



## State of New Jersey

### DEPARTMENT OF ENVIRONMENTAL PROTECTION

Natural & Historic Resources  
Office of the Assistant Commissioner  
Office of Resource Development  
Mail Code 501-04A  
PO BOX 420  
Trenton, NJ 08625-0420  
Tel. 609-292-4853 Fax. 609-633-7593

CHRIS CHRISTIE  
*Governor*

KIM GUADAGNO  
*Lt. Governor*

BOB MARTIN  
*Acting Commissioner*

February 10, 2014

Karol Bernadic Construction Co., Inc  
122 Breeze Point Dr.  
Hewitt, NJ 07421

RE: Foundation & Utility Connections for  
Temporary Office Trailer  
Leonardo State Marina  
Leonardo, NJ  
NHR 49-14

Dear Sir or Madam:

We are soliciting bids for the Foundation & Utility Connections for the Temporary Office Trailer at Leonardo State Marina, Leonardo, NJ.

Attached are a Request for Proposal, a Vendor Questionnaire (Form W-9), a MacBride Principles Form, an Affirmative Action Employee Information Report, a Contractor Certification and Disclosure of Political Contributions Form, Source Disclosure Certification Form and Ownership Disclosure Certification Form along with plans for the proposed work. Please review the documents carefully. All of the forms are to be completed and returned with the proper information. Proof of both business and contractor's registration shall be supplied with the bid.

Bids will be opened on **March 6, 2014** in the Office of Resource Development, located at **275 Freehold-Englishtown Rd., Englishtown, NJ, 07726-8813, at 10:00 AM.**

**There will be a mandatory pre bid meeting, Monday, February 24, 2014 on site at 10:00 AM.**

Any questions please contact Robert Kunze at 609-273-4568 (cell).

Very truly yours,

Robert Kunze  
Construction Manager

Attachments  
C: E. Mulvan, file

State of New Jersey  
 Department of Environmental Protection  
 Natural and Historic Resources  
 Office of Resource Development  
 Mail Code 501-04A, PO Box 420  
 501 E. State St. 4<sup>th</sup> Floor  
 Trenton, NJ 08625-0420

NHR No.: 49-14

Date: February 10, 2014

**REQUEST FOR PROPOSAL**

The State of New Jersey, Department of Environmental Protection, Natural and Historic Resources is soliciting bids for the following:

Project: Foundation & Utility Connections for Temporary Trailer

Location: Leonardo State Marina, Leonardo, NJ

in accordance with attached;  PLANS     SPECIFICATIONS     OTHER

SECTION A

**INSTRUCTIONS TO BIDDERS**

Bids must be received by the Department of Environmental Protection, Natural and Historic Resources on or before 2 P.M. on **March 6, 2014**.  
 Any Bidder desiring to tender a responsible bid must acquaint himself with the site conditions and carefully examine the bidding documents.  
 Bids shall be forwarded, in the envelope provided. Unsigned bids will be considered as non-responsive. Omission of the contractor's registration will be considered as a non-responsive bid. A copy of the business registration should be submitted with the bid. Facsimile transmissions will not be accepted.  
 Provided below are information and declaration Sections C and D, to be completed by the Bidder. Execute the Bidder's portion of Section E.  
 Upon award, the successful Bidder will receive a fully endorsed copy of this document accompanied by an invoice voucher. The invoice is to be completed upon completion of the job and returned to the same address.

SECTION B

**CONDITIONS OF CONTRACT**

The signature of the Bidder or his authorized representative in Section E on this document shall constitute an agreement to abide by the declaration and conditions of the contract contained herein and with the plans and specifications provided.  
 This document, together with project plans and specifications, as well as the State of New Jersey Delegated Purchasing Authority Terms and Conditions becomes the contract when and if the Cost Declaration is accepted by the State of New Jersey, Department of Environmental Protection, Natural and Historic Resources. The signature of the Approving State Officer shall constitute such acceptance. The State of New Jersey, through the Approving State Officer, reserves the right to reject all bids.  
 The prices quoted on this document shall remain firm for sixty (60) days after the bid due date.  
 The contractor shall procure and maintain for the life of this contract Workman's Compensation, Contractor's Public Liability Insurance, Contractor's Property Damage Insurance and Vehicle Liability Insurance as required by applicable New Jersey statutes.  
 All material and workmanship shall be guaranteed by the contractor for one year from the date of acceptance by the Approving State Officer. The contractor shall supply all applicable manufacturer's guarantees and warranties prior to submitting final invoice.  
 The contractor agrees that he and/or his subcontractors will abide by the provisions of NJSA 10:2-1 through 10:2-4 dealing with the discrimination in employment on public contracts and all associated rules and regulations.  
 The contractor agrees to abide by the N. J. Prevailing Wage Act, PL1963, C150, and the rates in effect for the geographical location of this project, the Public Works Contractor Registration Act, PL1999, C238, registration with the Department of Treasury, Division of Revenue, PL2001, C134, Restrictions on Political Contributions, PL2005, C51 and Source Disclosure Certification PL2005, C92.

SECTION C

**BUSINESS INFORMATION**

Name: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Federal Identification No.: \_\_\_\_\_ Telephone No. \_\_\_\_\_  
 Business Enterprise: (Check all that apply)  Minority     Women     Small Business (100 or less full-time employees)

SECTION D

**COST DECLARATION**

Provide all labor, materials, equipment and construction supervision to install the foundation system & utility connections for the temporary office trailer as per plans & specifications.

Lump Sum Bid: \$ \_\_\_\_\_

**NOTE MANDATORY PRE BID MEETING, 2/24/14 ON SITE AT 10:00 AM.**

SECTION E

**ENDORSEMENTS**

I, \_\_\_\_\_  
Print Name and Title  
 submit the Cost Declaration and agree to the terms as stated herein.

The State of New Jersey, Department of Environmental Protection accepts the Cost Declaration in Section D.

Signature \_\_\_\_\_

Date \_\_\_\_\_

Approving State Officer \_\_\_\_\_

Date \_\_\_\_\_

## **LIST OF PROSPECTIVE BIDDERS**

Karol Bernadic Construction Co., Inc  
122 Breeze Point Dr.  
Hewitt, NJ 07421

J E Hannon Inc. T/A Bird Const.  
105 Harbor Inn Rd.  
Bayville, NJ 08721

Hawley Brothers, Inc.  
192 Harrison Rd.  
Chesterfield, NJ 08515

Statewide Fire Restoration, Inc.  
2151 Brookfield St.  
Vineland, NJ 08361

# **SPECIFICATION**

**TEMPORARY MARINA OFFICE**

**LEONARDO STATE MARINA**

**LEONARDO, MIDDLETOWN TOWNSHIP, MONMOUTH COUNTY, N.J.**

**PROJECT No. P1092-17**

## **STATE OF NEW JERSEY**

**DEPARTMENT OF ENVIRONMENTAL PROTECTION**

**NATURAL AND HISTORIC RESOURCES**

**DEPARTMENT OF ENVIRONMENTAL PROTECTION**

**Bob Martin, Commissioner**

**NATURAL & HISTORIC RESOURCES**

**Richard Boornazian**

**Assistant Commissioner**

**RONALD A. SEBRING ASSOCIATES, LLC, ARCHITECTURE-PLANNING-DESIGN**

**405 RICHMOND AVENUE, POINT PLEASANT BEACH, NJ 08742**

**(732) 701-9444 FAX 701-9919 E-Mail architects@rasallc.com**

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**RONALD A. SEBRING, RA**

**NEW JERSEY REGISTERED ARCHITECT C-6933**

Date: July 15, 2013

Final: October 03, 2013

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## INSTRUCTIONS TO BIDDERS

### 1. BID

- A. Sealed bids for the work described herein will be received by the Office of Resource Development located in Station Plaza 5, 501 East State Street, Fourth Floor, Trenton, New Jersey 08625.
- B. Bids are to be submitted on "Request for Proposal" form, herewith provided. Bids not submitted on this form and in accordance with the instructions contained therein shall be considered non-responsive and shall be rejected. Bids submitted without a signature endorsement shall also be considered non-responsive. Facsimile submittals will not be accepted. Completed "W-9 Vendor Questionnaire", Ownership Disclosure, MacBride Principles, Affirmative Action, "PL2005, Chapter 51 and PL2005, Chapter 29" forms, herewith provided must also be submitted with the bid. Copy of the contractor's registration certificate shall be provided with the bid. It is recommended that a copy of the business registration certificate is provided with the submitted bid.
- C. Bidders shall submit a lump sum base bid for the entire work described herein. The amount shall be entered on the "Request for Proposal" form, where the appropriate description has been provided. Bids shall reflect the equipment and/or material(s) specified. Substitution shall only be considered after completion of the bidding process. Substitution requirements are explained on Page GC-3.
- D. Bids must be received and time-stamped by the Office of Resource Development before the closing date and time, as stated on the "Request for Proposal" form. Bidders are cautioned that reliance on mail carriers for timely delivery of bids is at the bidder's risk. Bids received and time-stamped after the prescribed time will be considered non-responsive.
- E. To facilitate award of contract, Bidders are requested to submit, along with the bid proposal an insurance certificate(s) as specified on the "Request for Proposal" form.
- F. In the event of similar bids, the earliest time-stamped entry will be considered the low bid.

