Section includes: Earthwork construction necessary for the restoration of existing earth work disturbed by the work of the contract serving existing: exterior storm drainage system exterior sanitary drainage system, exterior water distribution systems exterior steam and condensate system conduits and tunnels, existing telephone systems, existing communications systems, CCTV systems, site lighting systems, structures and appurtenances.
- D. Additional Requirements for Excavating and Backfilling for Underground/Electrical Work: Refer to Division 26 sections for additional requirements required in conjunction with underground electrical, conduit banks, utilities and buried electrical structures and appurtenances.

### **1.03 DEFINITIONS**

- A. Backfill: Material used in refilling a trench or other excavation.
- B. Base Course: The layer placed between the subbase and surface pavement in a paving system.
- C. Borrow: Soil material obtained off-site when sufficient approved soil material is not available from excavations.
- D. Cohesive Materials: Soils classified by ASTM D 2487 as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesive only when fines have a plasticity index greater than zero.
- E. Cohesionless Materials: Soils classified by ASTM D 2487 as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as cohesionless only when the fines have a plasticity index of zero.
- F. Compaction: The method of mechanically stabilizing a material by increasing its density at a controlled moisture condition as set forth in the New York State D.O.T. Standard Specifications. "Degree of Compaction" is expressed as a percentage of the maximum density obtained by the test procedure described in ASTM D 698 or D 1557 for general soil types or ASTM D 4253 or ASTM D 4254 for isolated cohesionless materials.
- G. Drainage Fill: Course of washed granular material supporting slab-on-grade placed to cut off upward capillary flow of pore water.
- H. Excavation consists of removal of material encountered to subgrade elevations specified, indicated, or required and subsequent disposal of materials removed.
  - 1. Unauthorized excavation consists of removal of materials beyond indicated specified or required subgrade elevations or dimensions without specific direction of Design Professional. Unauthorized



excavation, as well as remedial work directed by Design Professional, shall be at Contractor's expense.

- a. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Design Professional.
  - b. In locations other than those above, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Design Professional.
2. Additional Excavation: When excavation has reached required subgrade elevations, notify Design Professional, who will make an inspection of conditions. If Design Professional determines that bearing materials at required subgrade elevations are unsuitable, continue excavation until suitable bearing materials are encountered and replace excavated material as directed by Design Professional.
- I. Granular Pipe Bedding: A dense, well-graded aggregate mixture of sand, gravel, or crushed stone (mixed individually, in combination with each other, or with suitable binder soil) placed on a subgrade to provide a suitable foundation for pipe.
  - J. Lift: A layer or course of soil placed on top of unprepared subgrade or a previously prepared or placed soil in a fill or backfill.
  - K. Subbase Course: The layer placed between the subgrade and base course in a paving system or the layer placed between the subgrade and surface of a pavement or walk.
  - L. Subgrade: The undisturbed earth or the compacted soil layer immediately below granular subbase, drainage fill, or topsoil materials.
  - M. Structure: Buildings, foundations, manholes, handholes, drainage inlets, catch basins, drywells, leaching basins, culverts, spill ways, drainage structures, slabs, tanks, curbs, or other man-made stationary features occurring above or below ground surface.
  - N. Topsoil: In natural or undisturbed soil formations, the fine-grained, weathered material on the surface or directly below any loose or partially decomposed organic matter. Topsoil may be a dark-colored, fine, silty, or sandy material with a high content of well decomposed organic matter, often containing traces of the parent rock material. Gradation and material requirements specified herein apply to all topsoil references in this Contract. The material shall be representative of productive soils in the vicinity. (See USDA Soil

Conservation reports for New York State).

- O. Unyielding Material: Rock or soil with cobbles in the trench bottom requiring a covering of finer grain material or special bedding to avoid bridging in the pipe or conduit.
- P. Satisfactory Materials: Satisfactory materials shall consist of any material classified by ASTM D 2487 as GW, GP, and SW.
- Q. Unsatisfactory Material: Soil or other material identified as having insufficient strength or stability to carry intended loads on trench backfills without excessive consolidation or loss of stability. Also backfill material which contains refuse, frozen material, large rocks, debris, and other material which could damage the pipe or cause the backfill not to compact. Materials classified as PT, OH, or OL by ASTM D 2487 are unsatisfactory.
- R. Unstable Material: Material in the trench bottom which lacks firmness to maintain alignment and prevent joints from separating in the pipe, conduit, or appurtenance structure during backfilling. This may be material otherwise identified as satisfactory which has been disturbed or saturated.

#### **1.04 SUBMITTALS**

- A. Test Report: Submit the following reports directly to Design Professional from the testing services, with copy to Contractor:
  - 1. Test reports on borrow material.
  - 2. Verification of suitability of each footing subgrade material, in accordance with specified requirements.
  - 3. Field report; in-place soil density tests.
  - 4. One optimum moisture-maximum density curve for each type of soil encountered.
  - 5. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.
- B. Certified Test Reports
  - 1. Underdrain backfill material.
  - 2. Concrete.
  - 3. Trench backfill material.
  - 4. Pipe bedding material.
  - 5. Topsoil.
  - 6. Submit test reports for all non-native materials and for native materials deemed by, the College's representative to be of questionable quality.

C. Manufacturers Certificates of Compliance

1. Filter fabric.
2. Warning and identification tape.
3. Kraft paper.
4. Conduit casing.
5. Casing end seals.
6. Wood preservative and treatment.

D. Contractor Provide Drawings, Shop Drawings, and Certifications

1. Shoring and Sheet piling Plan: Describe materials of shoring system to be used. Indicate whether or not components will remain after filling or backfilling. Provide plans, sketches, or details along with calculations by a professional engineer registered in the state in which the project is located. Indicate sequence and method of installation and removal.
2. Dewatering Plan: Describe methods for removing collected water from open trenches and diverting surface water or piped flow away from work area. Describe equipment and procedures for installing and operating the dewatering system indicated. Describe the basic components of the dewatering system proposed for use and its planned method of operation. Record performance and effectiveness of method or system in use and submit weekly.
3. Temporary Continuation of Service Plans: Describe methods, procedures, equipment and services to provide continuous services of all utilities (electric, water, sanitary sewer, storm sewer, gas, telephone, communications, etc.). Describe the basic components and methods of operation.
4. Conduit casing fabrication drawings.
5. Proposed method of boring and jacking.
6. Certifications of each welder's qualifications prior to on-site welding.
7. Location of borrow materials.

E. Reports of Field Testing

1. Test for Moisture-Density Relation: Submit ten (10) days prior to commencing utility excavation.
2. Topsoil Tests: Submit topsoil tests verifying conformance to required parameters prior to commencing seeding and sodding, planting, operations.

3. Density and Moisture Tests: Submit within ten (10) days of test date.

Submit any field test data not listed above sufficiently in advance of construction so as not to delay work.

- F. Soil materials shall be obtained from a New York State D.O.T. approved source.

#### **1.05 QUALITY ASSURANCE**

- A. Codes and Standards: Perform excavation work in compliance with applicable requirements of authorities having jurisdiction.

- B. Testing and Inspection Service: Contractor shall employ a qualified independent geo-technical testing and inspection laboratory to perform soil testing and inspection service during earthwork operations. The costs of tests shall be paid for by the College.

- C. Testing Laboratory Qualifications: To qualify for acceptance, the geo-technical testing laboratory must demonstrate to Design Professional's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct required field and laboratory geo-technical testing without delaying the progress of the Work.

- D. Quality Control Testing

1. Testing Facilities: Tests shall be performed by an approved commercial testing laboratory. No work requiring testing will be permitted until the facilities have been inspected and approved by the Design Professional. Cost incurred for any subsequent inspection required because of failure of the first inspection will be charged to the Contractor.

2. Testing of Backfill Materials: Characteristics of backfill materials shall be determined in accordance with particle size analysis of soils ASTM D 422 and moisture-density relations of soils ASTM 1557, method (D). A minimum of one particle size analysis and one moisture-density relation test shall be performed on each different type of material used for bedding and backfill. A mechanical tamper may be used provided the results are correlated with those obtained by the referenced hand tamper in ASTM D 1557, method D.

3. Construction Quality Control: Quality control sampling and testing during construction shall be performed as hereinafter specified.

4. Copies of all laboratory and field test reports shall be submitted to the Design Professional within 24 hours of the completion of the test.

E. Codes

1. All State and Federal: Codes, rules, regulations and ordinances.
2. O.S.H.A.
3. New York State Uniform Code.
4. New York State DEC.

F. Applicable Publications: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The Publication in effect at the time of bidding shall be considered the basis of this specification. The Engineer will bring a copy of the applicable publication to the scheduled job meetings as directed by the Owner.

1. American Concrete Pipe Association (ACPA) Publication:  
Concrete Pipe Installation Manual (for existing pipe earthwork disturbed by the work of the Contract).
2. American National Standards Institute (ANSI) Publications:  
B31.8 Gas Transmission and Distribution Piping Systems (for existing pipe earthwork disturbed by the work of the Contract).
3. American Society for Testing and Materials (ASTM) Publications:  
C 12 Installing Vitrified Clay Pipe Lines (for existing pipe earthwork disturbed by the work of the Contract).  
C 14 Concrete Sewer, Storm Drain, and Culvert Pipe (for existing pipe earthwork disturbed by the work of the Contract).  
C 33 Concrete Aggregates.  
C 76 Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (for existing pipe earthwork disturbed by the work of the Contract).  
D 422 Particle-Size Analysis of Soils  
D 698 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-in. (305-mm) Drop.  
D 751 Coated Fabrics.  
D 1140 Amount of Material in Soils Finer Than the No. 200 (75-micrometer) Sieve.  
D 1556 Density of Soil in Place by the Sand Cone-Method.  
D 1557 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in. (457-mm) Drop.  
D 1682 Breaking Load and Elongation of Textile Fabrics.  
D 2316 Installing Bituminized Fiber Drain and Sewer Pipe (for existing pipe earthwork disturbed by the work of the Contract).  
D 2487 Classification of Soils for Engineering Purposes.  
D 2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).  
D 4253 Maximum Index Density of Soils Using Vibratory Table.

- D 4254 Minimum Index Density of Soils and Calculation of Relative Density.  
D 4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
4. American Water Works Association (AWWA) Publications
- C300 Reinforced Concrete Pressure Pipe, Steel Cylinder Type, for Water and Other Liquids (for existing pipe earthwork disturbed by the work of the Contract).  
C600 Installation of Ductile-Iron Water Mains and Their Appurtenances (for existing pipe earthwork disturbed by the work of the Contract).  
C603 Installation of Asbestos-Cement Pressure Pipe (for existing pipe earthwork disturbed by the work of the Contract).  
M9 Concrete Pressure Pipe (for existing pipe earthwork disturbed by the work of the Contract).  
M11 Steel Pipe Design and Installation (for existing pipe earthwork disturbed by the work of the Contract).  
M23 PVC Pipe-Design and Installation (for existing pipe earthwork disturbed by the work of the Contract).
5. American Wood Preserver's Association (AWPA) Publications
- C2 Lumber, Timbers, Bridge Ties and Mine Ties-Preservative Treatment by Pressure Process.  
P5 Water-Borne Preservatives.
6. American Welding Society (AWS) Publication
- D1.1 Structural Welding Code, Steel.
7. National Electrical Manufacturers Association (NEMA) Publications
- TC 6 PVC and ABS Plastic Utilities Duct for Underground Installation.
8. National Fire Protection Association (NFPA) Publications
- NFPA 30 Flammable and Combustible Liquids Code.  
NFPA 70 The National Electrical Code Handbook.
9. United States Army Corps of Engineers (COE) Publications
- EM-385-1-1 Safety and Health Requirements Manual.
10. U.S. Department of Agriculture (USDA) Publication
- April 1972 Soil Survey Investigation Report No. 1, Soil Survey Laboratory and Procedures for Collecting Soil Samples, Soil Methods or latest Conservation Service Edition

11. State of New York, Department of Transportation (DOT).  
  
Standard Specifications for Construction and Materials January 2, 1990, or latest edition.
12. Manual of Uniform Traffic Control Devices  
  
Department of Transportation  
Traffic and Safety Division  
State Office Building Campus  
Building No. 5  
Albany, New York 12232

**1.06 DELIVERY AND STORAGE**

- A. Deliver and store materials in a manner to prevent contamination, segregation, freezing, and other damage. Store synthetic fiber filter fabric to prevent exposure to direct sunlight.

**1.07 PROTECTION OF EXISTING STRUCTURES AND NEW UTILITIES**

- A. Become familiar with the existence of all utilities on the site belonging to the Owner, State, Local, Municipal and other public service corporations on/or adjoining the site of the work including but not limited to: Water, Gas, Electric, Telephone, TV, Communications, Steam, Condensate, Tunnels, etc.
- B. Do not perform any work which will subject the utilities or structures to damage.
- C. Do not remove or cause to be removed any structure or part of a structure owned by a public utility corporation Local Sub-Division, State, or other Agencies, and the Owner without the written approval of the Engineer.
- D. Cooperate with public utility corporations and the Owner whose structures (aerial, surface or sub-surface) are within the limits of or along the outside of the right-of-way to make it possible for them to maintain uninterrupted service.
- E. The term utility shall also apply to the site heat distribution systems, site gas, site water, site electrical and sewer systems, drainage, telephone and CCTV systems, etc.
- F. Excavations shall not be made around Local Sub-Division, and State monuments and bench marks until the said monuments or marks have been referenced and reset or otherwise disposed by the Chief Engineer of the Bureau of Highways and the Local Sub-Division. The necessary labor and materials required to remove, care for, and reset all such monuments and bench marks shall be furnished by the Contractor.

- G. Obtain site utility marking from site representatives of each Utility Co. and from the College.

**1.08 STRUCTURAL SUPPORT OF STRUCTURES AND UTILITIES**

- A. Shoring and Sheeting: Provide structural support, shoring, bracing, cribbing, trench boxes, underpinning and sheeting for all existing or new structures and utilities. Include provisions in the shoring and sheeting plan that will accomplish the following:
1. Prevent undermining of areaways, structures, pavements and slabs, underground utilities such as steam tunnels, electric, gas, water, TV, tunnels, etc.
  2. Prevent slippage or movement in banks or slopes adjacent to the excavation.
  3. Allow for the abandonment of shoring and sheeting materials in place in critical areas as the work is completed. In these areas, backfill the excavation to the required elevation and remove the remaining exposed portion of the shoring before completing the backfill.
- B. Dewatering: Plan for and provide the structures, equipment, and construction for the collection and disposal of surface and subsurface water encountered in the course of construction.
1. Dewatering Plan: Base on site surface and subsurface conditions, available soil, and hydrological data. Remove water by pumping or other methods to prevent the softening of surfaces exposed by excavation, prevent hydrostatic uplift, and provide a stable trench condition for installation of the utility. Use screens and gravel packs or other filtering systems on the dewatering devices to prevent the removal of fines from the soil.
  2. Operation and Performance: Operate the dewatering system continuously until construction work below existing water levels is complete. Measure and record the performance of the dewatering system at the same time each day with observation wells and piezometer installed in conjunction with the dewatering system.
- C. Utilities: Movement of construction machinery and equipment over, electric conduits banks, conduits, pipes and utilities during construction shall be at the Contractor's risk. Perform all work adjacent to non-Owner utilities as indicated in accordance with procedures outlined by National Grid or PSEGLI. Excavation made with power-driven equipment is not permitted within ten (10) feet of any known utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, use hand or light equipment excavation. Start hand or light



equipment excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured.

Support uncovered lines or other existing work affected by the Contract excavation until approval for backfill is granted by the Owner's Representative. Report damage to utility lines or subsurface construction immediately to the Engineer.

- D. Structures and Surfaces: Protect newly backfilled areas and adjacent structures, slopes, or grades from traffic, erosion settlement, or any other damage. Repair and reestablish damaged or eroded grades and slopes and restore surface construction prior to acceptance. Protect existing streams, ditches, and storm drain inlets from water-borne soil by means of straw bale dike filter fabric dams as indicated on the contract drawings. All work shall be conducted in accordance with requirements of OSHA and NYSDEC.
1. Legally dispose of excavated material so that it will not obstruct the flow of streams, endanger a partly finished structure, impair the efficiency or appearance of any facilities, or be detrimental to the completed work.
  2. Stockpile coarse rock from trench excavations in the location directed by the Design Professional.
- E. Channels and Ditches: Construct rock protection (rip-rap) in areas indicated to the lines and thicknesses specified indicated to dissipate stream energy and prevent channel erosion. Place rip-rap in bedding of granular material grout on a layer of filter fabric.
- F. Conduit Casing Under Pavement: Where permitted by Design Professional, the Contractor may provide new smooth wall steel pipeline casing under existing pavement in a trench by the boring and jacking method of installation. Provide each conduit casing to the lengths and dimensions required, complete and suitable for use with the new utility as approved by Design Professional.
1. Earthwork for Conduit Casings: Provide excavation, sheet piling, shoring, dewatering, and backfilling for casings under this section.

#### **1.09 PROJECT CONDITIONS**

- A. Site Information: The survey drawings bound within the documents show subsurface utility lines used for the basis of the design shall be used for information only. Conditions are not intended as representations or warranties of accuracy of utility locations. The Town will not be responsible for interpretations or conclusions drawn from this data by Contractor.

1. Test borings, non-intrusive tests for utilities and other exploratory operations may be performed by Contractor, at the Contractor's option; however, no change in the Contract Sum will be authorized for such additional exploration.
- B. Existing Utilities: Locate existing underground utilities in areas of excavation work by hand excavation and by non-intrusive tests. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.
  1. Should uncharted, or incorrectly charted, conduit, piping or other utilities be encountered during excavation, consult the Engineer immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of the Engineer.
  2. Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by the College and then only after acceptable temporary utility services have been provided.
    - a. Provide minimum of five (5) working days' notice to the Owner or Utility and receive written notice to proceed before interrupting any utility.
  3. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with Owner and Engineer for shutoff of services if lines are active.
- C. Use of Explosives: Use of explosives is not permitted. Do not bring explosives onto site.
- D. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.
  1. Operate warning lights after sundown to sun up seven (7) days per week for the entire periods excavations are not backfilled and grades restored to their original condition and as required by the Owner and authorities having jurisdiction.
  2. Protect structures, utilities, sidewalks, areaways, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
  3. Perform excavation by hand where new work is in close proximity to existing structures and existing utilities.
  4. Perform excavation by hand within dripline of large trees to remain.

- Protect root systems from damage or dryout to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with moistened burlap.
5. Install and maintain sediment and erosion control devices for the duration of construction in accordance with Erosion Control Plan and "The Manual of New York Guidelines for Urban Erosion and Sediment Control."

## **PART 2 - PRODUCTS**

### **2.01 SOIL MATERIALS**

- A. Provide soil materials as described below free of debris, roots, wood, scrap materials, vegetable matter, refuse, soft unsound particles, ice, or other deleterious and objectionable materials.
- B. Satisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, and SP.
- C. Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.
- D. Sub-base Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, and natural or crushed sand.
- E. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100 percent passing a 1-1/2 inch sieve and not more than 5 percent passing a No. 4 sieve.
- F. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, ASTM D 448, coarse aggregate grading size 57, with 100 percent passing a 1-1/2-inch sieve and not more than 5 percent passing a No. 8 sieve.
- G. Backfill and Fill Materials: Materials New York State D.O.T. standard specifications complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, and SP; free of clay, rock, or gravel larger than 2 inches in any dimension, debris, wastes, frozen materials, and vegetable and other deleterious matter.
  1. Backfill: Bring trenches to grade indicated on the drawings using material excavated on the site of this project. This material will be considered unclassified and no testing other than for compaction will be required before use as backfill classified as GM, SM, SC, by ASTM D 2487 with a maximum particle size of 3 inches conforming to gradation of New York State, DOT Standard Specification..
  2. Special Backfill for Roads and Paved Areas: Backfill trenches under

roads and paved areas with material conforming to gradation of New York State, DOT Standard Specification. With material conforming to the requirements stated above except that the liquid limit of the material cannot exceed 35 percent when tested in accordance with ASTM D 4318, the plasticity index cannot exceed 12 percent when tested in accordance with ASTM D 4318, and not more than 25 percent by weight can be finer than the No. 200 sieve when tested in accordance with ASTM D 1140.

3. Sand: Clean, coarse-grained sand classified in accordance with the gradation set forth in the New York State DOT Standard Specification or SW or SP by ASTM D 2487 for bedding and backfill as indicated.
4. Gravel: Clean, coarsely graded natural gravel, crushed stone or a combination thereof gradation of New York State D.O.T. Standard Specification or having a classification of GW, GP in accordance with ASTM D 2487 for bedding and backfill as indicated. Maximum particle size shall not exceed 3 inches.
5. Backfill for Under Drainage Systems: Clean sand, crushed rock, or gravel meeting the following requirements:
  - a. Perforated or Slotted-Wall Pipe: Backfill meeting requirements of New York State D.O.T. Standard Specification.
  - b. Open Joint Pipe: Materials as described in New York State D.O.T. Standard Specification.
  - c. Blind or French Drains: Backfill meeting requirements of New York State D.O.T. Standard Specification.
  - d. Any Type Drain Used With Filter Fabric: Clean gravel or crushed stone or gravel conforming to New York State D.O.T. Standard Specification.
6. Topsoil: Salvaged topsoil from stockpile. Prior to spreading, test the topsoil, and add the necessary soil amendments to bring the material within the ranges described in New York State D.O.T. Specifications. Furnish additional topsoil from approved sources off the site meeting the requirements described in Table 2 if stockpiled material is insufficient to complete work indicated.

\*\* OR \*\*

Topsoil: Free of subsoil, stumps, rocks larger than one inch in diameter, brush, weeds, toxic substances, and other material or substance detrimental to plant growth. Topsoil shall be a natural, friable soil representative of productive soils in the vicinity. Modify the topsoil

provided if necessary to meet the requirements described in New York State D.O.T. Specification.