### 2. AWARD

- A. Award of contract will be based upon the lowest responsible bid.
- B. The Office of Resource Development reserves the right to reject all bids.
- C. Results of the bidding will be made available upon request.
- D. Award of contract shall not be interpreted to mean approval to proceed with construction activities.

3. **SITE VISIT**

- A. The project site is situated within the Leonardo State Marina. See map provided within these specifications for project location. Examination of the area and proposed items of work can be conducted at the Contractor's convenience. All bidders shall thoroughly examine the site to be fully acquainted with conditions to be met under this contract.



**GENERAL CONDITIONS**

1. **DEFINITIONS**

- A. The Contracting Agency for this project will be the Office of Resource Development. All matters dealing with this contract and payment should be directed to Mr. Edward D. Mulvan, telephone number (609) 984-3819.
- B. The Using Agency/Owner for this project will be the DEP Division of Parks and Forestry, Natural and Historic Resources.
- C. The Using Agency Representative will be Robert Kunze at telephone number (609) 984-3875. For purposes of this contract, he will act as the Owner's project coordinator and inspector. He shall judge the quantity, quality, fitness and acceptability of all parts of the work. All work shall be coordinated with the Using Agency.
- D. The Area Contact is Robert Kunze. He may be contacted at telephone number (609)984-3875.
- E. The Architect/Engineer for this project will be Ronald A. Sebring, RA, NCARB, Ronald A. Sebring Associates, LLC, Mr. Ronald A. Sebring, telephone number (732) 701-9444. All technical questions can be directed to him.

2. **SUBMITTALS**

The following documents and/or materials are required and must be submitted by the Bid/Contractor during the noted project periods:

**A. Bid Response Period:**

*"Request for Proposal" form, identified within these specifications under Instructions to Bidders, Item 1, Page IB-1.*

*"W-9 Vendor Questionnaire" form, identified within these specifications under Instructions to Bidders, Item 1, Page IB-1.*

*Contractors Registration Certificate, identified within these specifications under Instructions to Bidders, Item 1, Page IB-1.*

*Restrictions on Political Contributions form, PL2005, C51, identified within these specifications under Instructions to Bidders, Item 1, Page IB-1.*

*Source Disclosure Certification form, PL2005, C92, identified within these specifications under Instructions to Bidders, Item 1, Page IB-1.*

*"MacBride Principles" form, identified within these specifications under Instructions to Bidders, Item 1, Page IB-1.*

*"Affirmative Action" form, identified within these specifications under Instructions to Bidders, Item 1, Page IB-1.*

*Ownership Disclosure Form, identified within these specifications under Instructions to Bidders, Item 1, Page IB-1.*

B. Pre-Construction Period:

Insurance Certificate(s), identified within these specifications under Instructions to Bidders, Item 1, Page IB-1 and specified under General Conditions, Item 3, Page GC-2.

Copies of Business Registration Certificates for contractor as well as all named subcontractors and/or suppliers.

C. Construction Period:

If stipulated, provide selection samples, record samples, shop drawings, diagrams, schedules, lists, illustrations, performance charts, catalog cuts, and brochures.

D. Close-Out Period:

Letter of Guarantee, guaranteeing quality and workmanship for a period of one year from date of final acceptance of the project.

Manufacturer's guarantees and warranties.

Payment Voucher, form ADM 310.

Copies of Business Registration Certificates for subcontractors and/or suppliers.

3. INSURANCE REQUIREMENTS

A. The Contractor shall submit insurance certificates in the following minimum coverage's:

- (1) **Workmen's Compensation** - \$250,000
- (2) **Comprehensive Liability**
  - a. Bodily Injury - \$1,000,000 each occurrence
  - b. Property Damage - \$1,000,000 each occurrence
- (3) **Vehicle Liability**
  - a. Bodily Injury - \$500,000 each occurrence
  - b. Property Damage - \$250,000 each occurrence

B. The Insurance Policy shall name the State of New Jersey, Department of Environmental Protection as the co-insured and shall be identified by specification title.

4. USE OF PREMISES

A. The Contractor shall coordinate requirements for available utilities/facilities with the Area Contact and/or the Using Agency Representative.

B. The Contractor shall confine his apparatus, the storage of materials and equipment, and the operation of his workmen to limits or directions of the Area Contact, and shall not unreasonably encumber the premises with his materials.

5. **PROTECTION AND LIABILITY**

- A. Protection and security of persons and property during the construction period from loss by theft, vandalism, pilfering, fire, water, wind, etc., shall be provided by the Contractor as the conditions at the site warrant. The Contractor shall be responsible for securing his own plant, equipment, and all materials scheduled for the project.
- B. If any direct or indirect damage is done to private or public property by or on account of any act, omission, neglect, or misconduct in the execution of work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition equal to or better than that existing before the damage was done, or he shall make good the damage in another manner, acceptable to the Using Agency and Owner of property.

6. **MATERIALS QUALITY**

- A. The Contractor shall furnish materials and equipment which will be efficient, appropriate, and have the capacity to secure a satisfactory quality of work and a rate of progress which will ensure the completion of the work within the time stipulated. Only new materials and equipment shall be incorporated into the work.

7. **SUBSTITUTIONS**

- A. In the event the Contractor should propose a substitution of the specified equipment or materials, it shall be his responsibility to submit proof of equality and data of sufficient detail to enable the Using Agency to identify the particular product, the method of installation, and whatever else is required so a determination can be made as to it's conformity to the product specified. The Contractor shall provide and pay for any tests which may be directed by the Using Agency in order to evaluate such proposed substitution(s). Any material or product which is not in full conformance with specifications may be rejected.
- B. The Contractor shall be allowed seven (7) working days from the date of contract award to provide the necessary shop drawing(s), data, and samples supporting any proposed substitution(s). Should the Contractor fail to provide the information within this period, the Using Agency shall exercise the option of either: allocating additional time for the information, or denying any further consideration of the substitution(s) whereby the Contractor must provide the equipment or material(s) specified. Since Substitutions are primarily for the financial benefit of the Contractor, a credit change order shall accompany each request for substitution.

8. **OTHER CONDITIONS**

- A. By submitting a bid, the Bidder warrants that he has familiarized himself with all provisions of the bidding documents and understands their intent and meaning.
- B. The failure or omission of the Bidder to examine forms, instruments, or plan and specification documents, or to visit the site and acquaint himself with conditions there existing, and compute required amounts of labor and materials covering the complete job shall not relieve him from any obligation with respect to his bid.

- C. Any oral interpretation, not documented in writing prior to bid opening or referenced in the bid proposal, shall be considered as privileged information, and, as such, not binding upon the Owner.
- D. Conditions existing at the time of the inspection will be maintained by the Owner as far as practical. The Owner assumes no responsibility for actual conditions where work is to occur. Starting of operations will be construed as evidence that the Contractor has complied with the above requirements, and later claims for difficulties encountered which could have been foreseen will not be recognized.
- E. In order to protect the lives and health of his employees, the Contractor shall comply with all applicable statutes and pertinent provisions of the "Manual of Accident Prevention in Construction", issued by the Associated General Contractors of America, Inc. He shall maintain an accurate record of all cases of death, occupational disease, and injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under the contract. The Contractor alone shall be responsible for the safety, efficiency, and adequacy of his plant, appliances, and methods, and for any damage or injury which may result from his failure or his improper construction, maintenance, or operation.
- F. The Contractor shall defend, protect, indemnify, and save harmless the State of New Jersey from all claims, suits, actions, damages, and costs of every name and description arising out of or resulting from the performance of his work under this contract. This responsibility is not limited by the provisions of other indemnification provisions included elsewhere herein.

9. **TIME OF COMPLETION**

- A. Work to be completed, inspected and approved within (60) days from notice to proceed.
- B. No activities will be permitted on weekends or holidays unless otherwise approved by the Using Agency Representative

10. **LIQUIDATED DAMAGES**

- A. The Contractor agrees that, from the compensation otherwise to be paid, the Owner will assess liquidated damages in the amount of \$150 for each calendar day thereafter that the work included under this contract remains uncompleted as specified under the Time of Completion which sum is agreed upon as the proper proportionate measure of liquidated damages which the Owner will sustain per diem, by failure of the Contractor to progress or complete his work under this contract at the time stipulated, and the sum is not be construed as in any sense a penalty.
- B. The above liquidated damages shall be interpreted as partial reimbursement to the Owner resulting from the legal fees and the cost of additional engineering services, and other expenses of the Owner because of non-compliance by original dates, but shall not be considered as including costs of legal fees and the cost of additional services in connection with claims, arbitration, litigation, default or insolvency of the Contractor.

11. **TERMINATION FOR CONVENIENCE**

- A. The Owner may, at any time, terminate the Contract in whole or in any part for the Department's convenience and without cause when the Owner in his discretion views termination in the public interest.
- B. Upon receipt of the Termination for Convenience, the Contractor shall complete only items specified in the order and in accordance with the contract documents.
- C. The Contractor will only be paid for items of work partially or completely finished at either the contract price or mutually agreed price.

12. **NEW JERSEY BUSINESS REGISTRATION REQUIREMENTS**

- A. The Contractor shall provide written notice to its subcontractors and suppliers of the responsibility to submit proof of business registration to the contractor. The requirement of proof of business registration extends down through all levels (tiers) of the project.
- B. ***Before final payment on the contract is made by the contracting agency, the contractor shall submit an accurate list and the proof of business registration of each subcontractor or supplier used in the fulfillment of the contract, or shall attest in writing that no subcontractors were used.***
- C. For the term of the contract, the contractor and each of its affiliates and a subcontractor and each of its affiliates [N.J.S.A. 52:32-44(g)(3)] shall collect and remit to the Director, New Jersey Division of Taxation, the use tax due pursuant to the Sales and Use Tax Act on all sales of tangible personal property is intended for a contract with a contracting agency.
- D. A business organization that fails to provide a copy of a business registration as required pursuant to section 1 of P.L.2001, c. 134 (C.52:32-44 et al.) or provides false business registration information under the requirements of either of those sections, shall be liable for a penalty of \$25 for each day of the violation, not to exceed \$50,000 for each business registration copy not properly provided under a contract with a contracting agency.

**DIVISION 1 - GENERAL REQUIREMENTS**

**SECTION 01 11 00  
SUMMARY**

**PART 1-GENERAL**

**1.1 SCOPE OF WORK**

- A. The Scope of this Project is for the construction of site improvements, foundations, and utility connections for new modular office trailers. The work generally includes:
1. Excavation, backfilling, and grading
  2. Paving
  3. Concrete pier foundations
  4. Installation of electrical services to the modular buildings
  5. Installation of telephone and data conduit to the new modular buildings
  6. Installation of new water service into the modular buildings
  7. Installation of sanitary building sewer to new modular buildings

**1.2 WORK NOT INCLUDED**

- A. The manufacturer of the modular office or their installing contractor will crane set, anchor, level, and install all lateral anchors in accordance with the design drawings prepared by the manufactures engineer.
- B. The manufacturer of the modular office or their installing contractor shall attach the modular unit to the piers in accordance with details shown on the drawings.
- C. Supply and installation skirting and flood vents shall be by the modular manufacturer.
- D. Pre-engineered stairs and ramps shall be supplied and installed by the modular manufacturer.

**PART 2 – MATERIALS (NOT USED)**

**PART 3 – EXECUTION**

**3.1 SETTING OF MODULAR UNITS**

- A. The Contractor shall provide a crane of sufficient size, and an operator, to lift and set the modular units on the pier foundations. The setting operation will be supervised by the modular manufacturer. Shimming and anchoring will be accomplished by the manufacturer of the modular buildings.

**END OF SECTION**

**DIVISION 1 - GENERAL REQUIREMENTS**

**SECTION 01 30 00  
ADMINISTRATIVE REQUIREMENTS**

**PART 1 – GENERAL**

**1.1 PROJECT MEETINGS**

- A. Construction Progress Meetings shall be held at the Project site on a bi-weekly basis. Attendees shall include the Contractor and applicable subcontractor(s), DEPC/NHR Project Manager, Client Agency Representative, and the Architect.
- B. The Contractor shall provide a written project review documenting the construction activity during the past two week period.
- C. The Contractor shall provide a written *two-week look-ahead* schedule at each bi-weekly Job Meeting. The *two-week look-ahead* shall indicate the work to be performed on each workday, in detail, for the forthcoming two weeks.
- D. Should the project be delayed for any reason provide a complete recovery schedule.
- E. The Contractor shall present up to date as-built drawings for review by the Architect at each Job Meeting.

**1.2 CONFLICTS OR DISCREPANCIES AMONG CONTRACT DOCUMENTS**

- A. In the event of conflicts or discrepancies among Contract Documents, interpretations will be based on the following priorities:
  - 1. The Agreement;
  - 2. Addenda, with those of later date having precedence over those of earlier date;
  - 3. Supplementary Conditions;
  - 4. The General Conditions of the Contract for Construction; and
  - 5. Drawings and Specifications
- B. In the case of any inconsistency between Drawings and Specifications, or within either document not clarified by addendum, the better quality or greater quantity of work shall be provided in accordance with the Architect's interpretation.

**1.3 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS**

- A. The annotated drawings are intended to convey the scope of work and indicate the general requirements of work and shall not limit the repairs required.
- B. Examine the areas and conditions where work is to be performed and notify the Architect of conditions detrimental to proper and timely completion of the work. Do not proceed with work until detrimental conditions have been corrected.
- C. Dimensions on drawings are for design only. Do not scale drawings for dimensions.
- D. The Contractor is entirely responsible for field checking and verifying all measurements before commencement of work and is entirely responsible for the correctness of his measurements.
  - 1. Before ordering any material to doing any work, take or verify all measurements at the building as may be required for the proper fitting of work to the building or to other adjoining work.
  - 2. Satisfactorily correct, without charge, any work which does not fit.

**PART 2 – MATERIALS (NOT USED)**

**PART 3 – EXECUTION (NOT USED)**

**END OF SECTION**

**DIVISION 1 - GENERAL REQUIREMENTS**

**SECTION 01 32 16  
CONSTRUCTION PHASING AND PROGRESS SCHEDULE**

**PART 1 – GENERAL**

**1.1 CONTRACT COMPLETION**

- A. The work under this Contract shall be completed within sixty (60) calendar days from the issuance of the Notice to Proceed.

**1.2 PROJECT SCHEDULE**

- A. The Contractor shall submit a Project Construction Schedule (no CPM) meeting the requirements of the General Conditions within ten (10) calendar days of the Notice to Proceed for review and approval.
- B. Provide, at each bi-weekly Project meeting, a written Project Schedule analysis.
- C. Provide, at each bi-weekly Project meeting, a written outline of the work completed within the past two weeks and a forecast of work projected within the next two week period.
- D. If the Project should fall behind schedule, provide a complete revised recovery schedule.

**PART 2 – MATERIALS (NOT USED)**

**PART 3 – EXECUTION (NOT USED)**

**END OF SECTION**



**DIVISION 1 - GENERAL REQUIREMENTS**

**SECTION 01 41 00  
QUALITY REQUIREMENTS**

**PART 1 – GENERAL**

1.1 SUPERVISION

- A. Provide day-to-day site supervision through a Site or Project Superintendent who uses English as their primary language.
- B. Assure that site supervision, craftspersons, and subcontractors are knowledgeable and experienced in their portion of the work and know and understand the specified requirements and methods needed for performance of the work.

1.2 WARRANTIES

- A. The Contractor warrants to the State and Architect that materials and equipment furnished under this Contract will be good quality, new, and that the work will be free of defects for a period of one (1) year from the date of final acceptance, and will conform to the requirements of the Contract Documents.
- B. All warranties shall be effective from the date of Final Acceptance by the State. Warranties must be signed by an authorized representative of the issuing company.

**END OF SECTION**

## **DIVISION 1 - GENERAL REQUIREMENTS**

### **SECTION 01 41 13 REGULATORY COMPLIANCE**

#### **PART 1 – GENERAL**

##### **1.1 SITE SAFETY**

- A. The Contractor is solely responsible for all site safety and compliance with OSHA regulations.
- B. The Contractor shall inspect and assure compliance with all statutory requirements for worker protection and safety. The Contractor shall provide, inspect, and assure that all workers utilize appropriate worker protective and safety gear.
- C. Instruct workers and inspectors in the proper use of all protective and safety equipment.