7. Borrow: Meeting requirement for general site fill backfill granular fill topsoil. Obtain borrow materials in excess of those furnished from excavations described herein from sources off the Owner's property. Borrow areas indicated.
8. Pipe Bedding: Provide material for pipe bedding where the existing pipe earth work is disturbed by the work of the Contract. See Part 3 of this Section of the project specification for material; material's reference and installations reference.

## **2.02 CONCRETE PIPE CRADLES OR ARCHES**

- A. Existing concrete pipe cradles and arches disturbed by the work of the Contract shall be replaced with cradles and arches with concrete having a 28-day compressive strength of 3,000 psi.

## **2.03 FILTER FABRIC**

- A. Provide a pervious sheet of polyester, nylon, glass or ultraviolet resistant, polypropylene filaments woven, spun bonded, fused, or otherwise manufactured into a nonraveling fabric with uniform thickness and strength. The fabric shall have the following manufacturer certified properties:
  1. Grab tensile strength (ASTM D 1682) min. 90 lbs  
machine and transverse direction
  2. Grab elongation (ASTM D 1682) min. 15-70 percent  
machine and transverse direction
  3. Puncture strength (ASTM D 751) min. 50 lbs
  4. Mullen burst strength (ASTM D 751) min. 100 psi
  5. Equivalent opening (CW02215) 70-100

## **2.04 BURIED WARNING AND IDENTIFICATION TAPE**

- A. Provide metallic core, acid and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch-minimum width, color coded as stated below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing is to be permanent, unaffected by moisture or soil. Provide warning tape for all new electric work and for all uncovered other existing utility and site services.

### Warning Tape Color Codes

Red: Electric

Yellow: Gas, Oil, Dangerous Materials  
Orange: Telephone and Other Communications  
Blue: Water Systems  
Green: Sewer Systems  
White: Steam Systems

1. Warning Tape for Metallic Piping: Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements indicated above. Minimum thickness of the tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise with a maximum 350 percent elongation.
2. Detectable Warning Tape for Electric Concrete Bank Enclosure and Non-Metallic Piping: Polyethylene plastic tape conforming to the width, color, and printing requirements indicated above. Minimum thickness of the tape shall be 0.004 inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. The tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when the tape is buried up to 3 feet deep. Encase the metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

## **2.05 MATERIAL FOR PIPE CASING**

- A. Casing Pipe: ASTM A 139, Grade B, or ASTM A 252, Grade 2, smooth wall pipe. Casing size shall be of the outside diameter and wall thickness as indicated. Protective coating is not required on casing pipe.
- B. Wood Supports: Treated Yellow Pine or Douglas Fir, rough, structural grade. Provide wood with nonleaching water-borne pressure preservative (ACA or CCA) and treatment conforming to AWPA P5 and C2, respectively. Secure wood supports to carrier pipe with stainless steel or zinc-coated steel bands.

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
- C. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

- D. Tree protection is specified in the Division 3 Section 311110 - "Site Clearing."

### **3.02 EXCAVATION**

- A. Excavation is unclassified and includes excavation to subgrade elevations required, regardless of character of materials and obstructions encountered.

### **3.03 SURFACE PREPARATION**

- A. Stockpiling Topsoil: Strip suitable soil from the site where excavation or grading is required and stockpile separately from other excavated material. Material unsuitable for use as topsoil shall be stockpiled and used for backfilling. Locate topsoil so that the material can be used readily for the finished grading. Where sufficient existing topsoil conforming to the material requirements is not available on site, provide borrow materials suitable for use as topsoil. Protect topsoil and keep in segregated piles until needed. Topsoil/stockpiles not immediately used shall have a silt fence installed around the pile.
- B. Cutting Pavement, Curbs, and Gutters: Saw cut with neat, parallel, straight lines one foot wider than trench width on each side of trenches and one foot beyond each edge of pits.

### **3.04 STABILITY OF EXCAVATIONS**

- A. General: Comply with State, and Federal: Codes, ordinances, and requirements of all agencies having jurisdiction.
- B. Slope sides of excavations to comply with codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- C. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.
1. Provide permanent steel sheet piling or pressure-creosoted timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops a minimum of 2'-6" below final grade and leave permanently in place.

### **3.05 DEWATERING**

- A. Prevent surface water and subsurface or ground water from flowing into

excavations and from flooding project site and surrounding area.

1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

### **3.06 STORAGE OF EXCAVATED MATERIALS**

- A. Stockpile excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent wind-blown dust.
  1. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.
  2. Dispose of excess excavated soil material and materials not acceptable for use as backfill or fill.
  3. Provide straw bales around the entire base of stockpiled materials to control sediment transport.

### **3.07 EXCAVATION FOR STRUCTURES**

- A. Conform to elevations and dimensions required within a tolerance of plus or minus 0.10 foot, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection.
  1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.
  2. Excavation for Underground Tanks, Basins, Electrical and Mechanical Structures: Conform to elevations and dimensions required within a tolerance of plus or minus 0.10 foot; plus a sufficient distance to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection. Do not disturb bottom of excavations, intended for bearing surface.



3. Erosion and sediment control devices shall be put in place prior to the start of any excavation and shall remain in place until the disturbed area(s) has/have been stabilized.

### **3.08 EXCAVATION FOR WALKS AND PAVEMENTS**

- A. Cut surface under walks and pavements to comply with cross-sections, elevations and grades as required to install new work.

### **3.09 COLD WEATHER PROTECTION**

- A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 °F.

### **3.10 BACKFILL AND FILL**

- A. General: Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in Part 2 of this Section.
  1. Under grassed areas, use satisfactory excavated or borrow material.
  2. Under walks and pavements, use subbase material, satisfactory excavated or borrow material, or a combination.
  3. Under steps, use subbase material.
  4. Under building slabs, use drainage fill material.
  5. Under electric conduit banks, piping, and equipment, use subbase materials where required over rock bearing surface and for correction of unauthorized excavation. Shape excavation bottom to fit bottom 90 degrees of cylinder.
  6. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and that are carried below bottom of such footings or that pass under wall footings. Place concrete to level of bottom of adjacent footing.
    - a. Concrete is specified in Division 3.
    - b. Do not backfill trenches until tests and inspections have been made and backfilling is authorized by Design Professional. Use care in backfilling to avoid damage or displacement of pipe systems.
  7. Provide 4-inch-thick concrete base slab support for existing piping less than 2'-6" below surface of roadways. Provide minimum 4-inch-thick encasement (sides and top) of concrete prior to backfilling or

placement of roadway subbase.

- B. Backfill excavations as promptly as work permits, but not until completion of the following:
  - 1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
  - 2. Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded.
  - 3. Removal of concrete formwork.
  - 4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.
  - 5. Removal of trash and debris from excavation.
  - 6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

### **3.11 PLACEMENT AND COMPACTION**

- A. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
  - 1. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.
- B. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- C. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- D. Place backfill and fill materials evenly adjacent to structures, piping, and electric conduit bank to required elevations. Prevent wedging action of

backfill against structures or displacement of piping bank or conduit bank by carrying material uniformly around structure, piping, and electric conduit bank to approximately same elevation in each lift.

- E. Control soil and fill compaction, providing minimum percentage of density specified for each area classification indicated below. Correct improperly compacted areas or lifts as directed by Design Professional if soil density tests indicate inadequate compaction.
1. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density, in accordance with ASTM D 1557:
    - a. Under structures, building slabs and steps, and pavements, compact top 12 inches of subgrade and each layer of backfill - or fill material at 95 percent maximum density.
    - b. Under lawn or unpaved areas, compact top 6 inches of subgrade and each layer of backfill or fill material at 90 percent maximum density.
    - c. Under walkways, compact top 6 inches of subgrade and each layer of backfill or fill material at 95 percent maximum density.
  2. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material.

Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.

    - a. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
    - b. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

### **3.12 GRADING**

- A. General: All existing grades shall be restored to their original condition. Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes with elevations the same as the existing grades.
- B. Grading Outside Building Lines: All new grade elevations shall match existing.

Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes and as follows:

1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevations.
  2. Walks: Shape surface of areas under walks to line, grade, and cross-section, with finish surface not more than 0.10 foot above or below required subgrade elevation.
  3. Pavements: Shape surface of areas under pavement to line, grade, and cross-section, with finish surface not more than 1/2 inch above or below required subgrade elevation.
- C. Grading Surface of Fill under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2 inch when tested with a 10-foot straightedge.
- D. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

### **3.13 SUBBASE AND BASE COURSES**

- A. General: Subbase course consists of placing subbase material, in layers of specified thickness, over subgrade surface to support a pavement base course.
1. Refer to Section 321216 for paving requirements.
- B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.
- C. Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least a 12-inch width of shoulder simultaneous with the compaction and rolling of each layer of subbase course.
- D. Placing: Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.
1. When a compacted subbase course is indicated to be 6 inches thick or less, place material in a single layer. When indicated to be more than 6 inches thick, place material in equal layers, except no single

layer more than 6 inches or less than 3 inches in thickness when compacted.

### **3.14 BUILDING SLAB DRAINAGE COURSE**

- A. General: Drainage course consists of placement of drainage fill material, in layers of indicated thickness, over subgrade surface to support concrete building slabs.
- B. Placing: Place drainage fill material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting material during placement operations.
  - 1. When a compacted drainage course is indicated to be 6 inches thick or less, place material in a single layer. When indicated to be more than 6 inches thick, place material in equal layers, except no single layer more than 6 inches or less than 3 inches in thickness when compacted.

### **3.15 SPECIAL EXCAVATION AND BACKFILLING FOR UTILITY LINES AND UTILITY LINE STRUCTURES**

- A. Trench excavation for utility lines and utility structures
  - 1. Keep excavations free from water while construction is in progress. Notify the Design Professional immediately in writing if it becomes necessary to remove specified, unstable, or otherwise unsatisfactory material to a depth greater than specified. Make trench sides as nearly vertical as practicable except where sloping of sides is allowed. Sides of trenches shall not be sloped from the bottom of the trench up to the elevation of the top of the electric conduit bank, conduit, or pipe. Excavate ledge rock, boulders, and other unyielding material to an overdepth at least six (6) inches below the bottom of the electric conduit bank, or pipe and appurtenances unless otherwise indicated or specified. Blasting will not be permitted. Excavate soft, weak, or wet excavations as required. Use bedding material, gravel, sand, placed in 6-inch-maximum layers to refill overdepth to the proper grade. At the option of the Contractor, the excavations may be cut to an overdepth of not less than 4 inches and refilled to required grade as specified. Grade bottom of trenches accurately to provide uniform bearing and support for each section of electric conduit bank, or pipe structure on undisturbed soil, or bedding material as indicated or specified at every point along its entire length except for portions where it is necessary to excavate for bell holes and for making proper joints. Dig bell holes and depressions for joints after trench has been graded. Dimension of bell holes shall be only 1/2 inch greater than length, width, and depth of bell, as required for properly making the particular type of joint to ensure that the bell does not bear on the

bottom of the excavation. Trench dimensions shall be indicated, specified, or as directed.

- a. Shoring and Sheet piling: Shore and sheet excavations as described in the approved plan submitted with various member sizes arranged to prevent injury to persons and damage to structures. Also arrange shoring and sheet piling to preclude injurious caving during removal. Obtain approval from the Engineer prior to removing any shoring, sheet piling, or bracing in excavations adjacent to on-grade slabs, foundations, or other structural elements.

B. Bedding For Utility Lines and Utility Structures

1. Shall be of the materials and depths as indicated, specified or as directed for utility lines and utility line structures. Place bedding in 6-inch-maximum loose lifts. Provide uniform and continuous support for each section of structure except at bell holes or depressions necessary for making proper joints.
  - a. Refill: Defined as material placed in excavation to correct overcut in depth.
  - b. Concrete Cradles: Specified in lieu of other types of bedding for a particular type of pipe material shall be as indicated, specified, or as directed.
  - c. Concrete encasements shall be as indicated on the drawings.

C. Buried Warning and Identification Tape for Utility Lines

1. Install tape in accordance with manufacturer's recommendations except as modified herein. Bury tape at the depth of 12 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade.

D. Backfilling for Utility Lines

1. Construct backfill in two operations (initial and final) as indicated and specified in this section. Place initial backfill in 6-inch-maximum loose lifts to one foot above electric conduit bank and pipe lines unless otherwise specified. Ensure that initially placed material is tamped firmly under pipe haunches. Bring up evenly on each side and along the full length of the structure. Ensure that no damage is done to structures or their protective coatings. Place the remainder of the backfill in 9-inch-maximum loose lifts unless otherwise specified. Compact each loose lift as specified in paragraph "General Compaction" before placing the next lift. Do not backfill in freezing weather or where the material in the trench is already frozen or is

muddy, except as authorized. Provide a minimum cover from final grade of four feet for water mains, gas mains, storm drains, and for sewer mains except where permitted otherwise by Design Professional. Where settlements greater than the tolerance allowed herein for grading occur in trenches and pits due to improper compaction, excavate to the depth necessary to rectify the problem, then backfill and compact the excavation as specified herein and restore the surface to the required elevation. Coordinate backfilling with testing of utilities. Testing for the following shall be complete before final backfilling: electric distribution system, water distribution, storm drainage, sanitary sewer, gas distribution systems. Provide buried warning and identification tape installed in accordance with the manufacturer's recommendation.

E. Compaction for Utility Lines

1. Use hand-operated, plate-type, vibratory, or other suitable hand tampers in areas not accessible to larger rollers or compactors. Avoid damaging pipes and protective pipe coatings. Compact material in accordance with the following unless otherwise specified. If necessary, alter, change, or modify selected equipment or compaction methods to meet specified compaction requirements.
  - a. Compaction of Material for Subcuts or Over Excavations: In soft, weak, or wet soils, tamp material to consolidate to density of adjacent material in trench wall. In stable soils, compact to 95 percent of ASTM D 1557 maximum, D 4254 relative density.
  - b. Compaction of Pipe and Conduit Bedding: In soil, compact to 95 percent of ASTM D 1557 maximum, D 4254 relative, density.
  - c. Compaction of Backfill: Compact initial backfill material surrounding pipes, cables, electric banks, to 95 percent of ASTM D 698, 1557, 4254 maximum density except where bedding and backfill are the same material. Where bedding and backfill are the same material, compact initial backfill to the density of the bedding. Under areas to be seeded or sodded, compact succeeding layers of final backfill to 85 percent of ASTM D 698, 1557, 4254 maximum density. For utilities under roads, streets, building slabs or other areas to be paved compact succeeding layers of final backfill as specified under paragraph entitled "Special Earthwork Installation Requirements."

F. Erosion Control

1. Erosion and sediment control devices shall be put in place prior to the start of any excavation and shall remain in place until the disturbed area(s) has/have been stabilized.

**3.16 SPECIAL EARTHWORK INSTALLATION REQUIREMENTS**

A. Standard Specification References: In addition to bedding and backfill construction requirements stated above, place material in overcuts, bed material, and provide special backfill construction in accordance with the installation references identified in the following Table for the pipe materials and utility systems listed.

TABLE 1

MATERIAL	SOIL MATERIALS REFERENCE	INSTALLATION REFERENCE
1. PVC Plastic Conduits Banks Encased in Concrete	NEMA TC 6 NFPA 30, NFPA 70	See Specification Section 260530 and Section 260543
2. Existing Earth Work Disturbed by the work of the contract serving existing Cast-Iron Soil, Ductile Iron and Ductile Iron Pressure Pipe	AWWA C600, except refill of overcut shall be gravel, bedding shall be GW, GP, SW, SP.	AWWA C600
3. Existing Earth Work Disturbed by the work of the contract serving existing Vitrified Clay Pipe	ASTM C12 except Class A, concrete cradle or concrete arch shall be as indicated, Class B, gravel bedding installed as indicated, Class C, GW, GP, SW, SP, as approved.	ASTM C 12
4. Existing Earth Work Disturbed by the work of the contract serving existing Concrete, Gravity, Sewer	ASTM C 76 (Reinforced) ASTM C 14(Nonreinforced) Class A, B, or C, bedding material	ACPA Concrete Pipe Installation Manual
5. Existing Earth Work Disturbed by the work of the contract serving existing Concrete Pressure Pipe	AWWA C300, AWWA M9, except shall be Type 3, Compacted Excavated Material, Type 4, GW, GP, SW, SP, Type 5, Low Concrete Cradle.	AWWA M9
6. Existing Earth Work Disturbed	AWWA C600	AWWA C600



	by the work of the contract serving existing Metallic Water Service Line Pipe (Steel, Copper Tube, Brass)		
7.	Existing Earth Work Disturbed by the work of the contract serving existing Steel Gas Piping	ANSI B31.8-2	
8.	Existing Earth Work Disturbed by the work of the contract serving existing Steel Water Main	AWWA M11	AWWA M11
9.	Existing Earth Work Disturbed by the work of the contract serving existing Polyvinyl Chloride (PVC) Nonpressure Pipe	ASTM D 2321, except bedding shall be Class I, gravel, Class II, GW, GP, SW, SP, Class III, GM, GC, SM, SC. Haunching to springline shall be Class I, gravel, Class II, GW, GP, SW, SP, Class III, GW, GP, SW, SP.	ASTM D 2321 AWWA M23
10.	Existing Earth Work Disturbed by the work of the contract serving existing Polyvinyl Chloride (PVC) Pressure Pipe	ASTM D 2774, except bedding shall be GW, GP, SW, SP, and all material surrounding pipe shall have maximum particle size of 1/2 inch.	ASTM D 2774

B. Manholes and Other Appurtenances: Provide at least 12 inches clear from outer surfaces to the embankment or shoring. Remove unstable soil that is incapable of supporting the structure to an overdepth of one foot and refill with gravel or sand to the proper elevation. Stabilize soft, weak, or wet excavations as indicated. Refill overdepths with gravel, sand, or concrete to the required grade and compact as specified to 95 percent of ASTM D 698, ASTM D 1557, maximum density.

C. Steel Cased Conduit: Install casing by dry boring and jacking method as follows:

1. Hole for Conduit Casing: Mechanically bore holes and case through the soil with a cutting head on a continuous auger mounted inside the casing pipe. Weld lengths of pipe together in accordance with AWS D1.1. Do not use water or other fluids in connection with the boring operation.

2. **Cleaning:** Clean the inside of the casing of dirt, weld splatters, and other foreign matter which would interfere with insertion of the utilities by attaching a cleaning plug to the boring rig and passing it through the casing.
3. **Utilities:** Provide the utilities in the casing using wood supports adjusted to obtained grades and elevations indicated.
4. **End Seals:** After installation of piped utilities in the casing, provide watertight end seals at each end of the pipeline casing between the pipeline casing and the piping utilities. Provide watertight end seals as indicated. Segmented elastomeric end seals.
5. **Roads, Streets, Building Slabs, and Other Areas to be Paved:** Place final backfill in 6-inch-maximum loose lifts. If a vibratory roller is used for compaction of final backfill, the lift thickness can be increased to 9 inches. Compact all backfill surrounding electric conduit banks pipes, and other structures to 95 percent of ASTM D 1557 maximum density except compact the top 12 inches of subgrade to 95 percent of ASTM D 1557 maximum density. Backfill to permit the rolling and compacting of the completed excavation with the adjoining material, providing the specified density necessary to enable paving of the area immediately after backfilling has been completed.

### **3.17 SPECIAL EARTHWORK REQUIREMENTS FOR SUBSURFACE DRAINS**

- A. Excavate to the dimensions required. Provide a bedding surface of no more than one inch of sand, gravel, Type I subdrain backfill material and place on compacted native soil, impermeable material as indicated. Backfill blind or french drains, around and over the pipes after pipe installation has been approved. Place special backfill in 6 inch lifts and compact with mechanical, vibrating plate tampers or rammers until no further consolidation can be achieved. Compact backfill overlying the special granular filter material as specified for adjacent or overlying work.
- B. **Granular Backfill Without Filter Fabric**
  1. **Perforated or Slotted Wall Pipe:** Place granular material as the pipe is laid and extend fit for a minimum of one pipe diameter on each side of and 18 inches above the top of the pipe. Place a layer of kraft paper, straw, 2 inches thick, on top of the granular filter before continuing with the backfill.
  2. **Open-Joint Pipe:** Place both types of granular material specified as the pipe is laid forming an aggregate filter around the pipe. Use Type II material to envelope the pipe a minimum of one-half the pipe diameter or twice the maximum aggregate size, whichever is larger, on each side and on top of the pipe. Place Type I material next to and on top of the Type II material to provide a total fill extending at

least one pipe diameter on each side of and 18-inches above the top of the pipe. Place a layer of kraft paper, straw, 2 inches thick, on top of the granular filter before continuing with the backfill.

C. Granular Backfill Using Filter Fabric

1. Perforated or Slotted Wall Pipes: Wrap one layer of filter fabric around pipe in such a manner that longitudinal overlaps are in unperforated or unslotted quadrants of the pipe. Overlap fabric a minimum of 2 inches. Secure the fabric to the pipe so that backfill material will not infiltrate through overlaps. Place granular material and extend it for a minimum of one pipe diameter on each side of and 18 inches above the top of the pipe. Place a layer of filter fabric on top of the granular filter before continuing with the backfill.
2. Open-Joint Pipe: Wrap one layer of filter fabric around pipe joints overlapping a minimum of 2 inches in the longitudinal direction and extending at least 6 inches on both sides of the joint. Secure the fabric to the pipe so that backfill material will not infiltrate through overlaps. Place granular material specified and extend it for a minimum of one pipe diameter on each side of and 18 inches above the top of the pipe. Place a layer of filter fabric on top of the granular filter before continuing with the backfill.
3. Blind or French Drains: Install filter cloth in trenches with smoothly graded sides and bottom, free of cavities or projecting rocks. Lay the cloth flat but not stretched and secure with anchor pins. Place the filter cloth so that drain water must pass through the cloth into the specified granular filter material. Overlap ends at least of 12 inches. Place backfill on the filter cloth in the direction of overlaps. Where fabric is damaged, place a new piece of filter cloth over the damaged area and overlap at least of 12 inches in every direction.

**3.18 FINISH OPERATIONS FOR UTILITY LINES**

- A. Grading: Finish to grades to match existing within one-tenth of a foot. Provide topsoil. Grade areas to drain water away from structures. Grade existing grades that are to remain but have been disturbed by the Contractor's operations.
- B. Spreading Topsoil: Clear areas to receive topsoil for the finished surface of materials that would interfere with planting and maintenance operations. Scarify subgrade to a depth of 2 inches. Do not place topsoil when the subgrade is frozen, extremely wet or dry, or in other conditions detrimental to seeding, planting, or grading. Comply with the requirements of New York State D.O.T. Standard Specifications.
- C. Borrow Area: Grade to drain properly. Maintain and restore borrow pits as specified in Section 01560, "Environmental Protection."

- D. Disposition of Surplus Material: Surplus or other soil material not required or suitable for filling, backfilling, or grading shall be become property of the Contractor and shall be removed from College property.
- E. Protection of Surfaces: Protect newly graded areas from traffic, erosion, and settlements that may occur and as required. Repair or reestablish damaged grades, elevations, or slopes.
- F. Pavement Repair and Restoration: Repair and restore pavement, curbs, and gutters. Do not repair pavement until trench or pit has been backfilled and compacted as herein specified. Provide a temporary road surface over the backfilled portion until permanent pavement is repaired. Remove and dispose of temporary road surface material when permanent pavement is placed. Maintain traffic on roads and streets crossed by trenches.

### **3.19 FIELD SAMPLING AND TESTING FOR UTILITY LINES**

- A. Test sand, gravel, bedding, backfill, topsoil, for conformance to specified requirements. Test bedding and backfill for moisture-density relations in accordance with ASTM D 698, D 1557 and D 4253 as specified herein. Perform at least one of each of the required tests for each material used sufficiently in advance of construction so as not to delay work. Provide additional tests as specified above for each change of source. Perform final tests on topsoil to assure adjustment of parameters into the ranges specified. Perform density and moisture tests in randomly selected locations and in accordance with ASTM D 1556, D 2992 and D 3017 as follows:
  - 1. Bedding and Backfill in Trenches: One test per 100 linear feet in each lift.
  - 2. Appurtenance Structures: One test per 200 square feet or fraction thereof in each lift.

Where ASTM D 2922 and ASTM D 3017 are used to test field compaction densities, verify the results of the tests by performing at least one test per day using ASTM D 1556 at a location already tested in accordance with ASTM D 2922. Perform at least one additional test using ASTM D 1556 for every ten tests performed with a nuclear device, also at locations checked in accordance with ASTM D 2922.

### **3.20 FIELD QUALITY CONTROL GENERAL**

- A. Quality Control Testing During Construction: Allow testing service to inspect and approve each subgrade and fill layer before further backfill or construction work is performed.
  - 1. Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ASTM D 2167 (rubber balloon method), as applicable.
    - a. Field density tests may also be performed by the nuclear

method in accordance with ASTM D 2922, providing that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. In conjunction with each density calibration check, check the calibration curves furnished with the moisture gauges in accordance with ASTM D 3017.

- b. If field tests are performed using nuclear methods, make calibration checks of both density and moisture gauges at beginning of work, on each different type of material encountered, and at intervals as directed by the Design Professional.
2. Footing Subgrade: For each strata of soil on which footings will be placed, perform at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata when acceptable to Design Professional.
  3. Paved Areas and Building Slab Subgrade: Perform at least one field density test of subgrade for every 2,000 sq. ft. of paved area or building slab, but in no case fewer than three tests. In each compacted fill layer, perform one field density test for every 2,000 sq. ft. of overlaying building slab or paved area, but in no case fewer than three tests.
  4. Foundation Wall Backfill: Perform at least two field density tests at locations and elevations as directed.
  5. If in opinion of Design Professional, based on testing service reports and inspection, subgrade or fills that have been placed are below specified density, perform additional compaction and testing until specified density is obtained.

### **3.21 EROSION CONTROL**

- A. Provide erosion and sediment control through the use of strawbale dikes, sediment traps, turbidity curtains and silt fences to prevent sediment transport.

### **3.22 MAINTENANCE**

- A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Repair, restore, and reestablish grades in settled, eroded, and rutted areas to specified tolerances.
- C. Reconditioning Compacted Areas: Where completed compacted areas are

disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

- D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

### **3.23 DISPOSAL OF EXCESS AND WASTE MATERIALS**

- A. Removal from Owner Property: Remove waste materials, including unacceptable excavated material, trash, and debris, and dispose of it off Owner property in a legal manner.

**END OF SECTION**

## **312323 - FLOWABLE FILL**

### **PART 1 – GENERAL**

#### **1.01 INTRODUCTION**

- A. Flowable fill refers to a slurry-like material consisting of a mixture of Portland cement, fine aggregate or mineral filler, water and/or fly ash, which is used as a fill or backfill in lieu of compacted earth. This mixture is self-leveling, can be placed in one lift with minimal labor and no vibration or tamping, capable of filling all voids in irregular excavations and hard to reach places and reaches 95% or more compaction within a few hours. Flowable fill is sometimes referred to as controlled density fill (CDF), controlled low strength material (CLSM), lean concrete slurry, and unshrinkable fill.
- B. This section specifies the requirements for flowable fill used for trenches, support for pipe structures, culverts, utility cuts and other works where cavities exist and where firm support is needed. The materials and mix design for the flowable fill should be designed to produce the desired compressive strength to the surrounding soil after hardening, making excavation at a later time possible using conventional excavation.

#### **1.02 DESCRIPTION**

- A. Furnish and place flowable fill in a fluid condition that sets within the required time and, after curing, obtains the desired strength properties as evidenced by the recommendations of ACI 229, at locations shown on the plans or as directed by the Resident Engineer.

#### **1.03 DEFINITIONS**

- A. Flowable Fill: Ready-mix controlled low strength material used as an alternative to compacted soil, and is also known as controlled density fill, and several other names, some of which are trademark names of material suppliers. Flowable fill (controlled low strength material) differs from Portland cement concrete as it contains a low cementitious content to reduce strength development for possible future removal. For excavatable mixes, the flowable fill material should be proportioned to produce a 28-day compressive strength of 75 to 100 psi. For use as a permanent structural fill, flowable fill can be designed to achieve 28-day compressive strengths of as high as 1200 psi. Chemical admixtures may also be used in flowable fill to modify performance properties of strength, flow, set and permeability.

#### **1.04 SUBMITTALS**

- A. Submit samples and shop drawings.

- B. Flowable Fill Mix Design: Provide flowable fill mix design containing Portland cement, fine aggregate and water. At the Contractor's option, it may also contain fly ash, aggregate, or chemical admixtures in any proportions such that the final product meets the strength and flow consistency, and shrinkage requirements included in these Specifications.
1. Test and Performance: Submit the following data:
    - a. Flowable fill shall have a minimum strength of 100 psi according to ASTM C 39 at 28 days after placement.
    - b. Flowable fill shall have minimal subsidence and bleed water shrinkage. Evaporation of bleed water shall not result in shrinkage of more than 1/8 inch per ft. of flowable fill depth (for mixes containing high fly ash content). Measurement of a final bleeding shall be as measured in Section 10 of ASTM C 940 "Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory".
    - c. Flowable fill shall have a unit weight of 90 - 115 lbs/ft<sup>3</sup> measured at the point of placement after a 60 minute ready-mix truck ride.
  - C. Provide documentation that the admixture supplier has experience of at least one year, with the products being provided and any equipment required to obtain desired performance of the product.
  - D. Manufacturer's Certificates: Provide Resident Engineer with a certification that the materials incorporated in the flowable fill, following achievement of the required strength, do not represent a threat to groundwater quality.

#### **1.05 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this Specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
- |          |  |
|----------|--|
| D4832-02 | Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.  |
| C618-03  | Standard Specifications for Coal Fly Ash and Raw or Calcined Natural Pozzolan for use as Mineral Admixture in Concrete. (Use Fly Ash conforming to the chemical and physical requirements for mineral admixture, Class F |



listed, including Table 2 (except for Footnote A). Waive the loss on ignition requirement.)

C403/C403M-05	Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance.
C150-99 Rev.A-04	Standard Specification for Portland Cement
C33-03	Standard Specification for Concrete Aggregates
C494/C494M-04	Standard Specification for Chemical Admixtures for Concrete
C940 RevA-98	Standard Specification for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced - Aggregate Concrete in the Laboratory

C. American Concrete Institute (ACI):

SP-150-94	Controlled Low-Strength Materials
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**1.06 QUALITY ASSURANCE**

- A. Manufacturer: Flowable fill shall be manufactured by a ready-mix concrete producer with a minimum of 1 year experience in the production of similar products.
- B. Materials: For each type of material required for the work of this Section, provide primary materials that are the products of one manufacturer. If not otherwise specified here, materials shall comply with recommendations of ACI 229, "Controlled Low Strength Materials."
- C. Pre-Approval Procedures: The use of flowable fill during any part of the project shall be restricted to those incidences where, due to field conditions, the Contractor has made the Resident Engineer aware of the conditions for which he recommends the use of the flowable fill, and the Resident Engineer has confirmed those conditions and approved the use of the flowable fill, in advance. During the submittal process, the Contractor shall prepare and submit various flowable fill mix designs corresponding to required conditions or if the Contractor desires to use flowable fill due to economics. Approval for the strength of the flowable fill shall be obtained from the Resident Engineer when the Contractor desires, or is required, to use flowable fill at specific location(s) within the project. Prior to commencement of field operations, the Contractor shall establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. The flowable fill shall be discharged directly from the mixer truck into the space to be filled. No compaction or vibration is required. The mix may be placed part depth or full depth as conditions dictate. Care is to be taken to prevent pipe from flowing. Formed walls or other bulkheads shall be constructed to withstand hydrostatic pressure exerted by the plastic flowable fill. All necessary means to confine the material within a designated space shall be provided. In addition, delivery and handling all products and equipment shall be in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures, and construction operations.

#### **1.08 PROJECT CONDITIONS**

- A. No flowable fill shall be placed on frozen ground. Mixing and placing of the material is acceptable in freezing temperatures. At the time of placement the flowable fill shall have a temperature of at least 40°F. When flowable fill is placed in freezing temperatures, the material should be covered with blankets overnight. When paving over flowable fill in cold weather, any frozen material on the surface can be scraped off and removed prior to paving. Perform installation of flowable fill only when approved by the Resident Engineer, and when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials and products used.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Provide normal weight flowable fill containing cementitious materials, fine aggregate/mineral filler (2000-3000 lbs/yd<sup>3</sup>), fly ash (250-400 lbs/yd<sup>3</sup>), air content 0-70% and water (600 lbs/yd<sup>3</sup>). Cementitious materials shall be Portland cement (30-70 lbs/yd<sup>3</sup>), pozzolanic materials, or other self-cementing materials, or combinations thereof, at the Contractor's option and following approval by the Resident Engineer.
- B. Portland Cement: ASTM C150, Type I,II or III. Meeting New York State DOT standards.
- C. Mixing Water: Fresh, clean, and potable. Meeting New York State DOT standards, for use as mix-water for cast-in-place concrete.
- D. Air-entraining admixtures as per manufacturer's specifications.
- E. Chemical Admixtures: ASTM C494.

- F. Fine Aggregate/Mineral Filler: ASTM C33 or non-ASTM sands or mineral fillers with 100% passing 1/2" sieve may be considered which produce an acceptable flow and desired performance characteristic.

## **2.02 FLOWABLE FILL MIXTURE**

- A. Mix design shall produce a consistency that will result in a flowable product at the time of placement which does not require manual means to move it into place.
- B. Flowable fill shall have a minimum strength of 100 psi according to ASTM C39 at 28 days after placement.
- C. Flowable fill shall have minimal subsidence and bleed water shrinkage. Evaporation of bleed water shall not result in shrinkage of more than 1/8 inch per foot of flowable fill depth (for mixes containing high fly ash content). Measurement of a final bleeding shall be as measured in Section 10 of ASTM C 940 "Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory".
- D. Flowable fill shall have a unit weight of 90 - 115 lbs/feet<sup>3</sup> measured at the point of placement after a 60 minute ready-mix truck ride. In the absence of strength data, the cementitious content shall be a maximum of (150 lbs/cy).
- E. Flowable fill shall have an in-place yield of at least 98% of design yield for permanent type and a maximum of 110% of design yield for removable types at 1 year.
- F. Provide equipment as recommended by the manufacturer and comply with manufacturer's recommendations for the addition of additives, whether at the production plant or prior to placement at the site.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine conditions of substrates and other conditions under which work is to be performed and notify Resident Engineer, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

### **3.02 APPLICATION OF FLOWABLE FILL**

- A. Secure tanks, pipes and other members to be encased in flowable fill. Insure that there are no exposed metallic pipes, conduits, or other items that

will be in contact with the flowable fill after placement. If so, replace with non-metallic materials or apply manufacturer's recommended coating to protect metallic objects before placing the flowable fill. Replacement or protection of metallic objects is subject to the approval of the Resident Engineer.

**3.03 PROTECTION AND CURING**

- A. Protect exposed surfaces of flowable fill from premature drying, wash by rain or running water, wind, mechanical injury, and excessively hot or cold temperature. Curing method shall be subject to approval by Resident Engineer.
  
- B. The flowable fill shall be left undisturbed until the material obtains sufficient strength. Sufficient strength for paving is achieved when the flowable fill can support the weight of foot traffic without apparent deformation. Sufficient strength for supporting vehicular traffic is 2.5tons per square foot as measured by a pocket penetrometer.

**END OF SECTION**

**321216 - REMOVAL AND RESTORATION OF EXISTING ASPHALT CONCRETE PAVEMENT  
DISTURBED BY THE WORK OF THE CONTRACT**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Sections:
  - SECTION 311110 - SITE CLEARING
  - SECTION 311316 - TREE PROTECTION AND TRIMMING
  - SECTION 312316 - EARTHWORK FOR STRUCTURES AND UTILITIES
  - SECTION 321313 - REMOVAL AND RESTORATION OF PORTLAND CEMENT CONCRETE PAVING DISTURBED BY THE WORK OF THE CONTRACT
  - SECTION 323113 - CHAIN LINK FENCES AND GATES
  - SECTION 329113 - RESTORATION OF LANDSCAPE WORK DISTURBED BY THE WORK OF THE CONTRACT
  - SECTION 330130 - REPLACEMENT AND RESTORATION OF EXISTING UNDERGROUND SANITARY AND STORM DRAINAGE SYSTEMS DISTURBED BY THE WORK OF THE CONTRACT

**1.02 SUMMARY**

- A. This Section includes provisions for removal and restoration of existing asphalt concrete pavement disturbed by the work of the Contract.
- B. Saw-cutting of edges of existing pavement is specified on site work drawings.
- C. Subbase.
- D. Proof rolling of prepared subbase.

**1.03 SUBMITTALS**

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Material Certificates signed by material producer and Contractor, certifying that each material item complies with or exceeds specified requirements.
- C. Pavement marking plan indicating lane separations and defined parking spaces. Note dedicated handicapped spaces with international graphics symbol.

- D. Product Data: Submit manufacturer's name, specifications and installation instructions for each item specified.
- E. Job Mix Formulas: Submit job mix formulas for asphalt paving indicating compliance with the requirements of each asphalt type specified including the name and location of the supplier.
- F. Quality Control Submittals
  - 1. Certificates: Submit one copy of all permits obtained from local regulatory agencies and the New York State Department of Transportation.
  - 2. Qualifications Certification: Submit written certification or similar documentation signed by the applicable subcontractor, prime contractor and/or manufacturer (where applicable) including compliance with the requirements specified below in the "Quality Assurance" section of this Specification.
  - 3. Experience Listing: submit a list of completed projects using the products proposed for this project, including Owner's contact information and telephone number for each project, demonstrating compliance with applicable requirements specified in the "Quality Assurance" section of this Specification.

#### **1.04 SITE CONDITIONS**

- A. Weather Limitations: Apply prime and tack coats when ambient temperature is above 50 deg F (10 deg C) and when temperature has not been below 35 deg F (1 deg C) for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.
- B. Construct hot-mixed asphalt surface course when atmospheric temperature is above 40 deg F (4 deg C) and when base is dry. Base course may be placed when air temperature is above 30 deg F (minus 1 deg C) and rising.
- C. Grade Control: Establish and maintain required lines and elevations.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. General: Use locally available materials and gradations that exhibit a satisfactory record of previous installations and conform to New York State D.O.T. Standard Specifications for Construction and Materials dated January 1, 2018.
- B. Herbicide Treatment: Commercial chemical for weed control, registered by

Environmental Protection Agency. Provide granular, liquid, or wettable powder form.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
  - a. Ciba-Geigy Corp.
  - b. Dow Chemical U.S.A.
  - c. E.I. Du Pont de Nemours & Co., Inc.
  - d. FMC Corp.
  - e. Thompson-Hayward Chemical Co.
  - f. U.S. Borax and Chemical Corp.

C. Wheel Stops: 2,500-psi compressive strength precast, air-entrained concrete, approximately 6 inches high, 9 inches wide, and 7 feet long. Provide chamfered corners and drainage slots on underside.

D. Aggregate Base: Comply with the New York State Department of Transportation Standard Specification, Section 304, Paragraph 304-2.

1. Base Course

- a. Select RCA Granular Material: Where indicated supply stockpiled, sound, durable, recycled Portland cement concrete aggregate which is a product of mechanical crushing free from organic and other deleterious materials. Comply with New York State Department of Transportation gradation and material requirements modified below:

Sieve		Percent Passing
Sieve Size	Size Opening (mm)	
2 inch	50.8	100
1 inch	25.4	80 - 100
¼ inch	6.35	50 - 85
No. 40	0.425	15 - 40
No. 200	0.075	0 - 7

- b. Select Type 1 Granular Material: Where indicated supply stockpiled, sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with New York State Department of Transportation gradation and material requirements specified below:

Sieve		Percent Passing
Sieve Size	Size Opening (mm)	

Sieve		Percent Passing
Sieve Size	Size Opening (mm)	
3 inch	76.2	100
2 inch	50.8	90 - 100
¼ inch	6.35	30 - 65
No. 40	0.425	5 - 40
No. 200	0.075	0 - 10

- c. Engineering Fabric: Fabric composed of high tenacity polypropylene yarns woven into a stable network. The fabric is to be inert to biological degradation and resistant to naturally encountered chemicals, alkalis and acids complying with the following mechanical and physical properties:

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value
Wide Width Tensile Strength	ASTM D 4595	kN/mm <sup>2</sup>	MD 17.6 (100)/CD 21.0 (120)
Grab Tensile Strength	ASTM D 4632	kN (lbs)	MD 0.9 (200)/CD 0.9 (200)
Grab Tensile Elongation	ASTM D 4632	%	MD 15/CD 10
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	MD 0.33 (75)/CD 0.33 (75)
CBR Puncture Strength	ASTM D 4833	kN (lbs)	3115 (700)
Percent Open Area	COE-02215-86	%	1
Apparent Opening Size (AOS)	ASTM D 4751	mm (US Sieve)	0.425 (40)
Permittivity	ASTM D 4491	sec <sup>-1</sup>	0.05
Flow Rate	ASTM D 4491	l/min/m <sup>2</sup> (gal/min/ft <sup>2</sup> )	163 (4.0)
UV Resistance (at 500 Hours)	ASTM D 4355	% strength retained	70

Physical Properties	Test Method	Unit	Typical Value
Weight	ASTM D 5261	g/m <sup>2</sup> (oz/ydm <sup>2</sup> )	136 (4.0)
Thickness	ASTM D 5199	mm (mils)	0.51 (20)
Roll Dimensions (Width x Length)	-	m (ft)	3.8 x 132 or 5.3 x 94.2 (12.5 x 432) or (17.5 x 309)
Roll Area	-	m <sup>2</sup> (yd <sup>2</sup> )	502 (600)
Estimated Roll Weight	-	kg (lb)	95 (210)



- 1) Manufacturer: For convenience, details have been based on Mirafi 500X as manufactured by Ten Cate/Mirafi, Pendergrast, GA (Tel. #706-693-2226).
- E. Asphalt Pavement: Paving materials shall comply with the New York State Department of Transportation Standard Specification, Section 402 for the materials indicated.
  1. Binder Course: Hot plant mixed asphalt, complying with the New York State Department of Transportation Standard Specification, Sections 401 and 402 for Asphalt-Type 1 Permeable Base and Section 702 – Bituminous Materials for Performance-Graded (PG) Binders for Paving, 19.0 Type F2, Performance Binder (PG), HMA Series 80 Compaction..
  2. Shim Course: Hot plant mixed asphalt, complying with the New York State Department of Transportation Standard Specification, Sections 401 and 402 for Asphalt – 9.5 Type 5 Shim Course HMA, 80 Series Compaction.
  3. Topcourse: Hot plant mixed asphalt, complying with the New York State Department of Transportation Standard Specification, Sections 401 and 402 for Asphalt – 9.5 F1 Top Course HMA 80 Series Compaction.
- F. Coatings: Comply with the New York State Department of Transportation Standard Specification, Section 702 for material designations indicated.
  1. Tack Coat: Emulsified asphalt, slow setting type, New York State Department of Transportation designation 702-3601 (SS-1h) or 702-4501 (CSS-1h).
  2. Asphalt Cement Filler: New York State Department of Transportation Designation 702-05.
- G. Pavement Marking Paint: Utilize pavement marking paint complying with the New York State Department of Transportation Standard Specification, Paragraph 727-01, White Marking Paint – Type 1 or Paragraph 727-01, Yellow Marking Paint – Type 1.
  1. Manufacturer: For convenience, specifications have been based on "Setfast Acrylic Latex Traffic Paint" by Sherwin Williams, Co., Cleveland, OH (Tel. # 216-566-2902).