##### **1.2 CODES, PERMITS, AND INSPECTIONS**

- A. Codes: The work described by these Contract Documents shall be accomplished in strict accordance with the New Jersey Uniform Construction Code and in full compliance with the following Codes as applicable:
  - INTERNATIONAL BUILDING CODE, NEW JERSEY EDITION 2009
  - NATIONAL STANDARD PLUMBING CODE, 2009
  - NATIONAL ELECTRICAL CODE, 2011
- B. Permits: U.C.C. Construction Permits for this project has been issued for this construction. There will be no costs to the Contractors for these permits.
- C. Construction Code Inspections: All construction inspections will be provided by DCA and shall be coordinated through the Construction Project Manager.

**END OF SECTION**

**DIVISION 1 - GENERAL REQUIREMENTS**

**SECTION 01 45 23  
TESTING AND INSPECTION SERVICES**

**PART 1 – GENERAL**

**1.1 TESTING AGENCY**

- A. The Contractor shall engage and pay for a testing agency(s), acceptable to the Architect and prequalified by DPMC to conduct all testing and inspection services listed below.

**1.2 SPECIAL TESTING AND INSPECTIONS**

- A. Compaction Testing
- B. Soil Bearing Capacity Verification
- C. Concrete Quality Control Inspection and Testing

**PART 2 – MATERIALS (NOT USED)**

**PART 3 – EXECUTION (NOT USED)**

**END OF SECTION**

**DIVISION 1 - GENERAL REQUIREMENTS**

**SECTION 01 50 00  
TEMPORARY UTILITIES AND CONTROLS**

**PART 1-GENERAL**

1.1 TEMPORARY UTILITIES

- A. Utilities are not available on site. Contractor shall provide at his expense temporary services required for construction.

1.2 SITE MAINTENANCE

- A. Maintain site in a clean and orderly condition. Contractor is responsible for all debris removal and disposal on a daily basis.
- B. Store construction materials and equipment only within the limits of the work site.

1.3 SITE RESTORATION

- A. At the completion of construction, restore all walkways, driveways, lawns, or plantings damaged by construction activity. The area of the site utilized by the Contractor for staging and storage must be restored to its pre-construction condition.

**END OF SECTION**

## DIVISION 1 - GENERAL REQUIREMENTS

### SECTION 01 61 00 PRODUCT REQUIREMENTS

#### PART 1 – GENERAL

##### 1.1 DRAWINGS AND SUBMITTAL PROCEDURES

- A. The Contractor shall supply evidence by the way of Specifications on the drawings, or by separate submittals, that materials and equipment to be supplied meets the requirements of the Specifications.
- B. DPMC 12/13: This form is to be used for submission and approval of all subcontractors, materials to be utilized in the construction, manufacturers/suppliers, and for professional services. Complete the Contractor Section as follows:
  1. **Tracking Number:** Insert tracking number defined in submittal log or utilize next chronological number.
  2. **Submission Type:** The Contractor is to place a check mark in the appropriate block(s) that applies to the submission.
  3. **Trade:** The Contractor is to place a check mark in the appropriate block that identifies the trade related to the submission.
  4. **Contractor Name:** The Prime Contractor submitting the form inserts his company name in the space indicated.
  5. **Description of Submittal:** The Prime Contractor is to give a brief description of the submittal.
  6. **General Condition, Specification or Drawing section:** The Contractor is to identify the Article, Spec Section or Drawing that represents the submission type, i.e., Article 4.11.2 Sleeve & Opening Drawing, Spec Section 115575 Condensate Pump, Drawing FP2.2 Ames Backflow Preventor.
  7. **Vendor/Manufacturer/Supplier/Subcontractor:** The Prime Contractor is to insert the name, address, and telephone number of the vendor/manufacturer/supplier or subcontractor for which he is requesting approval. (When required, insert the license number and registration number in the space provided, attach a copy of said license and certification.)
- C. The Contractor is to submit one (1) original copy of the DPMC 12/13 form (with six attachments of shop drawings, product data or testing results when appropriate) to the Architect. A copy of the cover letter or transmittal shall be sent to the Office of Construction Services Project Manager. At the option of the Contractor, submittals can be made electronically. Submit a .pdf copy of the DPMC 12/13 form and a separate .pdf of the submittal to the Architect and DPMC Construction Manager.
- D. Shop Drawings: Shop drawings and samples shall be dated and marked to show the name of the Project, Architect, Contractor, originating subcontractor, manufacturer or supplier and detailer, if pertinent. Shop drawings shall completely identify Specification section and locations at which materials or equipment is to be installed. Reproduction of the contract drawings is acceptable as shop drawings only when specifically authorized in writing by the Architect. Submission of shop drawings, manufacturer's specifications, installation instructions, material diagrams and samples shall be accompanied by the Contractor's transmittal form and DPMC form 12/13 as outlined in paragraph B of this section. Submit six (6) prints of each shop drawing including fabrication, erection, layout and setting drawings and such other drawings as required under various sections of the Specifications, until final approval is obtained. Submit six (6) copies of the manufacturer's descriptive data including catalogue sheets for materials, equipment and fixtures, showing dimensions, performance characteristics and capabilities, wiring diagrams and controls, schedules and other pertinent information as required. Where printed material describes more than one product or model, clearly identify which is to be furnished. The Contractor is responsible for obtaining and distributing required prints of shop drawings to other prime contractors, subcontractors, and material suppliers after, as well as before, final approval. Prints of reviewed shop drawings shall be made from transparency which carries the Architect's appropriate stamp.

## DIVISION 1 - GENERAL REQUIREMENTS

- E. Product Data:
1. Submit only pages which are pertinent; mark each copy of standard printed data to specifically identify only pertinent products; identify each submittal by designated submittal reference number. Show standards, performance characteristics, and capacities; wiring and piping diagrams; controls; component parts; finishes; dimensions; and require clearances.
  2. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to work of this project. Delete information not applicable.
- F. All submittals shall be made within fourteen (14) calendar days of the Notice to Proceed.
- G. Enforcement of Submittal Requirement:
1. The Contractor will be required to provide shop drawings, testing, laboratory test reports, product samples and test installations in order to establish acceptable standards of workmanship.
  2. **The requirement for submittal and review of all specified shop drawings, test, product samples and test installations will be rigorously enforced.** General work of each section shall not commence prior to required review. All work conducted prior to the review of required submittals, including test installation, is subject to rejection by the Architect. All rejected work shall be removed and replaced by the Contractor at no additional expense to the Owner.
- H. Contractor's Examination of Submittals: Prior to forwarding submittals to the Architect, the Contractor shall:
1. Review submittals to verify quantities, field measurements, field construction criteria, assembly and installation requirements, manufacturer's catalog numbers, and conformance of submittals with requirements of Contract Documents.
  2. Review each submittal to determine that it is acceptable in terms of the means, methods, techniques, sequences and operations of construction, and in terms of safety precautions, all of which are the contractor's sole responsibility.
  3. Clearly call to the Architect's attention any submittal that varies from what the Contract Documents have called for. Notify the Architect in writing at time of submittal of any deviations from requirements of Contract Documents.
  4. Clearly identify the products or product data which are pertinent to this project. Clearly mark through or delete all information which is not applicable.
  5. Stamp and sign each submittal to certify that the Contractor has checked for completeness and compliance with requirements of the contract documents and that the submittal has his/her approval.
    - a. The stamp shall state: "I certify that I have reviewed the above submittal and have verified that products, field dimensions, quantities, and field construction criteria comply with and have been coordinated with the requirements of Work and Contract Documents".
    - b. Samples or submittals which in the opinion of the Architect have clearly not been checked for compliance by the Contractor will not be reviewed and it will be the responsibility of the Contractor to arrange for return of such submittals.
  6. Do not fabricate products or begin work which requires submittal review until return of submittal with Architect's acceptance. Work begun or completed prior to the Architect's review of required submittals is subject to rejection. Remove and replace rejected work at no additional cost to the Owner.
- I. Architect's Review:
1. Allow 14 days for Architect's review of each submittal. Daily allowance is time in possession of Architect and exclusive of delivery from and to Contractor and exclusive of resubmissions.
  2. The Architect's review is limited to aesthetics, general conformance with the project design intent, and general compliance with information contained in Contract Documents. The Architect's review is neither a verification of Contractor's examination nor a substitution of