## **2.02 ASPHALT-AGGREGATE MIXTURE**

- A. Provide plant-mixed, hot-laid asphalt-aggregate mixture complying with ASTM D 3515 and NYSDOT Standard Specifications for Construction and Materials (January 1, 2018 edition).

### **PART 3 - EXECUTION**

#### **3.01 SURFACE PREPARATION**

- A. Aggregate Base: Comply with the requirements of the New York State Department of Transportation Standard Specification, Section 304-3 for aggregate gradations specified, unless otherwise indicated.
  - 1. Base Course: Completely fill voids with grits and roll with a roller, eliminating movement of the material ahead of the roller. After rolling, verify grading with a minimum ten foot long straight edge. Satisfactorily eliminate any depression over ¼" deep. Obtain approval of base prior to installing asphalt courses above.
    - a. Heavy Duty Pavement Thickness: Minimum 12" thickness (two 6" layers) unless otherwise noted.
    - b. Auto Duty Pavement Thickness: Minimum 12" thickness (two 6" layers) unless otherwise noted.
    - c. Recycled Asphalt Pavement: Refer to Project Manual Section 32 12 19 – Asphalt Pulverization for additional information.
- B. General: Remove loose material from compacted subbase surface immediately before applying herbicide treatment or prime coat.
- C. Proof-roll prepared subbase surface to check for unstable areas and areas requiring additional compaction.
- D. Do not begin paving work until deficient subbase areas have been corrected and are ready to receive paving.
- E. Herbicide Treatment: Apply chemical weed control agent in strict compliance with manufacturer's recommended dosages and application instructions. Apply to compacted, dry subbase prior to application of prime coat.
- F. Prime Coat: Apply at rate of 0.20 to 0.50 gal. per sq. yd., over compacted subgrade. Apply material to penetrate and seal, but not flood, surface. Cure and dry as long as necessary to attain penetration and evaporation of volatile.
- G. Tack Coat: Apply to contact surfaces of previously constructed asphalt or Portland cement concrete and surfaces abutting or projecting into hot-mixed asphalt pavement. Distribute at rate of 0.05 to 0.15 gal. per sq. yd. of surface.
- H. Allow to dry until at proper condition to receive paving.

- I. Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged surfaces.

### **3.02 PLACING MIX**

- A. General: Place hot-mixed asphalt mixture on prepared surface, spread, and strike off. Spread mixture at minimum temperature of 225 deg F (107 deg C). Place areas inaccessible to equipment by hand. Place each course to required grade, cross-section, and compacted thickness.
- B. Asphalt Paving: Pave finished surface free from depressions that may collect water. The Contractor shall remove any depressions at their own expense over 1/8" deep when tested with a six foot straight edge without evidence of patching.
  1. Heavy Duty Paving: Pave over aggregate base in two courses, 1½" compacted depth topcourse over 3 ½" compacted depth binder course. Comply with the New York State Department of Transportation Standard Specification, Section 402-Hot Mix Asphalt (HMA) Pavements.
  2. Auto Duty Paving: Pave over aggregate base in two courses, 1½" compacted depth topcourse over 2" compacted depth binder course. Comply with the New York State Department of Transportation Standard Specification, Section 402-Hot Mix Asphalt (HMA) Pavements.
  3. Recycled Asphalt Paving: Pave over aggregate base in two courses, 1½" compacted depth topcourse over 1½" compacted depth binder course. Comply with the New York State Department of Transportation Standard Specification, Section 402-Hot Mix Asphalt (HMA) Pavements.
- C. Paver Placing: After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.
- D. Immediately correct surface irregularities in finish course behind paver. Remove excess material forming high spots with shovel or lute.
- E. Joints: Make joints between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other sections of hot-mixed asphalt course. Clean contact surfaces and apply tack coat.
- F. Curbs: Construct curbs over compacted pavement surfaces. Apply a light tack coat unless pavement surface is still tacky and free from dust.
- G. Place curb materials to cross-section indicated or, if not indicated, to local standard shapes, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms as soon

as material has cooled.

### **3.03 ROLLING**

- A. General: Begin rolling when mixture will bear roller weight without excessive displacement.
- B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- C. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material.
- D. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been evenly compacted.
- E. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained 95 percent laboratory density.
- F. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot-mixed asphalt. Compact by rolling to specified surface density and smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

### **3.04 JOINING NEW ASPHALT PAVEMENT TO ADJACENT CONSTRUCTION**

- A. Carefully construct joints between old and new pavements, or between successive days work to ensure continuous bond between adjoining paving. Construct joints with the same texture, density and smoothness as adjacent sections of asphalt courses. Clean sand, dirt and other deleterious material from contact surfaces and apply tack coat.
- B. Offset traverse joints a minimum of 24" between succeeding courses. Cut back pavement to the edge of previously placed courses to expose an even, vertical surface for the full course thickness.
- C. Offset longitudinal joints a minimum of 6" between succeeding courses. When edges of longitudinal joints are irregular, honeycombed or inadequately compacted, cut back all unsatisfactory sections to expose an even, vertical surface for the full course thickness.
- D. In horizontal joints between the binder and the topcourse, clean all contact

surfaces and spray a tack coat prior to the installation of the topcourse if the binder has been in place for longer than seven days or if the pavement is determined to be excessively dirty by the Project Designer.

- E. Seal joints with the application of asphalt cement filler, a minimum of 2" to each side of the joint.

### **3.05 TRAFFIC AND LANE MARKINGS**

- A. Cleaning: Sweep and clean surface to eliminate loose material and dust.
- B. Striping: Use chlorinated-rubber base traffic lane-marking paint, factory-mixed, quick-drying, and nonbleeding.
- C. Do not apply traffic and lane marking paint until layout and placement have been verified with Design Professional.
- D. Apply paint with mechanical equipment to produce uniform straight edges. Apply at manufacturer's recommended rates to provide minimum 12 to 15 mils dry thickness.
- E. Traffic Marking: Apply pavement marking paint in accordance with the manufacturer's recommended procedures and in accordance with the New York State Department of Transportation Standard Specification, Paragraph 640-3.

### **3.06 WHEEL STOPS**

- A. General: Secure wheel stops to hot-mixed asphalt surface with not less than two 3/4-inch-diameter galvanized steel dowels embedded in precast concrete at 1/3 points. Size length of dowel to penetrate at least 1/2 hot-mixed asphalt depth.

### **3.07 FIELD QUALITY CONTROL**

- A. General: Testing in-place hot-mixed asphalt courses for compliance with requirements for thickness and surface smoothness may be done by Owner's testing laboratory. Repair or remove and replace unacceptable paving as directed by Design Professional.
- B. Thickness: In-place compacted thickness tested in accordance with ASTM D 3549 will not be acceptable if exceeding following allowable variations:
  - 1. Base Course: Plus or minus 1/2 inch.
  - 2. Surface Course: Plus or minus 1/4 inch.
- C. Surface Smoothness: Test finished surface of each hot-mixed asphalt course for smoothness, using 10-foot straightedge applied parallel with and at right angles to centerline of paved area. Surfaces will not be acceptable if

exceeding the following tolerances for smoothness:

1. Base Course Surface: 1/4 inch.
  2. Wearing Course Surface: 3/16 inch.
  3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.
- D. Check surface areas and in place densities at intervals as directed by Design Professional.
- E. Flood Tests: Perform a flood test in the presence of the Owner's Representative or the Project Designer utilizing a water tank truck. If a depression ponding water more than 1/8" in depth is found, provide corrective measures to provide proper drainage.

**END OF SECTION**

**321313 - REMOVAL AND RESTORATION OF PORTLAND CEMENT CONCRETE PAVING DISTURBED  
BY THE WORK OF THE CONTRACT**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. SECTION 312316 "Earthwork for Structures and Utilities" for subgrade preparation, grading and subbase course.

**1.02 SUMMARY**

- A. This Section includes removal and restoration of Portland cement concrete paving disturbed by the work of the Contract including, but not limited to:
  - 2. Roadways.
  - 3. Parking lots.
  - 4. Curbs and gutters.
  - 5. Sidewalks and walkways.
  - 5. Reinforced concrete pavement.

**1.03 SUBMITTALS**

- A. Product data for reinforcement, accessories, admixtures, joint systems, curing compounds, and dry-shake color materials.
- B. Design mixes for each class of concrete. Include revised mix proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Laboratory test reports for evaluation of concrete materials and mix design tests.
- D. Material certificates signed by concrete manufacturer and Contractor, certifying that each concrete material complies with or exceeds requirements, may be submitted in lieu of material laboratory testing when acceptable to Design Professional.
- E. Provide samples, manufacturer's product data, test reports, and materials' certifications as required in referenced Sections for Concrete and Joint fillers and sealers.

#### **1.04 QUALITY ASSURANCE**

- A. Concrete Standards: Comply with provisions of the following standards, except where more stringent requirements are indicated.
1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
  2. ACI 318, "Building Code Requirements for Reinforced Concrete."
  3. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
- B. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
- C. Concrete Testing Service: Engage a qualified independent testing agency to perform materials evaluation tests and to design concrete mixes.
- D. Field-Constructed Mockup: Cast mockup of size indicated or as required to demonstrate typical joints, surface finish, texture, and standard of workmanship.
1. When Design Professional determines that mockup does not meet requirements, demolish and remove it from the site and cast another until the mockup is accepted.
  2. Keep accepted mockup undisturbed during construction as a standard for judging completed paving. Undamaged mockup may be incorporated into the Work.
  3. Demolish accepted mockup and remove from site when directed by Design Professional.

#### **1.05 PROJECT CONDITIONS**

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

### **PART 2 - PRODUCTS**

#### **2.01 FORMS**

- A. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
1. Use flexible or curved forms for curves of a 100-foot or less radius.



- B. Form Release Agent: Provide commercial formulation form-release agent with a maximum of 350 mg/l (or legal maximum if less at the time the work is performed) volatile organic compounds (VOC's) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

## **2.02 REINFORCING MATERIALS**

- A. Reinforcing Bars and Tie Bars: ASTM A 615, Grade 60, deformed.
- B. Epoxy-Coated Reinforcing Bars: ASTM A 775 with ASTM A 615, Grade 60 deformed steel bars.
- C. Plain, Cold-Drawn Steel Wire: ASTM A 82.
- D. Epoxy-Coated Joint Dowel Bars: ASTM A 775 with ASTM A 615, Grade 60 plain steel bars.
- E. Hook Bolts: ASTM A 307, Grade A bolts, internally and externally threaded. Design hook bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- F. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting, and fastening reinforcing bars, welded wire fabric, and dowels in place. Use wire bar-type supports complying with CRSI specifications.
  - 1. Use supports with sand plates or horizontal runners where base material will not support chair legs.

## **2.03 CONCRETE MATERIALS**

- A. See Division 3 Section 03300.

## **2.04 ADMIXTURES**

- A. Provide concrete admixtures that are compatible with one another and contain not more than 0.1 percent chloride ions.
- B. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- C. Water-Reducing Admixture: ASTM C 494, Type A.
- D. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.

- E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
- F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

## **2.05 CURING MATERIALS**

- A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- B. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
  - 1. Waterproof paper.
  - 2. Polyethylene film.
  - 3. White burlap-polyethylene sheet.
- C. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type I, Class B.
  - 1. Provide material that has a maximum volatile organic compound required rating of 350 mg per liter or maximum V.O.C. rating set forth by Regulatory Agencies at the time the work is performed.
- D. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.

## **2.06 RELATED MATERIALS**

- A. Boiled Linseed Oil Mixture: Combination of boiled linseed oil and mineral spirits, complying with AASHTO M-233.
- B. Traffic Paint: Alkyd-resin ready-mixed, complying with AASHTO M 248, Type S.
  - 1. Color: As per N.Y.S.D.O.T. Standards.
- C. Nonslip Aggregate Finish: Fused aluminum oxide granules or crushed emery as the abrasive aggregate for a nonslip finish, with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory-graded, packaged, rustproof, nonglazing, and unaffected by freezing, moisture, and cleaning materials.
- D. Dry-Shake Color Hardener: Packaged dry combination of materials consisting of portland cement, graded quartz aggregate, coloring pigments, and plasticizing admixture. Use coloring pigments that are finely ground nonfading mineral oxides interground with cement. Color as selected by Design Professional from manufacturers' standards, unless indicated otherwise.

- E. Bonding Agent: Acrylic or styrene butadiene.
- F. Epoxy Adhesive: ASTM C 881, two-component material suitable for dry or damp surfaces. Provide material type, grade, and class to suit requirements.

## **2.07 CONCRETE MIX**

- A. Prepare design mixes as set forth in Section 03300 for 3000 psig air entrained concrete.
- B. Fiber Reinforcement: Add to mix at rate of 1.5 lb per cu. yd., unless manufacturer recommends otherwise.
- C. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, project conditions, weather, test results, or other circumstances warrant.

## **2.08 CONCRETE MIXING**

- A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94.
  - 1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

## **PART 3 - EXECUTION**

### **3.01 SURFACE PREPARATION**

- A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.
- B. Remove loose material from compacted subbase surface immediately before placing concrete.

### **3.02 EDGE FORMS AND SCREED CONSTRUCTION**

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for paving to required lines, grades, and elevations. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.
- B. Check completed formwork and screeds for grade and alignment to following tolerances:

1. Top of Forms: Not more than 1/8 inch in 10 feet.
  2. Vertical Face on Longitudinal Axis: Not more than 1/4 inch in 10 feet.
- C. Clean forms after each use and coat with form release agent as required to ensure separation from concrete without damage.

### **3.03 PLACING REINFORCEMENT**

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for placing and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

### **3.04 JOINTS**

- A. General: Construct contraction, construction, and isolation joints true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to the centerline, unless indicated otherwise.
1. When joining existing paving, place transverse joints to align with previously placed joints, unless indicated otherwise.
- B. Contraction Joints: Provide weakened-plane contraction joints, sectioning concrete into areas as shown on Drawings. Construct contraction joints for a depth equal to at least 1/4 of the concrete thickness, as follows:
1. Tooled Joints: Form contraction joints in fresh concrete by grooving and finishing each edge of joint with a radiuses jointer tool.
  2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into hardened concrete when cutting action will not tear,

- abrade, or otherwise damage surface and before development of random contraction cracks.
3. Inserts: Form contraction joints by inserting pre-molded plastic, hardboard, or fiberboard strips into fresh concrete until top surface of strip is flush with paving surface. Radius each joint edge with a jointer tool. Carefully remove strips or caps of two-piece assemblies after concrete has hardened. Clean groove of loose debris.
- C. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than 1/2 hour, unless paving terminates at isolation joints.
1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless indicated otherwise. Embed keys at least 1-1/2 inches into concrete.
  2. Continue reinforcement across construction joints unless indicated otherwise. Do not continue reinforcement through sides of strip paving unless indicated.
  3. Provide tie bars at sides of paving strips where indicated.
  4. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- D. Expansion Joints: Form expansion joints of preformed joint filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
1. Locate expansion joints at intervals of 50 feet, unless indicated otherwise.
  2. Extend joint fillers full width and depth of joint, not less than 1/2 inch or more than 1 inch below finished surface where joint sealant is indicated. Place top of joint filler flush with finished concrete surface when no joint sealant is required.
  3. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together.
  4. Protect top edge of joint filler during concrete placement with a metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- E. Installation of joint fillers and sealants is specified in Division 7 Section "Paving Joint Sealants."

- F. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one half of dowel length to prevent concrete bonding to one side of joint.

### **3.05 CONCRETE PLACEMENT**

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and reinforcing before placing concrete. Do not place concrete on surfaces that are frozen.
- C. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.
- D. Comply with requirements and with ACI 304R for measuring, mixing, transporting, and placing concrete.
- E. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
  - 1. When concrete placing is interrupted for more than 1/2 hour, place a construction joint.
- F. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures to consolidate concrete complying with ACI 309R.
  - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcing, dowels, and joint devices.
- H. Screed paved surfaces with a straightedge and strike off. Use bull floats or derbies to form a smooth surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces prior to beginning finishing operations.
- I. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire

fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

1. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer or use bonding agent if acceptable to Architect.
- J. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete.
- K. Slip-Form Pavers: When automatic machine placement is used for paving, submit revised mix design and laboratory test results that meet or exceed requirements. Produce paving to required thickness, lines, grades, finish, and jointing as required for formed paving.
1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.
- L. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.
- M. Cold-Weather Placement: Comply with provisions of ACI 306R and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
  2. Do not use frozen materials or materials containing ice or snow.
  3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
- N. Hot-Weather Placement: Place concrete complying with ACI 305R and as specified when hot weather conditions exist.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C).

Mixing water may be chilled or chopped ice may be used to control

temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### **3.06 CONCRETE FINISHING**

- A. Float Finish: Begin floating when bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Finish surfaces to true planes within a tolerance of 1/4 inch in 10 feet as determined by a 10-foot-long straightedge placed anywhere on the surface in any direction. Cut down high spots and fill low spots. Refloat surface immediately to a uniform granular texture.
1. Burlap Finish: Drag a seamless strip of damp burlap across concrete, perpendicular to line of traffic, to provide a uniform gritty texture finish.
  2. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across concrete surface perpendicular to line of traffic to provide a uniform fine line texture finish.
  3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating surface 1/16 inch to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.
- B. Final Tooling: Tool edges of paving, gutters, curbs, and joints formed in fresh concrete with a jointing tool to the following radius. Repeat tooling of edges and joints after applying surface finishes. Eliminate tool marks on concrete surfaces.
1. Radius: 1/4 inch.
  2. Radius: 3/8 inch.

### **3.07 SPECIAL FINISHES**

- A. Nonslip Aggregate Finish: Apply nonslip aggregate finish to paving surfaces indicated.
1. After completing float finish, uniformly spread 25 lb of dampened nonslip aggregate per 100 sq. ft. of surface. Tamp aggregate flush



with surface using a steel trowel, but do not force below surface.

2. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose nonslip aggregate.
- B. Dry-Shake Color Hardener Finish: Apply a dry-shake color hardener finish to indicated paving surfaces as follows:
1. Uniformly apply dry-shake materials at a rate of 100 lb per 100 sq. ft., unless a greater amount is recommended by material manufacturer.
  2. Immediately following the first floating operation, uniformly distribute approximately 2/3 of the dry-shake material over the concrete surface with a mechanical spreader, and embed by power floating. Follow the floating operation with a second shake application, uniformly distributing the remainder of the dry-shake material to ensure uniform color, and embed by power floating.
  3. After final floating, apply a light hand-trowel finish followed by a broom finish to concrete. Cure concrete with a curing compound recommended by the dry-shake material manufacturer. Apply the curing compound immediately after final finishing.

### **3.08 CONCRETE PROTECTION AND CURING**

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of ACI 306R for cold weather protection and ACI 305R for hot weather protection during curing.
- B. Evaporation Control: In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
1. Moisture Curing: Keep surfaces continuously moist for not less than 7 days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.

- c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with a 12-inch lap over adjacent absorptive covers.
  2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.  
  
Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
- E. Boiled Linseed Oil Treatment: Apply boiled linseed oil mixture no sooner than 28 days after placement to clean dry concrete surfaces free of oil, dirt, or other foreign material. Apply in 2 sprayed applications at rate of 40 sq. yd. per gallon for the first application and 60 sq. yd. per gallon for the second application. Allow complete drying between applications.

### **3.09 TRAFFIC PAINT**

- A. Traffic Paint: Apply traffic paint for striping and other markings with mechanical equipment to produce uniform straight edges. Apply at manufacturer's recommended rates to provide a 15-mil minimum wet film thickness.

### **3.10 FIELD QUALITY CONTROL TESTING**

- A. The Owner may employ a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include the following:
  1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
    - a. Slump: ASTM C 143; one test at point of placement for each compressive-strength test but no less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
    - b. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test but no less than one test for each day's pour of each type of air-entrained concrete.

- c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
  - d. Compression Test Specimens: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless directed otherwise. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
  - e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd. but less than 25 cu. yd., plus one set for each additional 50 cu. yd. Test one specimen at 7 days, test two specimens at 28 days, and retain one specimen in reserve for later testing if required.
2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
  3. When total quantity of a given class of concrete is less than 50 cu. yd., Architect may waive strength testing if adequate evidence of satisfactory strength is provided.
  4. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
  5. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
- B. Test results will be reported in writing to Architect, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in paving, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day and 28-day tests.
- C. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

- D. Additional Tests: The testing agency will make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

### **3.11 REPAIRS AND PROTECTION**

- A. Remove and replace concrete paving that is broken, damaged, or defective, or does not meet the requirements of this Section.
- B. Drill test cores where directed by Design Professional when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.

**END OF SECTION**

## **323113 - CHAIN LINK FENCES AND GATES**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 030500 - Concrete: Concrete anchorage for posts.
- C. Section 312316 - Earth Work for Structures and Utilities.

#### **1.02 SUMMARY**

- A. Section Includes:
  - 1. Remove existing fencing and provide new fencing in new location.
  - 2. New fence framework, fabric, and accessories.
  - 3. Excavation for post bases; concrete foundation for posts, and center drop for gates.
  - 4. New manual gates and related new hardware.

#### **1.03 REFERENCES**

- A. ASTM A116 - Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.
- B. ASTM A123 - Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
- C. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- D. ASTM A392 - Zinc-Coated Steel Chain-Link Fence Fabric.
- E. ASTM A428 - Weight of Coating on Aluminum-Coated Iron or steel Articles.
- F. ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- G. ASTM A569 - Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Sheet and Strip Commercial Quality.
- H. ASTM F567 - Installation of Chain-Link Fence.
- I. ASTM F669 - Strength Requirements of Metal Posts and Rails for Industrial Chain

Link Fence.

- J. ASTM F1083 - Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
- K. ASTM F1234 - Protective Coatings on Steel Framework for Fences.
- L. Chain Link Fence Manufacturers Institute (CLFMI) - Product Manual.

#### **1.04 SYSTEM DESCRIPTION**

- A. Fence Height: Not less than 8'-0" feet nominal but as indicated on Drawings.
- B. Line Post Spacing: At intervals not exceeding 10 feet.
- C. Fence Post and Rail Strength: Conform to ASTM F669 Heavy Industrial Fence.
- D. Gates (Doors): Two (2) each 36".

#### **1.05 SUBMITTALS**

- A. Product Data: Provide data on fabric, posts, accessories, fittings doors and hardware.
- B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components.
- C. Samples: Submit two (2) samples of fence fabric, slat in fill, 12 x 12 inch in size illustrating construction and colored finish.
- D. Manufacturer's Installation Instructions: Indicate installation requirements, post foundation anchor bolt templates, and all other data.
- E. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines and easements.

#### **1.06 QUALITY ASSURANCE**

- A. Installer Qualifications: Engage an experienced Installer who has at least three years' experience and has completed at least five chain link fence projects with same material and of similar scope to that indicated for this Project with a successful construction record of in-service performance.
- B. Single-Source Responsibility: Obtain chain link fences and gates, including accessories, fittings, and fastenings, from a single source.
- C. Perform Work in accordance with CLFMI - Product Manual and the manufacturer's instructions ASTM F567.

### **1.07 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three (3) years documented experience.

### **1.8 PROJECT CONDITIONS**

- A. Field Measurements: Verify layout information for fences and gates shown on the Drawings in relation to the new work, existing utilities and existing structures. Verify dimensions by field measurements.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS AND COMPONENTS**

- A. Materials and Components: Conform to CLFMI Product Manual.
- B. Fabric Size: CLFMI Heavy Industrial service.
- C. Intermediate Posts: Type I round.
- D. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round.
- E. Concrete: ASTM C94; Normal Sulfate Resisting Portland Cement, 3,500 psi strength at 28 days, 3 inch slump; inch nominal sized coarse aggregate.

### **2.02 COMPONENTS**

- A. Line Posts: 2½ inch diameter.
- B. Corner and Terminal Posts: 3½ inch.
- C. Gate Posts: 4½ inch.
- D. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.
- E. Gate Frame: 1.66 inch diameter for welded fittings and truss rod fabrication.
- F. Fabric: 1 inch diamond mesh interwoven wire, 6 gage thick, top salvage knuckle end closed, twisted tight, bottom salvage twisted tight. knuckle end closed.
- G. Tension Wire: 6 gauge thick steel, single strand.
- H. Tension Band: Steel.

- I. Tension Strap: Steel.
- J. Tie Wire: Aluminum alloy steel wire.

### **2.03 ACCESSORIES**

- A. Caps: Cast steel galvanized or malleable iron galvanized sized to post diameter, set screw retainer.
- B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; galvanized steel.
- C. Extension Arms: Cast steel galvanized to accommodate roof fabric.
- D. Gate Hardware: Fork latch with gravity drop, center gate stop and drop rod mechanical keepers; two 180 degree gate hinges per leaf and hardware for padlock.
- E. Privacy Slats: Vinyl coated fabric strips, sized to fit fabric weave, color as selected.

### **2.04 FINISHES**

- A. Components and Fabric: Galvanized to ASTM A123; 2.0 oz/sq ft coating.
- B. Vinyl Components: Color as selected by Design Professional.
- C. Hardware: Galvanized to ASTM A153, 2.0 oz/sq ft coating.
- D. Accessories: Same finish as framing and fabric.

### **2.05 BOLLARDS**

- A. Provide 6" diameter galvanized steel pipe bollards ASTM A53 schedule 80 concrete filled imbedded in concrete foundation 12" above grade and 48" below grade.
- B. Bollards shall be 48" O.C. all around the perimeter of slab around which the bollards are mounted.
- C. Bollards shall conform to NYSFC F312 Guidelines.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Install framework, fabric, accessories and gates in accordance with ASTM F567 and manufacturer's instructions.



- B. Place fabric on inside of posts and rails.
- C. Set intermediate, terminal, gate, and posts plumb, in concrete footings with top of footing 2 inches above finish grade. Slope top of concrete for water runoff.
- D. Line Post Footing Depth Below Finish Grade: ASTM F567 4 feet.
- E. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F567 4 feet.
- F. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.
- G. Provide top rail through line post tops and splice with 6 inch long rail sleeves.
- H. Install center and bottom brace rail on corner gate leaves.
- I. Do not stretch fabric until concrete foundation has cured 28 days.
- J. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.
- K. Position bottom of fabric 2 inches above finished grade.
- L. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.
- M. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
- N. Install bottom tension wire, strap and stretched taut between terminal posts.
- O. Install support arms sloped inward or outward as required and attach barbed wire; tension and secure.
- P. Do not attach the hinged side of gate from building wall; provide gate posts.
- Q. Install gate with fabric, install fabric roofing and barbed wire overhang to match fence for the gate. Install three hinges per leaf, latch, catches, drop bolt, foot bolts and sockets, torsion spring retainer, retainer and locking clamp.
- R. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.
- S. Install green privacy slats at all fence and gate locations.

**3.02 ERECTION TOLERANCES**

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Position: 1 inch.
- C. Components shall not infringe adjacent property lines.

**3.03 SCHEDULES**

- A. Sides of fence 8 feet high, dark green fabric, privacy slats.

**END OF SECTION**

## **329113 - RESTORATION OF LANDSCAPE WORK DISTURBED BY THE WORK OF THE CONTRACT**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this Section.
- B. Related Sections:
  - SECTION 31110 - SITE CLEARING
  - SECTION 311316 - TREE AND SHRUBS PROTECTION AND TRIMMING
  - SECTION 312316 - EARTHWORK FOR STRUCTURES AND UTILITIES
  - SECTION 321316 - REMOVAL AND RESTORATION OF EXISTING ASPHALT CONCRETE PAVEMENT DISTURBED BY THE WORK OF THE CONTRACT
  - SECTION 321313 - REMOVAL AND RESTORATION OF PORTLAND CEMENT CONCRETE PAVING DISTURBED BY THE WORK OF THE CONTRACT
  - SECTION 323113 - CHAIN LINK FENCES AND GATES
  - SECTION 330130 - REPLACEMENT AND RESTORATION OF EXISTING UNDERGROUND SANITARY AND STORM DRAINAGE SYSTEMS DISTURBED BY THE WORK OF THE CONTRACT

#### **1.02 SUMMARY**

- A. Related Documents: Comply with all of the Contract Documents.
- B. Work Included: This Section generally includes, but is not necessarily limited to, the following landscape work: Disturbed by the work of the Contract trees, shrubs, plants, ground cover, lawns topsoil replacement seeding and renovation of adjacent turf areas. This work also includes soil amendments and maintenance of landscape materials.

#### **1.03 DEFINITIONS**

- A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- B. Finish Grade: Elevation of finished surface of planting soil.
- C. Planting Soil: Existing, in-place surface soil, and imported topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for turf growth.
- D. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

- E. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- F. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

#### **1.04 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
  - 1. Certification of each turfgrass seed mixture. Include identification of source and name and telephone number of supplier.
- C. Qualification Data: For qualified landscape Installer.
- D. Product Certificates: For soil amendments and fertilizers, from manufacturer.
- E. Material Test Reports:
  - 1. Existing in-place surface soil
  - 2. Imported topsoil.
- F. Topsoil Amendment Schedule: Provide schedule of amendments for each type of topsoil used.
  - 1. Amendment Schedule shall include, but is not limited to:
    - a. Ratio of Loose Compost to Topsoil by Volume
    - b. Revise first subparagraph below if a specific type of liming material (ground dolomitic limestone, calcitic limestone, mollusk shells, or other type) is required; coordinate with "Inorganic Soil Amendments" Article.
    - c. Weight of Lime per 1000 Sq. Ft.
    - d. Weight of Aluminum Sulfate per 1000 Sq. Ft.
    - e. Weight of Agricultural Gypsum per 1000 Sq. Ft.

- f. Volume of Sand Plus 10 Percent Diatomaceous Earth or Zeolites per 1000 Sq. Ft.
  - g. Weight of Bonemeal per 1000 Sq. Ft.
  - h. Weight of Superphosphate per 1000 Sq. Ft.
  - i. Weight of Commercial Fertilizer per 1000 Sq. Ft.
  - j. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.
- G. Maintenance Instructions: Recommended procedures to be implemented by Owner to maintain restored turf after Acceptance of Contract. Submit before scheduled final inspection.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: A qualified landscape Installer with not less than five (5) years' experience in successful installation and establishment of recreational baseball field turf in addition to requirements in Division 01 Section "Quality Requirements."
- B. Retain applicable subparagraphs below; revise to suit Project.
- 1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
  - 2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
  - 3. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:
    - a. Certified Turfgrass Professional of Cool Season Lawns, designated CTP-CSL.
  - 4. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
- C. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- D. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of

organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
  2. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
  3. Report suitability of tested soil for turf growth.
    - a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. (92.9 sq. m) or volume per cu. yd. (0.76 cu. m) for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
    - b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.
- E. Preinstallation Conference: Conduct conference at Project site.

#### **1.04 REGULATIONS AND STANDARDS**

- A. The Contractor shall comply with all rules, regulations, laws and ordinances of all authorities having jurisdiction. All labor, materials, equipment and services necessary to make the work comply with such requirements shall be provided without additional cost to the Owner.
- B. Nomenclature: Plant names shall agree with the nomenclature of "Standardized Plant Names" as adopted by the American Joint Committee on Horticultural Nomenclature standards, Latest Edition. Names of varieties not listed therein shall conform generally with names accepted in the nursery trade. Clonal types must be true. No substitution shall be permitted.

#### **1.05 APPLICABLE SPECIFICATIONS AND STANDARDS**

- A. The following specifications and standards listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

- B. American Joint Committee on Horticultural Nomenclature:
  - 1. Standard Plant Names (Current Edition).
  - 2. American Association of Nurserymen.
  - 3. Horticultural Standards (Current Edition).

#### **1.06 MEASUREMENTS**

- A. Measurements of plants; trees, shrubs, and other plants shall be measured in units of caliper, height or spread to match existing although the Contractor may, at his option and with the approval of the Design Professional, supply oversize plants provided that this does not affect the Contract Price. Reduction of sizes specified will not be accepted.
- B. The caliper, height or spread, and quality shall be measured in accordance with standards specified in the current American Association of Nurserymen, Inc., American Standard for Nursery Stock, unless otherwise specified.
- C. A plant shall be dimensioned as it stands in its natural position.
- D. Deciduous trees shall be measured in units of average height in feet or of average caliper at a point 4'6" above the ground line for trees up to four (4) inches (102mm) in diameter, and twelve (12) inches (305mm) above the ground line for trees over four (4) inches (102mm) in caliper.
- E. Evergreen trees, deciduous shrubs, and evergreen shrubs of an upright type shall be measured in units of average height in feet.
- F. Evergreen shrubs of spreading type shall be measured in units of average spread in feet.
- G. Vines shall be measured by units of average spread of a typical plant or by units of plants of a specified age and root pot size.
- H. Ground cover plants shall be measured by units of plants of a specified age and root pot size.
- I. The minimum sizes of root balls, ball depth and diameters shall be in accordance with Recommended Balling and Burlapping Specifications, as set forth in the current edition of American Standards of Nursery Stock, sponsored by the American Association of Nurserymen, Inc.
- J. Analysis and testing of materials required under these Specifications shall be in accordance with the current methods of the Association of Official Agricultural Chemists and A.S.T.M.

#### **1.07 VERIFYING CONDITIONS**

- A. The Contractor, by careful examination, shall inform itself as to the nature and location of the work, the conformation of the ground, the nature of the soil and subsoil conditions, the character of the equipment and facilities needed preliminary to and during the execution of the work, the general and local conditions, climate, and all other matters which can in any way affect the work.
- B. The Contractor shall be held to have visited the site before submitting his proposal and to have familiarized himself with the aforesaid conditions and those of adjoining properties and utilities.
- C. The Contractor shall investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation and ingress and egress to the site. The Contractor shall conform to all governmental regulations in regard to the transportation of materials to and from and at the job site and shall secure in advance such permits as may be necessary.
- D. Should the Contractor, in the course of the work, find any discrepancies between the Drawings and the physical conditions of the locality, it will be his duty to immediately inform the Design Professional in writing and the Owner's Representative shall promptly clarify same. Any work done after such discovery unless authorized by the Owners Representative shall be done at the Contractor's risk.

**1.08 ENVIRONMENTAL CONDITIONS**

- A. Seeding, sodding, and ground cover planting shall be done only between August 15 and October 1 in the autumn and between April 1 and June 1 in the spring, unless otherwise authorized or directed by the Design Professional in writing.
- B. Trees and shrubs shall be planted between April 1 and June 1 or between September 1 and November 15.
- C. Conduct planting under favorable weather conditions during each season specified. Do not plant when ground is frozen. The Contractor may, at his option and under his full responsibility, conduct planting operations under unseasonable conditions without additional compensation.

**1.09 PROTECTION**

- A. The Contractor shall protect all utilities, structures, and vegetation during work.
- B. Paving and other work installed by others shall be kept clean and free of soil, straw, mulch, and other materials incidental to this work.
- C. Immediately before moving plant material from its sources, the Contractor



shall spray all deciduous and evergreen plants with an antidesiccant, applying an adequate film over trucks, branches, twigs, and/or foliage as directed by the Design Professional. Plant material shall be resprayed after planting.

- D. Roots and balls of all plants shall be adequately protected at all times from freezing, sun, and/or drying winds. Balled and burlapped plants that cannot be planted immediately upon delivery shall be set on the ground and well protected with soil, wet peat or other acceptable material. All plants shall be watered as necessary until planted.
- E. Staking: Trees shall be staked immediately upon planting as indicated on Drawings. Plants shall stand plumb after guying and staking.
- F. Wrapping shall be done promptly after planting. The trunk of all deciduous trees shall be wrapped spirally from the ground line to the height of the second branches. Wrapping shall be neat and snug and the material held in place with twine every two feet.
- G. Spraying shall be done to control insects, fungus and other diseases.
- H. The Contractor shall provide, at his own expense, such barricades, temporary fencing, signs or policing as may be necessary for the protection of all planted and lawn areas until they are accepted.

#### **1.10 MAINTENANCE**

- A. Lawn Areas: The Contractor shall restore and produce dense, vigorous well-established lawns and shall maintain lawn areas until final acceptance of the work by the Owner. Maintenance shall include, but not be limited to, the preparation and reseeded of any bare areas, proper watering, refilling of rain-washed gullies and rutted areas, refertilizing and mowing. At the time of the first cutting, mower blades shall be set 2 ½ inches (63.5mm) high. At least three (3) mowings shall be completed before the work will be accepted, unless otherwise directed by the Design Professional. Any areas which fail to show uniform stand of grass shall be reworked as specified.
  - 1. The Contractor shall refertilize all lawn areas after the first two grass cuttings have been made, or as otherwise directed by the Design Professional, with commercial fertilizer, 10-6-4, at a rate of 20 pounds per 1,000 square feet (9 kgs/92.9 sq. m).
- B. Planting: Maintenance shall begin immediately after each plant is planted and continue to the termination of the guarantee period. Maintenance shall consist of pruning, refertilization, watering, weeding, mulching, tightening and repairing of guys and stakes, resetting plants to proper grades or upright position, restoration of the planting saucers, and spraying.
  - 1. Pruning shall be done periodically as necessary to remove dead or

damaged branches.

2. Refertilization is to be Rapid-Gro or approved equal at the rate of one pound (0.453 kgs) of fertilizer to 30 gallons (113 liters) of water per tree 3" (76.2mm) caliper and larger. All smaller trees at the rate of one-third pound (0.15 kgs) fertilizer to 10 gallons of water per tree applied every three (3) weeks between May 15 and July 1. Fertilizer is to be completely water-soluble and containing not less than 23 percent nitrogen, 21 percent phosphorous, and 17 percent potassium.
3. Weeding shall consist of the complete removal of weeds within the mulched area surrounding each plant.
4. It shall remain the responsibility of the Contractor to water as necessary to keep the plant materials in their best condition. Water all plants once each week during the growing season or at a longer interval if directed by the Design Professional. Water shall be applied slowly so as to penetrate the entire root zone.
5. Mulch and plant saucers shall be restored as necessary to preserve their appearance and to control weed growth. At the end of the maintenance period, mulched areas shall be top dressed with ½ inch (12.7mm) of topsoil and seeded. Seed mix shall be as specified elsewhere in these specifications.
6. Tighten and repair or replace stakes, guys, and wrappings as necessary. Remove at end of maintenance period unless otherwise directed by the Design Professional. If any plant settles from its proper elevation, it shall be raised to the proper level and not merely filled in with additional material.
7. Spraying shall be done to control insects, fungus, and other diseases.
8. A maintenance inspection by the Design Professional will be held approximately six (6) months after the beginning of the Guarantee Period. The Contractor shall accompany the Design Professional on the inspection and shall perform all required maintenance work immediately thereafter.

#### **1.10 INSPECTION AND ACCEPTANCE**

- A. Obtain all certificates of inspection of plant materials (except certificates of analysis of top soil samples) that may be required by federal, state or other authorities to accompany each shipment of plants, and on arrival the certificate shall be filed with the Design Professional.
- B. Topsoiling: Notice shall be given in written form to the Design Professional prior to beginning topsoiling operations so that inspection might be made and the areas to be topsoiled approved.

- C. Lawn Areas: The Contractor may request inspection for acceptance sixty (60) days after completing all work and after at least three mowings as specified.
1. Inspection for Acceptance of Lawn Work: The Design Professional shall inspect all work for acceptance upon written request of the Contractor. The request shall be received at least two (2) weeks before the anticipated day.
  2. Any lawn areas which fail to show a uniform stand of grass shall be reworked, and resodded at the Contractor's expense with the same material as originally used thereon, and such work shall be repeated until all required areas are covered with a satisfactory stand of grass. Eroded areas shall be repaired and restored to finished grade.
  3. Upon completion of all repairs or renewals, the Design Professional shall certify in writing to the Owner as to the acceptance of the work. The Design Professional shall be the sole judge of the acceptability of the work.
- D. Plant Material Inspection and Acceptance Prior to Installation: The Contractor shall request, in writing, the inspection of plant materials by the Design Professional. The Contractor shall furnish complete information as to the location of all plants which he proposes to supply.
1. Plants shall be subject to inspection and approval at place of growth for conformity to specification requirements as to quality, size and variety. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of the work for size and condition of balls and root systems, diseases, insects and latent defects or injuries. No plants will be accepted if the ball is cracked or broken before or during planting operations. Rejected plants shall be removed from the site immediately. The Contractor shall furnish certificates of inspection of plant materials as may be required for Federal, State or other authorities to accompany shipments.
  2. No plants shall be dug or delivered to the site, or transplanted until the required inspections have been made and the plants approved by the Design Professional.
  3. Make a formal request in advance for any inspections at the various nurseries and collecting ground. This request shall state the location of the nursery or collecting grounds and shall list the particular plants which are to be inspected, as well as the size of such plants.
  4. Pay the entire cost of inspection (outside of 25 mile radius from City's limits), travel and maintenance of the Design Professional's inspector.

5. All costs relating to nursery inspections, including a \$500/diem fee to the Design Professional, shall be paid by the Contractor.
  6. The Contractor or his authorized representative shall be present during inspections.
- E. Inspection of Plant Material for Beginning of Guarantee Period: Inspection of the work to determine its completion for beginning of the guarantee period will be made by the Design Professional upon request for such inspection submitted by the Contractor at least two (2) weeks prior to the anticipated date. All planting must be alive, healthy and installed as specified to be considered acceptable and complete.
1. After inspection the Contractor will be notified by the Design Professional of the date of the beginning of the guarantee period, or if any deficiencies are found, of the requirements and corrections which must be met prior to the beginning of the guarantee period.

#### **1.11 RECEIPT OF MATERIALS**

- A. Furnish a receipt for all bulk deliveries of topsoil and humus, brought to job each day prior to unloading.
- B. Bagged items delivered to job shall have tags on all bags identifying same and weight.
- C. Material not complying with above requirements will not be accepted.

#### **1.12 GUARANTEE**

- A. Planing, seeding and sodding is subject to the one year Guarantee requirements set forth in the Contract for the entire work of this Contract, provided that landscaping has been completed and accepted at the start when same has been completed and accepted.
- B. At the end of this period all planted material, trees, shrubs, plating, seeding and sodding that is dead or in a dying condition shall be replaced.
- C. It shall be the responsibility of this Contractor to inspect the plant material during the one year guarantee period, in order to satisfy himself that the material is receiving the proper care by the Owner.
- D. If the Contractor is of the opinion that the care and watering given plants and grass, by authorities, is insufficient or may cause them to die, prematurely, he shall immediately, and in sufficient time to permit the condition to be satisfactorily rectified, notify the Design Professional in writing, otherwise no consideration will be given such claims.