## DIVISION 1 - GENERAL REQUIREMENTS

- Contractor's responsibilities. Architect may inform Contractor of any conspicuous errors on a submittal without prejudice to being held harmless to Contractor's examinations and responsibilities.
3. Upon review, any action shown by the Architect is subject to the requirements of the plans and specifications. The Architect's review does not authorize changes in contract requirements unless a separate written directive or change order is issued. The Contractor is responsible for conforming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, coordinating his or her work with that of all other trades, and performing all work in a safe and satisfactory manner.
  4. **The Architect will not review:**
    - a. Any submittal which is not called for by the contract documents or not requested in writing by the Architect.
    - b. Any submittal which does not bear the Contractor's stamp and signature certifying that he has checked the submittal for completeness and compliance with the contract documents and that the submittal has his/her approval.
    - c. Any submittal which does not bear the project name and contract number and the contractors, subcontractors, and suppliers names, addresses, and phone numbers.
    - d. Any submittal which does not clearly identify pertinent product (if more than one are shown). Clearly mark through all information which is not applicable.
  5. The Architect will not accept and will not review "faxed" submittals or submittals copied from a telefaxed transmission unless previously authorized by the Architect in the interest of the project.
- J. The Contractor shall be required to make submittals, revise and resubmit as required and establish compliance with the specified requirements requested in all sections of these Technical Specifications that are a part of this Contract Document. These submittals include but are not limited to shop drawings, manufacturer's literature, samples, colors, mock-ups, inspection reports, certifications, and delivery receipts.
- K. It is also the Contractor's responsibility, when so required by the Contract Documents or by written request from the State, to deliver all required proof that the materials or workmanship, or both, meet or exceed the requirements of the specifically named code or industry standard.
- L. The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of the submittal and the Architect has given approval of the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in the Shop Drawings or similar submittals by the Architect's approval thereof.

### 1.2 SUBSTITUTIONS

- A. Contractor's proposed substitutions shall be made within seven (7) calendar days from the Notice to Proceed. After that time has expired no substitutions will be considered by the State. Substitution submittals that are incomplete will be rejected.
- B. Every substitution shall be accompanied with a certification from the contractor that they have personally investigated the proposed substitution and that it meets or exceeds the specified item.
- C. Every substitution must be accompanied with a credit change order.
- D. Implied substitutions are not acceptable.

### PART 2 – MATERIALS (NOT USED)

### PART 3 – EXECUTION (NOT USED)

**END OF SECTION**

**DIVISION 1 - GENERAL REQUIREMENTS**

**SECTION 01 78 00  
CLOSEOUT SUBMITTALS**

**PART 1 – GENERAL**

**1.1 MAINTENANCE MANUALS**

- A. General Requirements: Submit six (6) bound sets of Maintenance Manuals as hereinafter defined.
- B. General Contractor: This Maintenance Manual shall be clearly labeled on the front and side with the Project Title and Number and shall be divided into four (4) sections, as follows:
  - 1. Subcontractor, material supplier listings. The names, addresses and telephone numbers shall be listed and indexed for each component or item incorporated into the work.
  - 2. Warrantees and Guarantees: All required warranties and guarantees shall be placed in this Section. Warrantees shall be fully executed, signed, and dated.
  - 3. Copies of approved submittal cuts, together with parts lists and operating instructions shall be in this Section.
  - 4. Shop Drawings: Copies of approved shop drawings delineating all as-built conditions shall be set forth in this Section.

**1.2 AS-BUILT DRAWINGS**

- A. The Contractor is required to maintain an updated set of “as-built” drawings on-site throughout the course of the Project in accordance with Paragraphs 4.9.8 through 4.9.10 of the Instructions to Bidders and General Conditions. The Contractor shall present the as-built drawings for review at each Job Meeting.
- B. Complete construction As-Built, certified by the Contractor as complete to the best of his knowledge, must be provided at the completion of the Project.

**PART 2 – MATERIALS (NOT USED)**

**PART 3 – EXECUTION (NOT USED)**

**END OF SECTION**



**DIVISION 1 - GENERAL REQUIREMENTS**

**DIVISION 1 - GENERAL REQUIREMENTS**

**DIVISION 3 CONCRETE**

**SECTION 03 30 00  
CAST-IN-PLACE CONCRETE**

**PART 1 – GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section specifies cast in place concrete, including formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes.
- B. Scope: Provide all materials, labor, equipment, and appliances required to complete work of this Section, including, but not necessarily limited to, the following:
  - 1. Footings
  - 2. Slabs on Grade
  - 3. Concrete Piers
  - 4. Sidewalks
- C. Related Sections include the following:
  - 1. Division 31 Earthwork

**1.3 REFERENCES**

- A. Codes and Standards: Comply with provisions of the latest editions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
  - 1. ASTM..... American Society of Testing and Materials “Listed Standard”
  - 2. ACI 301..... "Specifications for Structural Concrete for Buildings"
  - 3. ACI 318..... "Building Code Requirements for Reinforced Concrete"
  - 4. CRSI..... Concrete Reinforcing Steel Institute, "Manual of Standard Practice"
  - 5. NJDOT..... New Jersey Department of Transportation “Standard Specifications”

**1.4 QUALITY ASSURANCE**

- A. Concrete Testing Service: Employ, at Contractor's expense, a testing laboratory, with a minimum of 5 years documented experience comparable to work on this project, approved by DPMC to design concrete mixes and perform material evaluation tests related to the concrete mixes. Materials and installed work may require testing and retesting, as directed by Architect, at any time during the progress of work. Allow free access to material stockpiles and facilities. Tests, not specifically indicated to be done at Owner's expense, including retesting of rejected materials and installed work, shall be done at Contractor's expense.

**1.5 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, joint systems, curing compounds, and others as requested by Architect.
- B. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design tests as specified.
- C. Material Certificates: Provide materials certificates for cement, aggregates, admixtures, reinforcing, welded wire fabric, non-shrink grout, curing compounds and non-slip aggregates. Material certificates

## DIVISION 3 CONCRETE

- shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.
- D. Concrete Mix Designs: Provide mix designs with strength tests for each class and type of concrete for review and comment by the Architect prior to placement of concrete. **As a performance-based system, design responsibility rests with the Contractor.**
  - E. Reinforcement Shop Drawings: Provide reinforcement shop drawings for review and approval by the Architect prior to placement of concrete. Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement.

## PART 2 – PRODUCTS

### 2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system when shown on drawings. Provide form material of sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.
- B. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.
- D. Use flexible spring steel forms or laminated boards to form radius bends.

### 2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ANSI/ASTM A 615, Grade 60, deformed.
- B. Steel Wire: ANSI/ASTM A 82, plain, cold-drawn, steel.
- C. Welded Wire Fabric (WWF): ANSI/ASTM A 185, size as specified on drawings.
- D. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI recommendations, unless otherwise acceptable.
- E. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

### 2.3 CONCRETE MATERIALS

- A. Portland Cement: ANSI/ASTM C 150, Type I or II, Conforming to Section 914 of NJDOT Standard Specifications.
- B. Use one brand of cement throughout project, unless otherwise acceptable to Architect.
- C. Aggregates:
  - 1. Normal Weight Aggregates: ANSI/ASTM C 33, and as herein specified. Provide aggregates from a single source for exposed concrete.
  - 2. Local aggregates not complying with ANSI/ASTM C 33 but which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Architect.
- D. Water: Potable
- E. Air-Entraining Admixture: ANSI/ASTM C 260
- F. Products: Subject to compliance with requirements, provide one of the following:
  - 1. "Air-Mix" or "Perma Air"; Euclid Chemical Co.

## DIVISION 3 CONCRETE

2. "Daravair"; Grace Construction Products
  3. "MB-VR" or "MB AE 90"; Master Builders
  4. "Sika AER"; Sika Chemical Corp.
- G. Water-Reducing Admixture: ANSI/ASTM C 494, Type A, and contain not more than 0.05% chloride ions. Products: Subject to compliance with requirements, provide one of the following:
1. "Eucon WR-75"; Euclid Chemical Co.
  2. "WRDA with Hycol"; Grace Construction Products
  3. "Pozzolith 220N"; "MBL-82" or "Polyheed 997"; Master Builders Inc.
  4. "Plastocrete 161"; Sika Chemical Corp.
- H. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F or Type G and contain not more than 0.05% chloride ions. Products: Subject to compliance with requirements, provide one of the following:
1. "Eucon 37"; Euclid Chemical Co.
  2. "Daracem 100"; Grace Construction Products
  3. "Rheobuild 1000" Master Builders Inc.
  4. "Sikament 86"; Sika Chemical Corp.
- I. Non-Corrosive, Non-Chloride Accelerator Admixture: ASTM C 494, Type C or E, and contain no more chloride ions than are present in municipal drinking water. The manufacturer must have long-term test data (at least a year), from an independent testing laboratory, concerning corrosion using an acceptable accelerated corrosion test method such as that using electrical potential measures. Products: Subject to compliance with requirements, provide one of the following:
1. "Accelguard 80"; Euclid Chemical Co.
  2. "Daraset"; Grace Construction Products
  3. "Pozzolith NC-534" or " Pozzutec 20"; Master Builders Inc.
  4. "Plastocrete 161FL"; Sika Chemical Corp.
- J. Water-Reducing, Retarding Admixture: ASTM C 494, Type D, and contain not more than 0.05% chloride ions. Products: Subject to compliance with requirements, provide one of the following:
1. "Eucon Retarder 75"; Euclid Chemical Co.
  2. "Daratard-17"; Grace Construction Products
  3. "Pozzolith 100XR", "Pozzolith 122R" or "Polyheed RI"; Master Builders Inc.
  4. "Plastiment"; Sika Chemical Co.
- K. Calcium chloride, or admixtures containing more than 0.05% chloride ions are not permitted. Thiocyanate-based chemical admixtures shall contribute less than 0.30% thiocyanate ions by weight of cement when the manufacturer's maximum recommended dosage is used. Certification of conformance to the above-mentioned requirements and the chloride content of the admixture will be required from the admixture manufacturer prior to review of mix design.

## 2.4 RELATED MATERIALS

- A. Non-Shrink Grout: CRD-C-621-89a, Grade "C" (equipment grouting) or Grade "B" (Construction Grouting), Corps of Engineers Specification for Non-Shrink Grout, Type D, Non-metallic. In addition, the manufacturer shall furnish data from an independent laboratory indicating that the grout, when placed at a fluid consistency, shall achieve 95% bearing under a 4' x 4' base plate. Products: Subject to compliance with requirements, provide one of the following:
1. "Euco NS"; The Euclid Chemical Co.
  2. "Masterflow 928" or "Set Grout"; Master Builders
  3. "Five Star Grout"; U.S.Grout Co.

## DIVISION 3 CONCRETE

4. "Sika Grout 212"; Sika Chemical Corp.
- B. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
  1. "Eucobar,"; Euclid Chemical Co.
  2. "E-Con"; L&M Construction Chemicals, Inc.
  3. "Confilm"; Master Builders, Inc.
  4. "SikaFilm"; Sika Chemical Corp.
- C. Liquid Membrane-Forming Curing and Sealing Compound: Water-based acrylic type, 30% solids content minimum, and have test data from an independent testing laboratory indicating a maximum moisture loss of 0.55 kg per sq m in 72 hours when applied at the coverage rate recommended by the manufacturer. Products offered by manufacturers to comply with the requirements for membrane-forming curing and compounds include the following:
  1. "Super Diamond Clear VOX"; The Euclid Chemical Corp.
  2. "Mastercure 200W"; Master Builders
  3. "Dress & Seal #30 WB"; L&M Construction Chemicals Inc.
- D. Bonding and Repair Materials: Bonding Materials: Polyvinyl acetate, rewettable type. Use only in areas not subject to moisture.
  1. "Euco Weld"; Euclid Chemical Co.
  2. "Weldcrete"; Larsen Co.
- E. Epoxy Adhesive: The compound shall be a two (2) component, 100% solids, 100% reactive compound suitable for use on dry or damp surfaces:
  1. "Euco Epoxy" #452MV or #620; Euclid Chemical Co.
  2. "Sikadur 32,Hi-Mod"; Sika Chemical Corp.
  3. "Concresive Liquid LPL"; Master Builders
- F. Polymer Patching Mortar: Free-flowing, polymer-modified cementitious coating.
  1. "Euco Thin Coat" or "Verticoat LPL"; Euclid Chemical Co.
  2. "Sikatop 121, 122, or 123"; Sika Chemical Corp.
  3. "Emaco 300, 310, or 350"; Master Builders
- G. Bonding Admixture: The compound shall be a latex, non-rewettable type.
  1. "SBR Latex" or "Flex-con"; Euclid Chemical Co.
  2. "Daraweld C"; W. R.Grace.
  3. "MB Primer"; Master Builders
  4. "SikaLatex" or "SikaLatex R"; Sika Chemical Corp.
- H. Moisture Barrier: Provide moisture barrier cover over prepared base material where indicated. Use only materials which are resistant to decay when tested in accordance with ANSI/ASTM E 154, as follows: Polyethylene sheet not less than 6 mils thick. Overlap a minimum of 6 inches at all joints.
- I. Joint Filler: Closed cell extruded neoprene gasket conforming to ASTM C509, Grade 4, black.

### 2.5 PROPORTIONING AND DESIGN OF MIXES

- A. Design Mix Meeting: Prior to the preparation of any design mix containing high range water-reducing admixture, a meeting shall be held. The purpose of the meeting is to assure that all parties involved are aware of all of the requirements pertaining to the use of this type of concrete

## DIVISION 3 CONCRETE

- to assure that quality concrete is obtained. The meeting shall be attended by the Contractor, Concrete Subcontractor (if any), Concrete Supplier, Pumping Subcontractor (if any), Testing Laboratory preparing design mix and the Admixture Manufacturer's Representative.
- B. Prepare design mixes for each type and strength of concrete by either laboratory the trial batch or field experience methods as specified in ACI 301. If trial batch method is used, use an independent testing facility acceptable to Architect. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to Architect. If trial batch mixes are used, the mix design shall achieve an average compressive strength 1200 psi greater than the specified strength.
  - C. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Architect.
  - D. Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:
    - 1. Concrete for Building Construction and Site Improvements: 4000 psi 28-day compressive strength. Minimum cement content: 600 lbs/cu.yd; Maximum Water/cement ratio: 0.40 for all concrete.
  - E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.
  - F. Use water-reducing admixture or high range water-reducing admixture (super plasticizer) in all concrete.
  - G. Use non-corrosive accelerating admixture in concrete slabs placed at ambient temperatures below 50°F (10°C).
  - H. Use air-entraining admixture in exterior exposed concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having air content within following limits:
    - 1. Concrete structures exposed to freezing and thawing or subjected to hydraulic pressure, and slabs 6% for 3/4" aggregate.
    - 2. Other Concrete: 2% to 4% air.
    - 3. Interior slabs subjected to vehicle abrasion not more than 3%.
  - I. Use admixtures for water-reducing and set-control in strict compliance with manufacturer's directions.
  - J. Slump Limits: Proportion and design mixes to result in concrete slump at truck as follows:
    - 1. Reinforced foundation systems: Not less than 1" and not more than 3".
    - 2. Concrete containing HRWR admixture (super plasticizer): Not more than 8" after addition of admixture nor more than 3" prior to addition of admixture.
    - 3. Other concrete: Not less than 1" and not more than 4".

### 2.6 CONCRETE MIXES

- A. Ready-Mix Concrete: Comply with requirements of ANSI/ASTM C 94. and as herein specified.
- B. Delete references for allowing additional water to be added to batch for material with insufficient slump. Addition of water to the batch will not be permitted.
- C. Redosage with the specified high-range water reducing admixture may be done with the prior approval of the Architect regarding dosage and time periods.
- D. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ANSI/ASTM C 94 may be required.

## DIVISION 3 CONCRETE

- E. When air temperature is between 85°F (30°C) and 90°F (32°C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90°F (32°C), reduce mixing and delivery time to 60 minutes.

### PART 3 – EXECUTION

#### 3.1 FORMS

- A. Design, erect, support, brace, and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.
- B. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.
- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.
- D. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- E. Chamfer exposed corners and edges, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- F. Form Ties: Factory-fabricated, adjustable-length, removable or snap off metal form ties, designed to prevent form deflection, and to prevent spilling concrete surfaces upon removal.
- G. Unless otherwise indicated, provide ties so portion remaining within concrete after removal is at least 1-1/2" inside concrete. Unless otherwise shown, provide form ties which will not leave holes larger than 1" diameter in concrete surface.
- H. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.
- I. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms and bracing after concrete placement is required to eliminate mortar leaks and maintain proper alignment.