### **1.13 SHIPMENT DELIVERY**

- A. Promptly notify the Owners representative, in advance, when the plant material is to be delivered and the manner of shipment; and furnish therewith an itemized list in duplicate of the actual quality of plant material in each delivery, and to expedite the required inspection at the point of delivery.
- B. The itemized list in duplicate of the plant material for each delivery shall include the pertinent data in the form as specified in the list of plants to be furnished.
- C. This list and the necessary inspection certificates to accompany each plant and shipment shall be delivered to the Owners representative prior to acceptance and plating of the material.
- D. When shipment is made by truck, all plant material shall be packed to provide adequate protection against climatic, seasonal and breakage injuries during transit, loading and unloading.
- E. The tops shall be securely covered with tarpaulin or canvas to minimize wind whipping and drying.
- F. A suitable method of handling shall be employed to insure the careful, workmanlike delivery of heavy balled plants to preclude cracked or "mushroomed" plant balls at the point of delivery.
- G. Necessary pruning of roots shall be performed prior to delivery of plant material to the site.
- H. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.
- I. Bulk Materials:
  - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plantings.
  - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  - 3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

### **1.14 PREPARATION OF PLANTS**

- A. Care shall be exercised in digging and preparing plants for shipment and transplanting. Workmanship that fails to meet the highest standards will be rejected and replaced with acceptable material at no additional cost. Balled plants shall be dug with sufficient roots and shall have a solid ball of earth securely held in place by burlap and stout rope. No manufactured balls will be accepted. Bare root plants shall be "puddled" immediately before shipment, or after digging.

**1.15 SEPARATE PAYMENT**

- A. If, because of the restrictions contained herein limiting the permissible planting periods, planting or seeding or sodding is not completed before all other general construction contract work is completed, the final payment when due will be made subject to the deductions for the value of such incomplete planting, seeding or sodding, which sums will be released upon completion and acceptance of such work.

**PART 2 - PRODUCTS**

**2.01 TOPSOIL**

- A. Topsoil: Topsoil shall be fertile, friable, natural soil. It shall be without a mixture of subsoil and shall be free of stones, lumps, plants or their roots, sticks, and other extraneous matter. Topsoil shall consist of natural topsoil without a mixture of subsoil, and shall be of good, rich uniform quality, free from poison ivy roots and undesirable material harmful to plant growth. Topsoil shall contain not less than 5% nor more than 20% organic matter determined by loss on ignition on moisture free sample dried at 100°C., in accordance with the current method of the Association of Official Agricultural Chemists.
- B. All topsoil for general planting and lawn work shall be new obtained from off-site stockpiles. At Contractor's expense, the topsoil shall be analyzed, and must be amended as necessary to meet the requirements herein specified.
- C. Topsoil must contain at least 5% organic matter determined by the wet combustion method (chromic acid reduction) as described in Circular No. 757 by the U.S. Department of Agriculture. The acidity range shall be pH 5.9 to pH 7.0 inclusive. The mechanical analysis of the soil shall be as follows:

<u>Passing</u>	<u>Retained On</u>	<u>Percentage</u>
1" (25.4mm) Screen		100%
1" (25.4mm) Screen	¼" (6.35mm) screen (gravel not more than)	3%
¼" (6.35mm) Screen	#100 USS Sieve (coarse, medium, and fine sand)	40-60%
#100 USS Sieve	(very fine sand, silt, and clay).	40-60%

- D. The Design Professional reserves the right to reject topsoil in which more than 60% of the material passing the U.S.S. No. 100 sieve consists of clay as determined by the Buoyocous hydrometer, by the decantation method. All percentages are to be based on weights of the sample dried at 100°C. Analysis shall be made in accordance with the current method of Association of Official Agricultural Chemists.
- E. Contractor shall furnish prepared soil analysis for organic content, mechanical analysis and pH of two (2) samples representative of topsoil to Design Professional for approval. Contractor to pay all costs. Analysis shall indicate required amendments, if any, and shall be performed by a reputable testing laboratory and shall be submitted together with the bid for the work of this Section. All additional costs of further topsoil analysis required, due to failure of original samples to meet the requirements of the specifications, shall be paid for by the Contractor.
- F. The entire quantity of topsoil shall be delivered to the job and a composite sample for analysis shall be made by the Design Professional. Make any and all amendments required for this topsoil to remedy any deficiency shown by the topsoil test. Topsoil which does not meet specified criteria shall be amended with additives as indicated by the analysis.

## **2.02 BONE MEAL**

- A. Commercial raw bone meal shall be finely ground and have a minimum analysis of 4% nitrogen and 20% phosphoric acid. It shall be delivered in standard size bags showing weight, analysis and name of manufacturer. It shall be kept in a weatherproof storage place on the job. Application shall be as described in the specification.

## **2.03 COMMERCIAL FERTILIZER**

- A. Fertilizer shall be uniform in composition, free-flowing, and suitable for application with approved equipment. The fertilizer shall be delivered to the site in bags or other convenient containers, each fully labeled, conforming to the applicable state fertilizer laws, and bearing the name, trade name of trademark, and warranty of the producer. Fertilizer for lawn work shall be a granular 5-10-5, and for general planting shall be slow release 10-10-10.

## **2.04 GROUND LIMESTONE**

- A. Limestone: Agricultural-grade limestone ground to pass an 8-mesh sieve with 25 percent passing a 100-mesh sieve shall be furnished. In addition, calcareous limestone shall contain not less than 50 percent calcium oxide, and dolomitic limestone shall contain not less than 40 percent magnesium oxide. Coarser materials will be acceptable provided the specified rates of application are increased proportionately, on the basis of quantities passing the 8- and 100-mesh sieves, but no additional payment will be made for the increased quantity.

- B. The ground limestone shall be delivered in standard size bags of the manufacturer showing weight, analysis and name of the manufacturer. It shall be stored in a manner to insure preservation of its qualities and fitness for the work, and shall be placed undercover if the Design Professional directs.

**2.05 CHLORDANE**

- A. Chlordane shall be commercially produced in dry powdered form and of recent manufacture, which will meet the following analysis:
  - 1. Technical Chlordane 10%
  - 2. Inert Ingredients 90%
  - 3. Chlordane shall be furnished in packages appropriately labeled.
- B. Do not bring chlordane to the job until ready to apply, and take all precautions in handling and keeping from children.

**2.06 HUMUS**

- A. Humus shall consist of reed peat or sedge peat of such physical condition that it can be passed through a 1" screen and can be readily incorporated with the topsoil. It shall be free from sticks, stones, woody roots and other objectionable materials. Humus shall be taken from a previously well drained fresh water site, and shall be conditioned after excavation by storage in stockpiles for a 4 to 6 month period, which includes at least one freezing and thawing period. Organic matter, on a dry weight basis, shall test not less than 80% in test made in accordance with current methods of the Association of Official Agricultural Chemists. Acidity range shall be 5 pH to 7.5 pH. Moisture content by weight shall be 60% to 70%. Water-absorbing ability shall not less than 300%. Iron and sulphur content shall be low.
- B. Furnish a certified report of an approved analytical chemist showing the mechanical and chemical analysis of representative samples of the humus which he proposes to use. No humus shall be delivered until the approval of samples by the Design Professional, but such approval does not constitute a final acceptance. The Design Professional reserves the right to reject on or after delivery any material which does not in his opinion meet these specifications. When humus is stored on the job, it shall be done as directed by the Design Professional.

**2.07 SOD**

- A. Sod: The turf shall be cultivated and grown in an established sod farm for commercial application from certified seed under good turf management and cultural practices for at least eighteen (18) months before lifting.
- B. The sod shall be a mixture of merion bluegrass and fescue creeping grass, with at least 50% merion present. It shall be square cut for uniform laying, and



- one inch minimum depth of soil around the roots. Sod that is dried out or overheated shall not be used.
- C. The blend/mix of grass in sod shall be one of those listed below and shall be harvested from one field to insure a uniform color and texture. Percentages of each grass type are to be within the given range for that type.
1. 70-90% Tall Fescue: One or more of the following varieties: Apache, Arid, Bonanza, Falcon, Jaguar, Mustang, Rebel II.
  2. 10-20% Bluegrass: One or more of the following varieties: Benson (A-34), Bristol, Eclipse, P-104, Touchdown.
  3. 0-10% Perennial Ryegrass: One or more of the following varieties: All Star, Palmer, Pennant, Prelude, Premier, Yorktown II.
- D. Sod shall be machine cut to uniform soil thickness of five-eighths inch (5/8"), plus or minus one-quarter inch (1/4") at the time of cutting. Measurement for thickness shall exclude top growth and thatch. Individual pieces of sod shall be cut eighteen inches (18") wide by sixty inches (60") long (7½ sq. ft.) or rolls four feet (4') wide by fifty feet (50') long (200 sq. ft.). Standard sections of sod shall be strong enough to support their own weight and retain their size and shape when suspended vertically. Sod shall not be harvested or transplanted when the moisture content may adversely affect its survival.
- E. Sod shall be harvested, delivered, and transplanted within a period of thirty-six (36) hours. Before cutting, sod shall be mowed uniformly at a height of one and one-half inches (1½"). The Landscape Architect may inspect the sod before it is harvested but reserves the right to reject, on or after delivery, any sod which, in their opinion, does not meet with the specifications.

## **2.08 GRASS SEED**

- A. Seed: Seed labeled in accordance with U.S. Department of Agriculture Rule and Regulations under the Federal Seed Act shall be furnished. Seed shall be furnished in sealed, standard containers, unless written exception is granted, indicating vendor name, showing the weight and analysis. Seed that is wet or moldy or that has been otherwise damaged in transit or storage will not be acceptable.
- B. All grass seed shall be fresh, recleaned grass seed of the latest crop mixed in the following proportions by weight and meeting the following standards of pure live seed (P.L.S) content, purity and germination.

Seed Kind	Percentage by weight of each seed kind in mixture	Percentage by weight of pure live seed of each kind	Percentage by weight of pure live seed in mixture
Baron Kentucky Bluegrass	30	90	27
Fyking Kentucky Bluegrass	30	90	27
Chewings Red Fescue	20	90	18
Yorktown II Perennial Rye	20	88	17.6
Total pure live seed in mixture			89.6%
Maximum weed seed content			.9%
Other than weed and pure live seed			9.5%
Total			100.0%

- C. Seeds containing prohibited or restricted noxious weeds will not be accepted.
- D. Meadow grass seed shall be a mixture of wildflower and sheep fescue as indicated on the Drawings.
- E. The following noxious weeds are prohibited: Bindweed, Canada Thistle, quackgrass, hedge kind weed, horse nettle, wild garlic, bermuda grass, cheat, wild onion, corn cockle, dodder and wild onion, Johnson grass, perennial sweet sudan grass, sorghum alum, and other perennial sorghum hybrids.
- F. Present a certificate of P.L.S. tests of the grass seed intended for use. The certificate shall be obtained from a well-recognized seed test laboratory that is not engaged in the business of selling seeds. This certificate must state the true quality of the seeds which the Contractor proposes to furnish.
- G. Samples of the seed taken from the stock proposed to be supplied may be subjected to tests for purity, viability and seed content and acceptance or rejection will be made on the basis of such tests.
- H. Grass seed shall meet the tolerance for germination and purity according to the standards tabulated on pages 22 and 23 of U.S. Department of Agriculture, Service and Regulatory Announcements No. 156.
- I. Peat Moss and Organic Matter: Baled sphagnum moss, brown, acid reaction

about 4.5 pH, low in content of woody material, free of mineral matter harmful to plant life, and water absorbing capacity 1100 to 2000 percent by weight, or suitable alternate as approved by Design Professional. Organic matter shall be well-rotted, unleached horse or cattle manure; free from harmful chemicals or other injurious substances; at least 3 months old, but not more than 2 years old; and with not more than 25% straw, leaves, etc.

- J. Water: Clean, fresh, and free from harmful materials, as available from hose bibbs and hydrants.
- K. Mulch: Material used for mulching hydroseeded areas shall be natural wood cellulose mulch, capable of dispersing readily in water and shall have no toxic effect when combined with seed or other materials. Mulch shall be dyed green by a dye non-injurious to plant growth and shall be packaged in new, labeled containers in an air dry condition.
- L. Mulch: For planting, tree saucers shall be pine bark chip, 1/4" -1/2" size, free of extraneous matter, as approved by the Design Professional.
- M. Antidessicant: "Wiltproof," as manufactured by Nursery Specialty Product Incorporated, Stabbins Road, Croton Falls, New York.

## **2.09 RESTORATION OF EXISTING PLANT MATERIALS**

- A. Verify the existing plant types and locations prior to submitting bid proposal, including sizes, quantities, and other requirements not shown on the drawings. Restore and/or replace plants and plant materials disturbed by the work of the Contract.
- B. All plants shall be nursery grown, unless otherwise specifically permitted in each instance, and shall have been growing under similar climatic conditions as the location of this project for at least two (2) years prior to award date of this Contract. They shall have straight trunks with the leader intact, undamaged and uncut, unless in the case of certain multi-stemmed specimens directly specified otherwise by the Design Professional.
- C. Plants shall be freshly dug, no heeled in or cold storage plants will be accepted. Plants shall be typical of their species or variety and shall have normal habits of growth. They shall be sound, healthy and vigorous, well-branched and densely foliated when in leaf. They shall be free from disease, insect pests, eggs or larvae, and shall have healthy well-developed fibrous root systems, free from defects, decay, disfiguring roots, sun-scald injuries, and abrasions of the bark.
- D. Plant names shall agree with nomenclature of "Standardized Plant Names" as adopted by the American Joint Committee on Horticultural Nomenclature, and size and grading standards shall conform to those of the American Association of Nurserymen, unless otherwise specified. No substitution will be permitted.

- E. All plants shall conform to the measurements specified in the Plant List except that plants larger than specified may be used if approved by the Design Professional. Use of such plants shall not increase the contract price. If larger plants are approved, the ball of earth shall be increased in proportion of the size of the plants.
- F. Plants shall not be pruned prior to delivery.
- G. All plant materials shall be true to species or variety, shall be sound, healthy, vigorous, acclimated plants free abrasions of the bark, plant diseases, insect eggs, borers and all other forms of infestations. They shall have normal, well-developed branch systems and vigorous, fibrous root systems. All materials shall be freshly dug, nursery grown stock, and shall have been grown for a period of at least two years prior to the calling for bids, under the same climatic conditions as at the location of the site.
- H. A plant shall be dimensioned so it stands in its natural position. Trees under 6 inches in caliper shall be calipered at a point 1 foot above the ground. Trees over 6 inches shall be calipered at a point 2 feet above the ground. The stock furnished shall be a fair average of the minimum and maximum size specified.
- I. All trees must have straight trunks with single leader intact. There shall be no abrasion of the bark and no fresh cuts of limbs over 1-1/4 inches which have not completely call used over.
- J. The Contractor shall have investigated the sources of supply and satisfied himself that he can supply all of the plants mentioned in the Plant List in the size, variety, and quality noted and specified before submitting his bid. Failure to take this precaution will not relieve the Contractor from his responsibility to furnish and install all the plant material in strict accordance with the Contract requirements and without additional expense to the Owner. Substitutions will not be permitted.
- K. All plant stock shall be dug and handled with reasonable care and skill to prevent injuries to the trunk, branches, and root and shall be packed in an approved manner to insure arrival at the Project site in good condition.

## **2.10 STAKING AND GUYING**

- A. **Stakes:** Stakes for the support, bracking, and deadmen shall be rough cypress, cedar, locust or other wood, free from unsound and loose knots, rot, cross grain, or other defects that may impair strength of stake. Stakes shall be minimum diameter of 2 inches (51mm) for trees up to 4 inches (102mm) in caliper, and minimum of 4 inches (102mm) diameter for trees over 4 inches (102mm) in caliper.
- B. **Trees:** Stakes shall be 8 feet long, of white cedar with bark attached and with

a maximum allowable deflection of 10% (deflection shall be outward at top of stake). Stakes shall have a diameter at the middle of not less than 2 inches, not more than 2-3/4 inches, and a diameter of not less than 1-3/4 inches at the tip nor more than inches at the butt. Stakes shall be driven 30 inches into the ground and fastened to the trees with double No. 12 gauge annealed galvanized steel wire run through a suitable length of new black rubber hose. Stakes shall be placed about 1 foot away from the trunk, taking care to clear the roots.

- C. Guy Wire: Wire shall be new, soft, annealed galvanized steel wire, free from bends and kinks. No. 10 wire shall be used in guying and No. 12 wire for staking.
- D. Hose: Shall be new 3/4" (19mm) I.D. black corded rubber hose.

## **2.11 WRAPPING**

- A. Wrapping Material: Wrapping for trees shall be waterproof paper 30-30-30, 4 inches (102mm) wide, in rolls, such as Krinkle Kraft Tree Wrapping paper, or approved equal.
- B. Trees of 2" caliper and up shall be wrapped with a 6" burlap bandage or suitable substitute securely tied at the top and bottom and at 2 foot intervals along the trunk. The bandage shall cover the entire surface of the trunk to the height of the first branches. Burlap shall be maintained until first winter has elapsed.
- C. Twine: Wrapping shall be tied with approved quality jute twine. Two-ply twine shall be used for trees 3 inches (76.2mm) and less in diameter, and 3 ply for trees over 3 inches (76.2mm) in diameter.

## **2.12 TREE GUARDS**

- A. Restore existing tree guards.
- B. All metal work shall be hot dipped galvanized, after fabrication.

## **2.13 HERBICIDES AND PESTICIDES**

- A. Herbicides and Pesticides: Approved for type and rate of application by local and state agencies with jurisdiction before use.

## **2.14 GRANULAR DRAINAGE BED AND FILTERS**

- A. Granular drainage bed for tree pits, as required, shall be clean, dry crushed, rock or river run gravel up to one (1) inch (25.4mm) in diameter.
- B. Soil separator/filter for tree pits shall be soil-check filter media as manufactured by Brighton By-Products Co., Inc., New Brighton, PA.

### **PART 3 - EXECUTION**

#### **3.01 PLANTING TIME**

A. Trees-Shrubs

1. Spring Planting.
2. Fall Planting.

a.	Deciduous	March 1 - May 1	Oct. 15 - Dec. 1
b.	Evergreen	April 1 - May 15	Sept. 1 - Oct. 1
c.	Ground Cover	April 15 - June 15	

B. Grass:

1. Seed March 15- May 1....Aug. 15- Oct. 1
2. Sod May be laid at any time except during the months of June and July, provided that the ground is not frozen. (Sodding for athletic fields - March 15 - Oct. 15)

#### **3.02 PLANTING OPERATIONS**

- A. In general planting and transplanting shall be done only in period specified in Par. 27, unless otherwise directed by the Owner's Representative. Balled plants may be planted at such times as the Owner's Representative may direct.
- B. Immediately following delivery and inspection at the job, all plants with exposed roots shall be heeled-in moist soil, in a manner satisfactory to the Owner's Representative. All plants heeled-in shall be properly maintained by the Contractor until planted.
- C. The roots of balled and burlapped (B. & B.) plants shall, if not immediately planted after digging and inspection, be adequately protected by topsoil until planted in their final location. Balled plants shall be handled so that the ball will not be loosened. After the soil has been thoroughly firmed under and around the ball, the burlap shall be cut away from the upper half of the ball and the remaining burlap adjusted to prevent the formation of air pockets; or when directed by the Owner's Representative, the burlap shall be entirely removed. Soil shall be firmed at six to eight inch intervals and thoroughly settled with water.
- D. In loading, unloading, or handling plants, exercise utmost care to prevent injuries to the branches or to the roots of the plants. The solidity of the ball or balled and platformed plants shall be carefully preserved. Trees with tops broken in transit shall be replaced by a satisfactory substitute.

- E. While plants with exposed roots are being transported to and from heeled-in beds, or being distributed in planting beds, or are awaiting planting after distribution, protect the roots from drying out by means of wet canvas, burlap, straw, or by "puddling". The means employed shall be satisfactory to the Owner's Representative and shall depend on weather conditions, and the length of time the roots must remain out of the ground. Plants with exposed roots shall be placed in the proper position and loose, friable topsoil shall be worked around the roots and thoroughly settled with water. Care shall be taken to avoid bruising or breaking the roots when tamping or firming the soil about them. Any large roots or fleshy roots which are bruised or broken shall be pruned with a clean cut at the time of planting.
- F. No planting shall be done except in the presence of the Owner's Representative. In general, all plant shall stand, after settlement, at the same level at which they have grown. Care shall be exercised in setting the plants plumb. Ropes, stones, etc. shall be removed from the hole before backfilling and all soil for backfilling shall be loose and friable and not frozen.

**3.03 FINE GRADING AND SPREADING OF RESTORED TOPSOIL**

- A. All areas within the Contract Limit Line, not occupied by buildings, pavements, structures, washed gravel mulch, or other hard surface, shall receive six (6) inches of restored topsoil.
- B. The sub-soil upon which topsoil is to be placed shall be cleared of all stones, woody roots, rubbish or other objectionable matter, removed from the premises, the surface thoroughly scarified and loosened to at least a depth of 4 inches, to the satisfaction of the Design Professional, the topsoil spread to a smooth even surface and to the depth required, then raked or otherwise manipulated to form smooth drainage grades to the levels shown on drawings.
- C. Topsoil shall be deposited and spread to a minimum depth of 8 inches over earth where seeded and sodded areas are indicated, 18 inches over rock where seeded, sodded or ground cover areas are indicated, and to a minimum depth of 18 inches over earth, and 36 inches over rock where planted, garden or shrubbery areas are indicated on drawings.
- D. Topsoil shall be spread, raked, compacted, and otherwise manipulated to form, after settlement, smooth draining final grades. Spread topsoil to six (6) inches depth, after compaction, creating smooth even surfaces, providing proper run off of surface water without ponding.
- E. Topsoil shall be cleaned of all hard clods, stiff clay, sods, stones, roots, sticks, and any other debris over 1 ½" which will interfere with the formation of the seed bed.
- F. To the topsoil used in backfilling major and minor tree pits, there shall be

thoroughly incorporated bone meal as follows:

1. 5 lbs. trees 2-1/2"-3" cal., 1 lb. minor trees 3'-4' high 7 lbs. trees 2"-3" cal., 1-1/2 lb. minor trees 4'-5' high 10 lbs. trees 4"-5" cal., 2 lb. minor trees 5'-6' high 12 lbs. trees 5"-6" cal. 3 lb. minor trees 6'-8' high 15 lbs. trees 6"-8" cal., 5 lb. minor trees 8'-10' high 20 lbs. trees 8"-10" cal. 7 lb. minor trees 10'-12' high.
- G. Where a bed or hedge of shrubs is shown, excavate all fill between shrubs of this bed or hedge before backfilling with topsoil.
  - H. Topsoil which must be transported across any finished walks and roads shall be handled in such a manner that no damage will be done to the walks or roads. The Contractor shall be responsible for the repair of such damage at no additional cost to the Owner.
  - I. Do not spread topsoil when in a muddy or frozen condition.
  - J. Spreading of topsoil shall be coordinated with the seeding and sodding operations to insure these operations take place as soon as topsoiling has been completed and approved by the Design Professional.