#### 3.2 PLACING REINFORCEMENT

- A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
- C. Accurately position, support and secure reinforcement (including welded wire fabric) against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.
- D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and tie splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.



## DIVISION 3 CONCRETE

### 3.3 JOINTS

- A. Construction Joints: Locate and install construction joints, which are not shown on drawings, so as not to impair strength and appearance of the structure, as acceptable to Architect.
- B. Provide keyways at least 1-1/2" deep in construction joints in slabs.
- C. Place construction joints of members perpendicular to the main reinforcement. Continue reinforcement across construction joints or structural members.
- D. Isolation Joints in Slabs-on-Ground: Construct isolation joints in slabs-on-ground at points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, precast items, and elsewhere as indicated.
- E. Sealant materials are specified in Division-7 Sections of these specifications.
- F. Contraction (Control) Joints in Slabs-on-Ground: Construct contraction joints in slabs-on-ground to form panels of patterns as shown by saw cutting or by inserting an approved plastic strip into fresh concrete until the top surface of the strip is flush with the slab surface.
- G. Install plastic strip into concrete using tool recommended by manufacturer. Prior to the concrete being floated, remove the top section of the insert. If saw cutting is used, "Soff-Cut" saw shall be used immediately after final finishing and to a depth as indicated on drawings.

### 3.4 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto.
- B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

### 3.5 PREPARATION OF FORM SURFACES

- A. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.
- B. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
- C. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

### 3.6 CONCRETE PLACEMENT

- A. Pre-placement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.
- B. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.
- C. General: Comply with ACI 304, and as herein specified.
- D. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

## DIVISION 3 CONCRETE

- E. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
- F. Do not allow concrete to drop more than 5 feet in concrete which will be exposed to view. Do not allow concrete to drop more than 7 feet in concrete which will not be exposed.
- G. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309 recommended practices.
- H. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
- I. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
- J. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
- K. Bring slab surfaces to correct level with straightedge and strikeoff. Use highway straightedges, bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
- L. Maintain reinforcing in proper position during concrete placement operations.
- M. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified. When air temperature has fallen to or is expected to fall below 40°F (4°C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50°F (10°C), and not more than 80°F (27°C) at point of placement. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. Only the specified non-corrosive non-chloride accelerator shall be used. Calcium chloride, thiocyanate or admixtures containing more than 0.05% chloride ions are not permitted.
- N. Hot Weather Placing: When high temperatures, low humidity and dry winds create conditions suitable for plastic cracking, the evaporation retarder "Eucobar" by The Euclid Chemical Co. or "Confilm" by Master Builders may be required to be applied by spray one or more times during the finishing operation. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90°F (32°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. 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 embedment in concrete. Wet forms thoroughly before placing concrete. Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

### 3.7 MONOLITHIC SLAB FINISHES

- A. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified.
- B. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power driven floats, or both Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to a tolerance of F<sub>f</sub>20/F<sub>l</sub>17. Cut down high spots and fill low spots, refloat surface to a uniform, smooth, granular texture.
- C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint or other thin-film finish coating system. After floating, begin first trowel finish operation using a power-driven trowel. Begin final

## DIVISION 3 CONCRETE

- troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation free of trowel marks, uniform in texture and appearance, and with a surface leveled to a tolerance of FF25/FL20. Surface defects which would telegraph through applied floor covering system are to be ground smooth.
- D. Non-Slip Aggregate Finish: Apply non-slip aggregate finish to all exterior slab steps. After completion of float finishing and before starting trowel finish, uniformly spread 25 lbs. of dampened non-slip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as herein specified. After curing, lightly work surface with a steel wire brush, or an abrasive stone, and water to expose non-slip aggregate.
  - E. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, walks and ramps, and elsewhere as indicated. Immediately after trowel finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
  - F. Wash Bay slab shall have a tine finish with grooves parallel to slope.

### 3.8 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply in accordance with manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- C. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified
- D. Provide moisture curing by following methods.
- E. Keep concrete surface continuously wet by covering with water. Use continuous water-fog spray. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.
- F. Provide moisture-cover curing as follows:
- G. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- H. Provide curing and sealing compound to exposed interior slabs and to exterior slabs, walks, and curbs as follows:
- I. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller in accordance with 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. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete
- J. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- K. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces, by application of appropriate curing method.
- L. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

## DIVISION 3 CONCRETE

### 3.9 REMOVAL OF FORMS

- A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50°F (10°C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as beam soffits, joints, slabs and other structural elements, may not be removed until concrete has attained design compressive strength ( $f'_c$ ) but in no case shall the forms be removed in less than 14 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or membrane.
- C. Form facing material may be removed 4 days after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

### 3.10 RE-USE OF FORMS

- A. Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Architect.

### 3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.
- B. Grout Application: All sills, equipment bases and other locations noted on the drawings shall be grouted with the specified non-shrink grout.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

### 3.12 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.
- B. Cut out honeycomb, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar before bonding compound has dried. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- C. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spills, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry-pack mortar, or precast cement cone plugs secured in place with bonding agent.

## DIVISION 3 CONCRETE

- D. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
- E. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having required slope.
- F. Repair finished unformed surfaces that contain defects that affect durability of concrete. Surface defects, as such, include crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with patching compound. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- G. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.
- H. Repair methods not specified above may be used, subject to acceptance of Architect.

### 3.13 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. The Contractor shall employ a testing laboratory prequalified by New Jersey Department of Treasury, Division of Property Management and Construction and approved by the Architect to inspect formwork and reinforcement, test concrete and to submit test and inspection reports. All technicians used on the project shall have successfully completed the ACI concrete technician course. The testing laboratory shall certify that the technicians used on this project meet this requirement.
- B. Sampling and testing for quality control during placement of concrete shall include the following for **each truck** at point of delivery:
  - 1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
  - 2. Slump: ASTM C 143; one test for each concrete truck load at point of discharge. If Super Plasticizer is used, conduct an additional slump test after Super Plasticizer is introduced and mixed.
  - 3. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C231 pressure for normal weight concrete; one for each set of compressive strength test specimens. Air content shall be tested for each truck.
  - 4. Concrete Temperature: Test hourly when air temperature is 40°F (4°C) and below, and when 80°F (27°C) and above; and each time a set of compression test specimens made
  - 5. Compression Test Specimen: ASTM C 31; one set of 6 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
  - 6. Compressive Strength Tests: ASTM C 39; one set for each truck load regardless of quantity, with 2 specimens tested at 7 days, 2 specimens tested at 28 days, and 2 specimens retained in reserve for later testing if required. 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 by more than 500 psi.

### DIVISION 3 CONCRETE

- C. Test results shall be reported in writing to the, Architect and Contractor **on same day that tests are made.** Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete slump, air content and temperature at time of placement; compressive breaking strength and type of break for both 7-day tests and 28-day tests.
- D. Inspection Results shall be reported in writing to Architect and Contractor **on same day that inspections are made.** Reports shall contain location, size, grade, spacing, and form clearance of reinforcing, slump, temperature of concrete, air temperature, and air content. Condition of forms shall be noted on the report. The Architect and Contractor are to be notified verbally at the time of inspection of deviations from approved drawings so that the reinforcing and mix may be corrected prior to concrete placement. Report shall note all deviations which were not corrected prior to concrete placement.
- E. If specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing service shall conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.
- F. Compression testing and sampling is required for all concrete and grout.
- G. Testing agency shall be present throughout placement of concrete and indicate in their report the time of completion of off loading.
- H. Testing agency shall compare delivery and batch tickets with design mix and indicate compliance in their report and include a copy of the delivery or batch ticket with the report.

**END OF SECTION**

**DIVISION 10 SPECIALTIES**

**SECTION 10 14 19  
SPECIALTY SIGNS**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division One Specification Section, apply to this Section.

1.2 SUMMARY

- A. The work under this section includes the supply and installation of:
  - 1. Parking Signage

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and installation instructions for each type of sign required.
- B. Samples: Submit samples of each sign form and material showing finishes, colors, surface textures and qualities of manufacture and design of each sign component including graphics. Acceptable units may be installed as part of the work.

**PART 2 - PRODUCTS**

2.1 MATERIALS

- A. Signs: Traffic control signs shall be pole mounted extruded aluminum. Sign panels paints and installation per D.O.T. Standard Specification Section 916.

**PART 3 - EXECUTION**

3.1 INSTALLATION

- A. General:
  - 1. Locate sign units and accessories where shown or scheduled.
  - 2. Mount interior signage plumb and level, secure to construction with tamperproof stainless steel screws.