### **3.04 PREPARATION OF LAWN BED**

- A. Ground limestone and organic matter shall be applied in the stated proportions in addition to the requirements, if any, stated in the mechanical and chemical analysis of topsoil.
- B. Ground limestone shall be distributed evenly by spreader over all areas to be seeded/sodded. It shall be worked lightly into the top three (3) inches (76.2mm) of the topsoil at least five (5) days before hydroseeding and sodding. The rate of application shall be 50 lbs. (22.5kgs) per 1000 square feet (93 sq. m).
- C. Organic matter shall be distributed evenly by spreader over all areas to be seeded or sodded. It shall be worked lightly into the top three (3) inches of the topsoil at least five (5) days before hydroseeding and sodding. The rate of application shall be 100 lbs. (45kgs.) per 1000 square feet (93. sq. m).
- D. Immediately before seeding or sodding, the topsoil shall be loosened to a depth of three inches (3") (76.2mm) and smoothed. Each area shall then be rolled in two directions perpendicular to each other with a light roller and then finely raked. Raking shall be done by hand adjacent to structures, paving, and trees.
- E. The finished surface shall be friable, smooth, finely textured, and shall conform to the lines and grades as indicated on the Drawings and/or as directed by the Design Professional. All bumps, depressions, or other irregularities shall be corrected prior to seeding and sodding operations begin.



### **3.05 SEEDING**

- A. After topsoil has been placed, all areas indicated on drawings or specified to be seeded shall be raked to true lines, free from all unsightly variations, bumps, ridges or depressions. All sticks, stones, roots, or other objectionable material which might interfere with the affirmation of a finely pulverized seed-bed shall be removed from the soil.
- B. The prepared lawn area shall be thoroughly rolled with an approved lawn roller and all low spots leveled up.
- C. Ground limestone shall be applied at the rate of 46 pounds per thousand square feet and shall be evenly distributed and worked lightly into the top of the soil to a depth of 3" either hand or machine at least five (5) days before applying commercial fertilizer.
- D. Chlordane shall be broadcast at the rate of 5 pounds per thousand sq. ft. and raked into the top 2" of topsoil.
- E. Acceptable commercial fertilizer shall be applied at a rate of 25 pounds per thousand square feet and worked lightly into the top 3" of topsoil.
- F. The rate of seeding shall be 5 pounds per thousand square feet. The grass seed shall be sown by approved machine in such a manner that a uniform stand shall result. After seeding, the surface shall be evenly raked as directed by the Design Professional with a fine-toothed rake and rolled with approved roller weighing at least 200 pounds.
- G. Grass seed shall only be sown in periods indicated under the "Planting Time" schedule or at such other times as are approved by the Design Professional. All seeding is to be done in dry or moderately dry soil and at times when the wind does not exceed a velocity of 5 miles per hour.
- H. Seed mulch and fertilizer shall be mixed in the needed amount of water to produce a slurry and then applied under pressure at the rate specified. Mulch shall be added to the slurry mix after seed and fertilizer have been thoroughly mixed.
- I. Care shall be taken to prevent footprints or other disturbances to the finished surface.

### **3.06 DIGGING AND HANDLING PLANT MATERIAL**

- A. No plant shall be dug or delivered to the site until the required inspections have been made and the plants approved by the Design Professional.
- B. Immediately before moving plant material from its source, the Contractor shall spray all deciduous and evergreen plants with antidessicant, applying

an adequate film over trunks, branches, twigs, and/or foliage as directed by the Design Professional. Respray the plant material after planting.

- C. Dig balled and burlapped (B & B) plants with firm, natural balls of earth as specified above. No plants will be accepted if the ball is cracked or broken before or during planting operations.
- D. No plant shall be bound with wire or rope at any time so as to damage the bark, break branches, or destroy its natural shape.

### **3.07 LAYOUT**

- A. Start the work of planting when other divisions of the work, including placing of topsoil, have progressed sufficiently to permit the work of planting.
- B. Stake out new planting where shown on plans except where obstructions below ground or overhead or where changes have been made in the construction. Necessary adjustments shall be approved by the Design Professional. Do not excavate any planting pits or beds until stake locations have been inspected and approved. Adjust stake locations as directed by the Design Professional.
- C. Prior to the excavation of all planting areas or plant pits, or placing tree stakes, the Contractor shall ascertain the location of below-grade structural slabs, all electric cables, all conduits, and all utility lines, so that proper precautions may be taken not to disturb or damage any subsurface improvements.

In the event any are uncovered, the Contractor shall promptly notify the Design Professional who will arrange to relocate the plant material. Failure to follow this procedure places upon the Contractor the responsibility of making, at his own expense, all the required repairs to damaged utilities and improvements.

### **3.08 PREPARATION OF PLANTING PITS**

- A. Circular pits with vertical sides with a diameter at least one (1) foot greater than the spread of the ball or roots shall be excavated to a depth below finish grade required to accommodate beneath the ball or roots a bed of topsoil not less than six (6) inches in depth, as shown on the Drawings. The ball or roots shall rest on this bed when the plant is properly set to finished grade.
- B. Do not put plants in pits and beds until the pits and beds have been inspected and approved by the Design Professional.
- C. Remove all excavated subsoil.

### **3.09 HOLES FOR TREES AND SHRUBS**

- A. The size of holes for all trees and shrubs with a ball of earth less than 4 feet in diameter and for all bare root trees shall be 2 times as wide as the diameter of the ball of earth or spread of roots and 6 inches deeper than the depth of the ball or roots. In no case shall the distance from the ball to the side of the hole be less than 12 inches.
- B. Holes for trees with a ball of earth 4 to 5 feet in diameter shall be 1-3/4 times as wide as the diameter of the ball of earth and 9 inches deeper than the depth of the ball.
- C. Holes for trees with a ball of earth over 5-feet in diameter shall be 1-1/2 times as wide as the diameter of the ball and 12 inches deeper than the depth of the ball.
- D. In no case shall holes for shrubs and vines be less than 12 inches deep and 12 inches in diameter.
- E. When the excavation for the tree pits occurs in an area filled with brickbats, ashes, stones, broken concrete or other foreign matter, the holes shall be dug 1/2 wider in diameter and 1/2 deeper than normally required, and the bottom and sides of pits shall be backfilled with fertilizer topsoil, thoroughly worked in place.

### **3.10 PLANTING SOIL MIXTURES**

- A. General Planting Soil Mixtures: Planting soil shall be prepared on the site by mixing topsoil, peat, sand, and fertilizer so that the resulting soil is of the following consistency: 75% topsoil, 20% peat, and 5% sand. Fertilizer shall be added to the planting soil in strict accordance with the manufacturer's specifications.
- B. On-site mixtures of planting soils shall be approved by Design Professional prior to installation.

### **3.11 PLANTING**

- A. Unless otherwise shown or specified, all plants shall be planted in pits, centered, and set on compacted planting soil to such depth that the finished grade level of the plant after settlement will be the same as that at which the plant was grown.

Plants shall be planted upright and, if necessary, faced to give the best appearance or relationship to adjacent plants and structures. No burlap shall be pulled out from under balls. Platforms, wire, and surplus binding from top and sides shall be removed. All broken or frayed roots shall be cut off cleanly. Planting soil shall be placed and compacted carefully to avoid injury to roots and to fill all voids. Tamp backfill firm to prevent settlement. When the hole is nearly filled, water as necessary and allow it to soak away. Balled and burlapped plants shall have the burlap cut away or folded back from the top of the ball before applying water. If backfill settles after watering, add more

backfill to bring to required level. Construct saucer around entire area of plant pits as shown on the Drawings.

- B. Ground cover beds shall be cultivated 6" (152mm) deep and graded smooth immediately before planting ground cover plants. Before planting, spread commercial fertilizer per manufacturer's specifications and mix peat and sand into topsoil to a 6" (152mm) depth to produce planting soil as previously specified. Plant ground cover to within one foot of tree.

### **3.12 GROUND LIMESTONE**

- A. The ground limestone shall be distributed evenly over all lawn, hedge, and ground-cover areas (except over Ericaceous plant areas), by machine, at least five (5) days before applying Commercial Fertilizer. The ground limestone shall be incorporated with the soil as specified under "SEEDING".

### **3.13 COMMERCIAL FERTILIZER**

- A. Add to all shrub, round cover and garden areas at the rate of 25 lb. per thousand square feet and worked lightly into top 3-inches of topsoil.

### **3.14 HUMUS**

- A. Humus shall be evenly spread over all seeded and sodded areas at the rate of 3 cu. yds. per 1000 sq. ft. and thoroughly incorporated with the top 3-inches of the top soil for tree pits, garden and planted areas at the rate of 1 cu. yd. of humus to 7 cu. yds. of topsoil. Soil containing 10% or more organic matter as determined by the test described in Par. 13 shall have lesser amounts of humus added to give a maximum of approximately 15% organic content present. Substitution with peat moss instead of humus is prohibited.

### **3.15 STAKING AND GUYING**

- A. Trees shall be supported immediately after planting. All evergreen trees shall be guyed as indicated on Drawings. Deciduous trees shall be staked as indicated on Drawings. Wires shall be encased in hose to prevent direct contact with the bark of the tree and shall be placed around the trunk in a single loop. Wires shall be tightened and kept taut by twisting the strands together, or with turnbuckles. Trees over 4" cal. shall have turnbuckles. Plants shall stand plumb after staking and guying. Guys, wires and stakes are to be maintained until final payment.
- B. Guying shall be done with three guys spaced equally about each tree. Each guy shall consist of two strands of wire attached to the tree trunk at an angle of about 60 degrees at about two-fifths of the height of the tree, and anchored at the ground to notched stakes which have been driven into the ground at an angle away from the tree so that the tops of the anchor stakes are below finished grade. Care shall be taken when driving stakes if

subgrade utilities are within four feet of the surface. Lines must be taut.

- C. Staking: Stakes shall be equally spaced about each tree and shall be driven vertically into the ground to a depth of 2 ½ to 3 feet (622mm to 914mm) in such a manner as not to injure the ball or roots. Trees shall be fastened to each stake at a height of about five feet by means of two strands of wire and hose. Stakes shall be uniform in height and placed according to the caliper of the tree as follows:
- D. Major trees over 6 feet high and less than 3" in caliper shall be supported with two 8' high stakes.
- E. Major trees 3 to 6 inches in caliper inclusive, as well as minor trees such as Crataegus, Malus, Magnolia, Halesia, Prunus, etc., shall be firmly guyed immediately after planting by 3 galvanized No. 12 gauge annealed steel wires attached to 2"x4" anchor posts 30 inches long, notched to receive the wires and driven into the ground with their tops below the finished grade. The wires shall be put through sections of new, black rubber hose of sufficient length to prevent injury to the trees and the free ends of the wire secured to anchor stakes below the ground surface. All staking and guying shall be done immediately after planting and transplanting. All trees shall stand plumb after staking and guying.
- F. All trees larger than 6" in caliper shall be firmly anchored after planting by 4 guys secure to anchors (dead men) placed at least 3' below finished grade. Each guy shall be made up of at least 4 strands of No. 10 gauge galvanized iron wire and shall be provided with an approved weldless turnbuckle, hood and eye type. Dead men shall be oak or locust posts 8" in diameter and 4' long placed immediately after planting. All trees shall stand plumb after anchoring.

### **3.16 WRAPPING**

- A. Wrapping shall be done promptly after planting. The trunks of all deciduous trees shall be wrapped spirally from the ground line to the height of the second branches. The paper shall overlap 1 ½" minimum. Wrapping shall be neat and snug and the material held in place with the twine every two feet.

### **3.17 PRUNING**

- A. Neatly prune and/or clip all plants to preserve their natural character, and in a manner appropriate to the particular requirements of each plant, and at the time designated by and to the satisfaction of the Design Professional. Do not prune or clip plants prior to delivery. Remove broken or badly bruised branches with a clean cut. Perform pruning with clean, sharp tools.
- B. Each plant shall be pruned to preserve its natural character in a manner appropriate to its particular requirements. In general, at least one-third of the wood shall be removed by thinning, or shortening branches, but no leaders

shall be cut. Street trees shall be pruned to a height of 7'-0" above sidewalk grade.

- C. Pruning cuts shall be painted over with an approved paint such as R.I.W. Tree Surgery Paint, manufactured by Toch Bros., N.Y.C.; Sherwin Williams Pruning Compound or approved equal.

### **3.18 MULCHING**

- A. Mulching shall be done within two (2) days of planting. All shrub beds and tree saucers shall be covered with a two-inch layer of mulch.
- B. Mulch and plant saucers shall be restored as necessary to preserve their appearance and to control weed growth.

### **3.19 WATERING**

- A. At the time of planting, the soil around each plant shall be thoroughly saturated with water and as many times later as seasonable conditions require, until acceptance of the work.
- B. Water all plants once each week during the growing season or at a longer interval as required and approved by the Design Professional.

### **3.20 WEED AND PEST SPRAYING**

- A. If an infestation of weeds or undesirable plants develop prior to acceptance of the lawn, the Contractor shall treat the infestation by hand weeding or chemical control. The chemical control shall be furnished and applied by the Contractor as recommended by the manufacturer and approved by the Design Professional. At least two weeks shall elapse after chemical control is applied before a request of inspection for acceptance is made to the Design Professional.

### **3.21 INSPECTION**

- A. Inspect all plant materials at least once a month to locate any disease or insect pest infestation, identify, or have identified, the nature of the infestation, and submit the proposed method of control to the Design Professional for approval prior to application of control measures.

### **3.22 CLEANUP**

- A. At all times during the progress of the work, the Contractor shall maintain the site in an orderly condition. Excess and waste materials shall be continuously and promptly removed; lawn areas, walks and roads shall be kept clear. Materials and equipment shall be stored where directed and shall be limited to the quantity required for the work. Rejected materials shall be immediately removed from the property.

- B. Upon completion and acceptance of the work, the Contractor shall promptly remove all equipment, surplus material, and all debris and trash resulting from operations under this Contract. The site shall be left in a neat, orderly condition and shall be "broom clean".

### **3.23 COOPERATION**

- A. Cooperation with all others whose work affects or is affected by the work of this Section. Advise them of conditions necessary for proper performance under this Section.
- B. Resolve in writing any condition which may or will interfere with the proper performance of work of this Section. Otherwise, proceeding with the work of this Section shall be construed as complete acceptance of conditions for work of this Section.

### **3.24 MAINTENANCE OF TREES AND SHRUBS**

- A. Maintain, at Contractor's expense, all planted and replanted areas to the satisfaction of the Design Professional until final acceptance of the work. Maintenance shall include watering, cultivating, spraying, pruning edging, tightening guys and other horticultural operations necessary for the proper growth of all plants or for keeping the whole area neat in appearance.

### **3.25 MAINTENANCE OF SEEDING AND SODDING**

- A. Maintain all seeded and sodded areas until final acceptance of the Contract and any regrading, refertilizing, reseeding or resodding as directed by the Design Professional, shall be done at the Contractor's own expense. After the grass is started, any parts or areas which fail to show a uniform stand, for any reason whatsoever, shall be reseeded with the same mixture as originally used herein, and such reseeding shall be repeated until all required areas are covered with grass. Reseeding may only be carried on during the seeding periods.
- B. Establish and maintain a neat edge where planted areas meet grass areas, as directed by the Design Professional. Edging shall be done in workmanlike manner with spade or edging tool. Particular care shall be exercised in edging, to establish good flowing curves, as shown on the plans or as directed by the Design Professional. Edging shall not be done before grass is fully established.
- C. Properly water, mow and otherwise maintain all seeded and sodded areas throughout the life of the Contract, and until all Contract work is accepted. The grass shall be maintained at a maximum height of 2-1/2 inches.

### **3.26 ACCEPTANCE OF THE WORK**

- A. Maintain all landscaping installed until acceptance is granted upon total completion of planting. Maintenance includes cutting of grass and all other plant operations.
- B. Acceptance shall be granted upon a healthy growth and satisfactory foliage condition of all plants and a complete stand of grass in all lawn areas with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.

**END OF SECTION**



**329120 – TOPSOIL**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.02 SUMMARY**

- A. Provide all materials, equipment and labor to furnish, place topsoil in landscape areas shown on the Drawings, to compacted depths specified by Related Work and as directed by the Engineer.
- B. Section includes:
  - 1. All work to amend topsoil per laboratory test result recommendations.
- C. Related Work:
  - 1. Section 329219 Seeding

**1.03 DEFINITIONS**

- A. Topsoil: Natural surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1" in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials. Top soil shall conform to Islip Item 121 Specifications.
  - 1. Manufactured soil shall not qualify as Topsoil.
- B. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- C. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

**1.04 SUBMITTALS**

- A. Product Data: for each Product specified.

- B. Product Certificates: For soil amendments and fertilizers, from manufacturer.
- C. Laboratory Test Results:
  - 1. Topsoil: Source Product Sampling: Furnish a written report by a qualified soil-testing laboratory stating results of analyses for percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of the soil.
    - a. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
    - b. Report suitability of tested soil for plant growth.
      - 1) Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
      - 2) Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.
  - 2. Compost Analysis: For each compost type, furnish lab analysis verifying that the compost meets the U.S. Composting Council ([www.compostingcouncil.org](http://www.compostingcouncil.org)) Seal of Testing Approval (STA) requirements.
- D. Samples for Verification: Submit 1 lb. sample of each of the following, in sealed plastic bags with composition of materials and source. Each sample shall be typical of material to be furnished, providing and accurate representation of color, texture and organic makeup.
  - 1. Topsoil
  - 2. Organic soil amendments

## 1.05 PRODUCT DELIVERY AND HANDLING

- A. Do not deliver topsoil to the Work site before laboratory test results have been accepted and amendments have been incorporated. Avoid stockpiling topsoil on site for more than two (2) weeks.
- B. Store Inorganic and Organic Amendment materials in cool, dry conditions, on pallets and within sealed containers until use. Secure bulk materials to keep cool and dry.

## **PART 2 - PRODUCTS**

### **2.01 TOPSOIL**

- A. Topsoil: Fertile, natural sandy loam, typical for locality, capable of sustaining vigorous plant growth. Soil shall be screened and free of subsoil, impurities, plants, weeds and roots; minimum pH value of 5.8 and maximum 7.0; organic matter between 3-5%, clay content between 15-25%, magnesium to exceed 100 units; phosphorous to exceed 150 units; potassium to exceed 120 units; soluble salts/conductivity not to exceed 600 ppm/0.6 mmhos/cm in soil.
- B. Manufactured Topsoil shall not be acceptable.

### **2.02 INORGANIC SOIL AMENDMENTS**

- A. Where required, and as per laboratory test results.
  - 1. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
  - 2. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
    - a. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.
    - b. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
  - 3. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.
    - a. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
    - b. Aluminum Sulfate: Commercial grade, unadulterated.

4. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.
5. Soil Conditioners: Where required, provide either of the following:
  - a. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.
  - b. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

### **2.03 ORGANIC SOIL AMENDMENTS**

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 6.0 to 8.0; moisture content 35 to 55 percent by weight; 100 percent passing through 3/4-inch sieve; soluble salt content not to exceed 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
  1. Organic Matter Content: 40 to 65 percent of dry weight.
  2. Feedstock: yard trimmings, leaves, and brush
  3. Product shall meet the standards of the U.S. Composting Council's Seal of Testing (STA) Program ([www.compostingcouncil.org](http://www.compostingcouncil.org))

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Verify that all subgrades are true to line and grade, are damp and not wet, muddy or frozen, are free of soft or spongy areas, and are clear of deleterious materials. Correct any subgrade conditions that do not comply with the intent of the Contract Documents, and make any corrections directed by the Engineer.
- B. To insure a proper bond with the topsoil, harrow or otherwise loosen the subgrade to a depth of 3 inches before placing and spreading topsoil.

### **3.02 TOPSOIL PLACEMENT**

- A. Place topsoil only during dry weather.
- B. Spread topsoil directly upon prepared subgrade in four (4) inch lifts and proof-roll with a 300 lb roller until placed soil is firm. Smooth out unsightly variations, bumps, ridges, and depressions that will hold water. Place topsoil in lifts until finish grade is achieved. Finish

grades shall conform to the contour lines and elevations indicated on the Drawings after natural soil settlement.

**3.03 CLEANUP AND PROTECTION**

- A. Keep finish grades free of stones, litter, or other objectionable material.
- B. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

**END OF SECTION**

**329219 - SEEDING**

**PART 1 – GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.02 SUMMARY**

- B. Section Includes:
  - 1. Seeding
  - 2. Turf area restoration
  - 3. Initial Turf Maintenance
- C. Related Sections:
  - 1. Section 329120-Topsoil
  - 2. Section 329113-Restoration of Landscape Work Disturbed by the Work of the Contract.

**1.03 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Certification of Grass Seed: By independent or government testing agency, for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
- C. Qualifications:
  - 1. Seed Vendor
  - 2. Installer
- D. Maintenance Schedule for establishment.

**1.04 QUALITY ASSURANCE**

- A. Qualifications
  - 1. Seed Vendor: USDA or state-certified turf seed producer.

2. Installer: A qualified landscape installer with not less than five (5) years' experience in work of this Section and professional membership in either the Professional Landcare Network or the American Nursery and Landscape Association.

#### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.
- B. Bulk Materials:
  1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
  2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

#### **1.06 PROJECT CONDITIONS**

- A. Seeding Restrictions: Seed during one of the following periods. Coordinate seeding periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.
  1. Spring Seeding: March 15 – April 30, as weather permits.
  2. Fall Seeding: September 15 – September 30, as weather permits.
- B. Weather Limitations: Proceed with seeding only when existing and forecasted weather conditions permit seeding to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

#### **1.07 MAINTENANCE SERVICE**

- A. Initial Turf Maintenance Service: Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Duration: one complete growing season from date of Substantial Completion.
  - a. When initial maintenance period has not elapsed before end of seeding season, or if turf is not fully established, continue maintenance during next seeding season.

## **PART 2 - PRODUCTS**

### **2.01 GRASS SEED**

- A. See Paragraph 2.08-Grass Seed Section 329113 for requirements.

### **2.02 MULCHES**

- A. Provide one of the following:
  1. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 2 to 5 Insert range or value decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to seedings; and as follows:
    - a. Organic Matter Content: 50 to 60 percent of dry weight.
    - b. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
  2. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
  3. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**



- A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
  - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within an area to be seeded.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within an area to be seeded, remove the soil and contamination as directed by Architect and replace with new topsoil.

### **3.02 COORDINATION**

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plants from damage caused by seeding operations.
- B. Schedule work so that seeding and mulching can immediately follow topsoil placement and finish grading. Prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

### **3.03 PREPARATION**

- A. Rake areas to be seeded to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
- B. Moisten prepared area before seeding: water thoroughly and allow surface to dry before seeding. Do not create muddy soil.

### **3.04 SEEDING**

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.
  2. Do not seed against existing trees. Limit extent of seed to outside edge of mulch saucer.
- B. Sow seed at a total rate of 3 to 4 lb/1000 sq. ft.
- C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- D. Mulch seeded areas immediately after sowing and raking.
- E. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

### **3.05 TURF AREA RESTORATION**

- A. Mow, dethatch, core aerate, and rake existing turf disturbed by construction work. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new topsoil. Rake areas to be restored.
- B. Apply seed and protect with straw mulch as required for new turf.
- C. Water newly planted areas and keep moist until new turf is established.

### **3.06 TURF MAINTENANCE**

- A. Maintain new and restored seeded areas for three month period after sowing, by watering, fertilizing, weeding, mowing, trimming, reseeding, and performing other operations as required to establish healthy, viable turf. Roll, re-grade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
  2. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

- B. Watering: Monitor moisture availability on a weekly basis and water when needed to keep turf uniformly moist to a depth of 4 inches.
  - 1. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
- C. Mow turf as soon as top growth exceeds four (4) inches. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
- D. Nutrient Availability: Monitor nutrient availability and apply fertilizers as needed. Perform in-situ soil tests on regular basis throughout maintenance period.

### **3.07 SATISFACTORY TURF**

- A. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

### **3.08 CLEANUP AND PROTECTION**

- A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after seedlings are established.
- C. Remove non-degradable erosion-control measures after grass establishment period.

**END OF SECTION**

**330130 – REPLACEMENT AND RESTORATION OF EXISTING UNDERGROUND SANITARY AND STORM DRAINAGE SYSTEMS DISTURBED BY THE WORK OF THIS CONTRACT**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**1.02 SUMMARY**

- A. This Section includes alterations and additions to existing underground sanitary and storm drainage systems piping and appurtenances. This Section include sump pumps for transformer vaults and other indicated locations.
- B. The alterations and additions to the existing storm drainage systems shall include, but not be limited to: Drainage structures, manholes, catch basins, curb inlets, manhole steps, ladder rungs, and piping.
- C. Include all labor, materials, tools, equipment, excavating, dewatering, backfilling and services required furnish, deliver and install all work under this Section as required by the Drawings and as specified.
- D. Related Sections: The following sections contain requirements that relate to this section:
  - 1. Division 3 Section 312316 - "Earthwork" for excavation and backfill required for sanitary and storm drainage system piping and structures.

**1.03 SUBMITTALS**

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for sanitary and storm drainage piping specialties.
- C. Shop drawings for precast concrete manholes, including frames and covers.
- D. Shop drawings for cast-in-place concrete or field-erected masonry manholes, including frames and covers.
- E. Coordination drawings showing pipe sizes and manholes, locations, and elevations. Include details of underground structures and connections. Show other piping in the same trench and clearances from sanitary and storm drainage system piping. Indicate interface and spatial relationship between piping and proximate structures. N.B. cold water systems shall be in separate

trenches, these trenches shall be the distance from storm and sanitary sewers as set forth in State codes but not less than 10'-0".

**1.04 QUALITY ASSURANCE**

- A. Comply with Local, State, and Federal codes, laws, rules, regulations and ordinances.

**1.05 PROJECT CONDITIONS**

- A. Site Information: Verify existing utility locations.

**1.06 SEQUENCING AND SCHEDULING**

- A. Coordinate with other underground services and underground structures work.

**1.07 STORAGE AND PROTECTION**

- A. The Contractor shall protect against damage to existing structures and pipes and any damage by his operations shall be repaired at the Contractor's own expense and to the satisfaction of the Design Professional.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include but are not limited to the following:
1. Cleanouts:
    - a. Josam Co.
    - b. Smith (Jay R.) Mfg. Co.
    - c. Wade Div.; Tyler Pipe.
  2. Underground Warning Tapes:
    - a. Allen Systems, Inc.; Reef Industries, Inc.
    - b. Brady (W.H.) Co.; Signmark Div.
    - c. Seton Name Plate Co.

## **2.02 PIPE AND FITTINGS**

- A. General: Provide pipe and pipe fitting materials compatible with each other. Where more than one type of materials or products is indicated, selection shall match adjacent piping.
- B. Hub and Spigot Cast Iron Piping and Fittings: ASTM A74 Grey cast iron for lead and oakum hub and spigot joints, extra heavy class.  
OR  
Hub and Spigot Cast-Iron Soil Pipe and Fittings: ASTM A 74, gray cast iron, for compression gasket joints.
1. Class: Extra Heavy.
  2. Gaskets: ASTM C 564, rubber, thickness to match class of pipe.
- C. Ductile-Iron Sewer Pipe: ASTM A 746, Class 50, for push-on joints.
1. Lining: AWWA C104, asphaltic material seal coat, minimum 1 mil thick.
  2. Gaskets: AWWA C111, rubber.
- D. Ductile-Iron Pipe Encasement: AWWA C105, polyethylene film tube.
- E. Extra-Strength Vitrified Clay Sewer Pipe and Fittings: ASTM C 700, unglazed, for socket and spigot joint.
1. Sealing Elements: ASTM C 425, rubber.
- F. Couplings: Rubber or elastomeric compression gasket, made to match pipe inside diameter or hub, and adjoining pipe outside diameter.
1. Gaskets: ASTM C 425, rubber for vitrified clay pipe; ASTM C 443, rubber for concrete pipe; ASTM C 564, rubber for cast-iron soil pipe. Gaskets for dissimilar or other pipe materials shall be compatible with pipe materials being joined.
- G. Sump pump discharge piping shall be schedule 80 PVC with solvent welded fittings.
- H. Reinforced Concrete Culvert, Storm Drain and Sewer Pipe: ASMA C76 and AASHTO M170.

## **2.03 MANHOLES**

- A. Manholes shall be of the types, construction and configuration required by State Codes.
- B. Precast Concrete Manholes: ASTM C 478, precast reinforced concrete, of depth indicated with provision for rubber gasket joints.

1. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having a separate base slab or base section with integral floor.
  2. Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
  3. Top Section: Eccentric cone type, unless concentric cone or flat-slab-top type is indicated. Top of cone to match grade rings.
  4. Grade Rings: Provide 2 or 3 reinforced concrete rings, of 6 to 9 inches total thickness and match 24-inch diameter frame and cover.
  5. Gaskets: ASTM C 443, rubber.
  6. Steps: Cast into base, riser, and top sections sidewall at 12-to 16-inch intervals.
  7. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
  8. Channel and Bench: Concrete.
- C. Cast-in-Place Manholes: Reinforced concrete of dimensions and with appurtenances indicated.
1. Bottom, Walls, and Top: Reinforced concrete, finished with cement mortar.
  2. Channel and Bench: Concrete.
  3. Steps: Cast into sidewall at 12- to 16-inch intervals.
- D. Manhole Steps: Wide enough for an adult to place both feet on one step and designed to prevent lateral slippage off the step.
1. Material: Ductile iron.
- E. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, heavy-duty, ductile iron, 24-inch inside diameter by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch-diameter cover, indented top design, with lettering "STORM SEWER" or "SANITARY SEWER" or "COMBINED SEWER" cast into cover.
- F. Concrete: Portland Cement Mix, 3000 psi.
1. Cement: ASTM C 150, Type II.
  2. Fine Aggregate: ASTM C 33, sand.
  3. Coarse Aggregate: ASTM C 33, crushed gravel.
  4. Water: Potable.

- G. Reinforcement: steel conforming to the following:
1. Fabric: ASTM A 185, welded wire fabric, plain.
  2. Reinforcement Bars: ASTM A 615, Grade 60, deformed.

**2.04 CLEANOUTS**

- A. General: Provide cast-iron ferrule and countersunk brass cleanout plug, with round cast-iron access frame and heavy-duty, secured, scoriated cast-iron cover.

**2.05 IDENTIFICATION**

- A. Metallic-Lined Plastic Underground Warning Tapes: Polyethylene plastic tape with metallic core, 6 inches wide by 4 mils thick, solid green in color with continuously printed caption in black letters "CAUTION - SEWER LINE BURIED BELOW."

**2.06 SUMP PUMPS**

- A. Sump pumps shall be as scheduled on the drawings as manufactured by little giant, weil, or federal.

**PART 3 - EXECUTION**

**3.01 INSTALLATION, GENERAL**

- A. All drainage structures (manholes, catch basins, drainage inlets, etc.) shall bear on firm granular soil, free of organic or compressible materials and debris. When non-granular material is encountered at the bottom of the manhole and footings, the Contractor shall extend his excavation below the bottom of footings until firm, undisturbed inorganic material is reached. Drainage inlets footings shall bear on a minimum two (2) foot thickness of compacted granular material. No extra compensation will be made for non-granular material encountered in the excavation or for the granular backfill to replace unsuitable materials.
- B. Excavations shall be kept free of water during construction and pumping shall be employed to this end if required.
- C. No concrete and masonry work shall be done when the temperature is below 35° without consent of the Design Professional.
- D. Mortar, sand and the cement in the required proportions shall be thoroughly mixed together, dry, in proper boxes provided for the purpose. The mixture shall then be gradually wetted and tamped to the proper consistency in such quantities as may be required for immediate use. No mortar that has been mixed more than one-half (1/2) hour or that has begun to take initial set, or



that has become hard, shall be remixed or used. No lime shall be used.

- E. All castings shall, in their final position, be set so as to conform to the cross section of the finished surface. After installation, all castings are to receive two (2) coats of asphalt paint.
- F. Pipe shall be installed as shown on the drawings. All pipe shall be laid true to line and grade and shall have a full, firm and even bearing. Pipe which is defective from any cause, including damage during handling will be unacceptable for installation and shall be replaced as directed by the Design Professional at the Contractor's own expense.
- G. Existing Site Relocated or Abandoned Sewer Lines
  - 1. All existing sewer lines originating from the existing site which are not designated as being reutilized shall be terminated in strict conformance with the requirements of all State and Local Codes.
  - 2. Before any sanitary or storm drainage work is done, uncover each sewer at each point where connection is to be made and determine the actual sewer elevation. If the actual elevation of the sewer at any point of connection is such that the drainage line cannot be installed at the elevation require, the matter shall be referred to the Design Professional's Representative.
- H. Where pipe connections are made to the existing inlets, dry wells, culverts, drainage basins, headways, etc., the Contractor shall make necessary excavations, cut openings in the wall, insert the pipes, brick up openings, watertight to the full wall thickness of the structure and backfill to the satisfaction of the Design Professional. Where pipe connections are made to the existing basins, all silt and refuse shall be cleaned from the basin to which the connection is being made.
- I. Wherever the required vertical adjustment of existing manholes is in excess of 1'-0", or as otherwise directed by the Design Professional, the Contractor shall remove the existing corbelled sections, adjust the height of the vertical wall sufficiently with material similar to that of the existing vertical wall, reconstruct the corbelled section and reset the castings. Wherever the required vertical adjustment of a manhole is less than 1'-0", the Contractor shall remove the existing casting, use brick and mortar to adjust the manhole to the required elevation and reset the casting. Before beginning any work, the Contractor shall place sufficient steel metal or plywood over the bench of the manhole so that no brick, block, mortar or debris will enter into the sewer system. He shall clean all debris and remove the device from the manhole upon completion of the work on the manhole. All loose brick, block, and mortar shall be removed and the surfaces thoroughly wetted before placing new brick and mortar thereon. The diameter of the chimney shall not be made less than the inside dimensions of the casting and the spacing of manhole

steps shall be maintained and the Contractor shall install manhole steps as may be required. All castings shall be set on a one (1) inch full bed of mortar. The outside of all new brick and block work and the inside of all new brick and block vertical walls shall be parged with a one (1) inch cement plaster coat. The outside of all new brick or block work, after the placement of the one (1) inch cement plaster coat shall be covered with one (1) heavy coat of a bituminous compound, bituplastic or approved equal.

**3.02 PREPARATION OF FOUNDATION FOR BURIED SANITARY SEWERAGE SYSTEMS**

- A. Grade trench bottom to provide a smooth, firm, stable, and rock-free foundation, throughout the length of the pipe.
- B. Remove unstable, soft, and unsuitable materials at the surface upon which pipes are to be laid, and backfill with clean sand or pea gravel to indicated level.
- C. Shape bottom of trench to fit bottom of pipe. Fill unevenness with tamped sand backfill. Dig bell holes at each pipe joint to relieve the bells of all loads and to ensure continuous bearing of the pipe barrel on the foundation.

**3.03 PIPE APPLICATIONS FOR UNDERGROUND SANITARY STORM, AND COMBINED SEWERS**

- A. Pipe Sizes 3 to 42 Inches: Extra-strength vitrified clay sewer pipe and fittings when connecting to existing vitrified clay sewer pipe piping..
- B. Pipe Sizes 4 to 54 Inches: Ductile-iron sewer pipe for all other services.  
OR  
Pipe Sizes 2 to 15 Inches: Extra-heavy-class hub and spigot cast-iron soil pipe and fittings for all other services.  
OR  
Pipe Sizes 8 to 48: Reinforced concrete culvert, storm or sewer pipe when connecting to existing reinforced concrete piping.

**3.04 INSTALLATION, GENERAL**

- A. General Locations and Arrangements: Drawings indicate the general location and arrangement of the underground sanitary and storm drainage system piping. Location and arrangement of piping layout take into account many design considerations. Install the piping as indicated, to the extent practical.
- B. Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings in accordance with manufacturer's recommendations for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.

- C. Use manholes for changes in direction.
- D. Use proper size increasers, reducers, and couplings, where different size or material of pipes and fittings are connected. Reduction of the size of piping in the direction of flow is prohibited.
- E. Install piping pitched down in direction of flow, at minimum slope of 1 percent, except where indicated otherwise.
- F. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed, by tunneling, jacking, or a combination of both.

### **3.05 PIPE JOINT CONSTRUCTION AND INSTALLATION**

- A. Join and install hub and spigot soil pipe and fittings with lead and oakum joints in accordance with CISPI hand book, volume I.
    - 1. Hub-and-spigot cast-iron pipe shall be extra heavy cast-iron soil pipe and fittings in accordance with Federal Specification WW-P-401D, uncoated.
    - 2. All joints shall be made in conformance with the State Codes. Lead joints shall be round, wiped joints; connections between lead and steel or cast iron pipe to be made with brass ferrules, or soldering nipples, caulked or screwed into the cast-iron and wipe the lead through ferrules.
- OR
- Join and install hub and spigot cast-iron soil pipe and fittings with compression gaskets in accordance with CISPI "Cast Iron Soil Pipe and Fittings Handbook, Volume I." Use "Extra Heavy" class gaskets to match class of pipe and fittings.
- B. Join and install ductile-iron pipe with ductile-iron or cast-iron push-on joint fittings and rubber gaskets in accordance with AWWA C600, except that anchorages are not required.
    - 1. Install polyethylene encasement in accordance with AWWA C105.
  - C. Join vitrified clay pipe and fittings with rubber sealing elements in accordance with ASTM C 425, and install piping in accordance with ASTM C 12.
  - D. Join different types of pipe with standard manufactured couplings and fittings intended for that purpose.
  - E. All piping shall be inspected, tested, and approved before being buried,

covered or concealed.

### **3.06 MANHOLES**

- A. General: Install manholes complete with accessories as indicated. Form continuous concrete or split pipe section channels and benches between inlets and outlet. Set tops of frames and covers flush with finish surface where manholes occur in pavements. Elsewhere, set tops 3 inches above finish surface, unless otherwise indicated.

### **3.07 CLEANOUTS**

- A. Install cleanouts and extension from sewer pipe to cleanout at grade as indicated. Set cleanout frame and cover in concrete block 18 by 18 by 12 inches deep, except where location is in concrete paving. Set top of cleanout 1 inch above surrounding earth grade or flush with grade when installed in paving.

### **3.08 CONNECTIONS**

- A. Make connections to existing underground structures so that finished work will conform as nearly as practicable to the requirements specified for new work.
- B. On outside of pipe or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
  - 1. Provide concrete that will attain minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.
  - 2. Use epoxy bonding compound as interface between new and existing concrete and piping materials.
- C. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris, concrete, or other extraneous material that may accumulate.

### **3.09 CONCRETE AND MASONRY WORK**

- A. Concrete walls and footings or bases shall be keyed together in a manner to insure watertight construction or shall be placed monolithically where practicable.
- B. Pipe, ladder rungs, steps, inserts and all metal shall be placed and secured in position before concrete is placed. Cast iron frames, other than those set in concrete, shall be bedded in cement mortar mixed in the proportion of one part of Portland cement to three parts of clean sharp sand.

- C. Drainage structure walls shall be constructed on a footing of cast-in-place concrete.
- D. Mortar for masonry work, including targetting of the exterior manhole walls, shall be mixed in the proportion of one part of Portland cement and two parts of an approved mortar sand. Mortar which has hardened to the extent that it cannot be made workable without the addition of water shall not be used. The thickness of targetting shall not be less than 1/2". No targetting will be permitted on the inside of manholes. The inside joints shall be smooth.

### **3.10 CLOSING ABANDONED COMPONENTS SYSTEM**

- A. Abandoned Piping: Close open ends of abandoned underground piping that is indicated to remain in place. Provide sufficiently strong closures to withstand hydrostatic or earth pressure that may result after ends of abandoned utilities have been closed.
  - 1. Close open ends of concrete or masonry utilities with not less than 8-inch-thick brick masonry bulkheads.  
OR  
Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Wood plugs are not acceptable.
- B. Abandoned Structures: Remove structure and close open ends of the remaining piping, or remove top of structure down to not less than 3 feet below final grade; fill structure with stone, rubble, gravel, or compacted dirt, to within 1 foot of top of structure remaining, and fill with concrete.

### **3.11 INSTALLATION OF IDENTIFICATION WARNING TAPE**

- A. Install continuous plastic underground warning tape during back-filling of trench for underground water service piping. Locate 6 to 8 inches below finished grade, directly over piping.

### **3.12 INSTALLATION OF SUMP PUMPS**

- A. Install sump pumps in sump pump pits in strict conformance with manufacturers instructions. Connect discharge line and pipe discharge line to 3" above a splash block. See Drawings.

### **3.13 FIELD QUALITY CONTROL**

- A. Testing: Perform testing of completed piping in accordance with State Code.
- B. Cleaning: Clear interior of piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.

1. In large, accessible piping, brushes and brooms may be used for cleaning.
  2. Place plugs in ends of uncompleted pipe at end of day or whenever work stops.
  3. Flush piping between manholes, if required by local authority, to remove collected debris.
- C. Interior Inspection: Inspect piping to determine whether line displacement or other damage has occurred.
1. Make inspections after pipe between manholes and manhole locations has been installed and approximately 2 feet of backfill is in place, and again at completion of project.
  2. If inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects correct such defects, and reinspect.
- D. Final Inspection by Local Authorities
1. All work shall be proved to be in first class condition and constructed in accordance with the drawings and specifications. All defects in the work provided by the Contractor shall be corrected by him at his own expense. A light held at one end of the piping shall show a practically full circle of light through the pipe when viewed from the adjoining manhole or end of the piping. If required by local authorities or the Design Professional, piping shall be tested for infiltration by means of a suitable weir or other device as directed by the Local Authorities or the Design Professional. When determination of infiltration is not practicable because of dry trench conditions, an exfiltration test shall be performed by filling the piping with water so that the head will be at least 4 feet above the crown of the upper end of the section being tested. The amount of leakage (infiltration or exfiltration) shall not exceed 1,000 gallons per inch of diameter per day per mile of pipe, or 500 gallons per inch of diameter per day per mile of pipe where resilient type joints are used.
  2. Surfaces disturbed during the installation of the work shall be repaired and replaced with matching surfaces in accordance with the requirements of the applicable specifications.

**END OF SECTION**