3.2 CLEANING AND PROTECTION

- A. At completion of installation, clean soiled sign surfaces in accordance with manufacturer's instructions. Protect units from damage until acceptance by Owner.

**END OF SECTION**

**DIVISION 22 - PLUMBING**

**SECTION 22 01 00  
PLUMBING SUMMARY OF WORK**

**PART 1 – GENERAL**

**1.1 SUMMARY**

- A. This section includes the following:
1. A new plumbing underground cold water service into the new modular office building as shown on the Drawings.
  2. Provide new sanitary main drain from the new modular office building to sewer ejector pump and pumped sewer pipes to septic tank or public sewer as shown on the Drawings. Provide sanitary fitting to connect into the existing sewer lateral near existing cleanout at street. Provide exterior cleanouts as shown on the Drawings.
  3. Provide sewage ejector pump basin as specified on Drawings for each site.
  4. Provide heat tracing and insulation on all water and sanitary lines above grade under the new modular office building and down into ground as shown on the Drawings. Provide thermostatic controls on each heat tape as specified on the Drawings.
  5. Provide new cold water service pipe from existing water service pipe outside the modular building up through the crawl space and connect to modular building cold water main and install a shutoff valve in the modular office building.
  6. Carriers, hangers and supports for plumbing piping.
  7. Cutting and patching.
  8. Testing, calibration and adjustments, cleaning, disinfecting, and placing in operation all systems provided.
  9. Excavation, backfill, compaction and repair of surfaces to match existing required for Plumbing work.
- B. The Plumbing Work shall be as specified in the following specification sections:

<u>PLUMBING:</u>	
22 01 00	Plumbing Summary of Work
22 05 29	Supports and Anchors
22 07 00	Piping Insulation
22 10 00	Plumbing Piping

**1.2 RELATED WORK**

Division 01	General Requirements
Division 03	Concrete Work
Division 26	Electrical Work
Division 31	Earthwork

**1.3 WORK NOT INCLUDED**

- A. The following principle items of work will be done under other sections of this specification:
1. Payment of water service fees from the water company. Payment will be made by the Using Agency. New Jersey American Water Company shall supply shut-off service valve and meter and pit near road and extend main to site.
  2. Payment of sewer connection fees to the sewage authority. This will be paid by the Using Agency.



## DIVISION 22 - PLUMBING

### 1.4 WORK IN CONNECTION WITH OTHER DIVISIONS OF WORK

Electrical Work: The Contractor under this Division of the contract shall furnish all electrical equipment that is required for completion of the electrical work for installation and wiring as outlined in Division 26. All equipment in piping or on ductwork shall be furnished and installed under Division 22 and connected as described in Division 26. Under Division 26 work, the contractor shall furnish all conduit and wiring and any appurtenances required to make systems operate as intended. The Contractor shall furnish approved detailed wiring diagrams and electrical equipment furnished in Division 22 and furnishes to Division 26 responsible trades for installation, and shall be responsible for verification as to the correctness of their work.

### 1.5 CODES AND STANDARDS

- A. All shall be done in accordance with the New Jersey Uniform Construction Code, the 2009 International Building Code, New Jersey edition, and the 2009 National Standard Plumbing Code.
- B. Refer to Division 01 of these specifications for permits, codes, fees and inspection requirements.
- C. Contractor shall submit copies of all tests, reports and inspections to the Architect for temporary rough-in and final plumbing inspections.

### 1.6 TEMPORARY FACILITIES, UTILITIES AND SERVICES

Refer to Division 01.

### 1.7 DRAWINGS

- A. Drawings are diagrammatic and define the intent of the work. Locations of equipment are approximately correct but are subject to modifications caused by structural conditions and equipment furnished by other Contractors or by the Using Agency. Coordinate all work with other trades. Minor modifications of location required to effect such coordination will be made at no cost to the Using Agency. Determine roughing locations from approved shop Drawings only.
- B. Plumbing Work is shown on the Drawings.

### 1.8 SHOP DRAWINGS

- A. Shop drawings, catalog information, manufacturer's certification, etc., on materials or equipment, shall be submitted in the number of copies required and as directed in Division 01 of the General Requirements of the Specification.
- B. Approval will not release the Contractor from responsibility to provide all materials and labor necessary for the complete installation nor release the Contractor from responsibility for errors or omissions originating with them.
- C. Furnish shop drawings with full information as to dimensions, materials, finish, gauge, installation detail, etc. Catalog sheets will not be accepted as shop drawings unless the item is specified by catalog number. Incomplete submission, such as shop drawings without contract number and contract specification reference or without detailed operational description, will not be examined. No shop drawing will be accepted for approval unless it bears a signed note that it has been fully checked by the Contractor for suitability including coordination with other trades.
- D. Submit drawings of auxiliary steel used for hanging or supporting equipment, piping, conduit or ductwork. Indicate method of fastening to building structure, size of steel members and load to be supported by the member.
- E. Submit shop drawings of the following material and equipment. In addition, submit any other materials or equipment requiring fitting or coordination with other trades as well as any operating equipment specified elsewhere.

## DIVISION 22 - PLUMBING

### PLUMBING:

Domestic water pipe and fittings	Sanitary pipe and fittings	Pipe hangers
Pipe insulation	Heat tape	Clean outs
Sewer Ejector Pump & Basin	Solder	Pump Discharge pipe & fittings

## PART 2 – PRODUCTS

### 2.1 SEWAGE EJECTOR PUMP AND BASIN

- A. Provide Sewage Ejector Pump Basin complete with pumps, floats, remote control, alarms, etc. as specified on the Drawings.
- B. Provide pump basin as specified on Drawings.
- C. Contractor shall perform all work in accordance with terms of contract and schedules in accordance with related documents listed in Division 01.
- D. Provide pump start-up and set-up and testing to insure installation is in accordance with the Manufacturer's installation instructions.
- E. Provide pump manufacturer's warranty in addition to warranty as specified in Division 01.

## PART 3 – EXECUTION

### 3.1 GENERAL

- A. Contractor shall perform all work in accordance with terms of contract and schedules in accordance with related documents listed in Division 01.
- B. The contractor shall perform all work as specified in Division 22 and shown on the Drawings and coordinate with other trades.
- C. The Contractor shall provide all necessary material, labor and equipment to complete this work.
- D. The Contractor shall perform all work in accordance with the New Jersey Uniform Construction Code, the Electrical and Plumbing Subcodes.

### 3.2 TESTS

- A. All piping and equipment shall be tested in accordance with the 2009 National Standard Plumbing Code. The contractor shall provide all labor, materials, instruments, power, etc., required for testing shall be furnished under this section. Test shall be performed in the presence of the code inspectors. Architect shall be notified of all tests and results. All defective work shall be promptly repaired or replaced, and the tests shall be repeated until the particular system and component parts receive the approval of the inspector. The duration of tests shall be as determined by all authorities having jurisdiction. After completion of all tests, the Using Agency's operating department shall be fully instructed by the Contractor and manufacturer's representative where required as to the operation and maintenance of the equipment.
- B. Domestic Water System Tests:
  1. After rough piping has been installed, but before any pipe insulation is installed, the system shall be filled with water and tested.
  2. After completion of entire system the system shall be filled and thoroughly flushed and then tested again.

## DIVISION 22 - PLUMBING

3. Upon completion of a section on the entire water supply system, it shall be tested and proved tight under pressure in accordance with the Plumbing Code. Any defects shall be corrected. The contractor shall provide a pump to provide pressure test.
4. After completion of all tests and after equipment has been connected, the system shall be cleaned of all dirt and foreign matter.
5. The hot water system shall be tested for satisfactory circulation to assure water within the required temperature limits at all points.

### C. Drainage and Vent System Tests:

1. Shall be performed in accordance with the 2009 National Standard Plumbing Code.  
"Rough Plumbing - the piping of plumbing drainage and venting systems shall be tested upon completion of the rough piping installation by water or air and proved watertight. The Administrative Authority may require the removal of any cleanout plugs or ascertain if the pressure has reached all parts of the system.

### D. Tests:

1. Provide such additional tests as may be required by code inspectors, and submit proof in writing that such tests have been conducted and accepted.
2. Before an application for final acceptance of the work will be considered, all tests deemed necessary to show proper execution of the work shall have been performed and completed in the presence of code inspector. Scheduling of all testing procedures shall be arranged to suit the convenience of the Using Agency. Refer to the N.J. Uniform Construction Code and the 2009 National Standard Plumbing Code for a description of tests required.
3. Where electricity-utilizing equipment supplied by other Contractors is energized, controlled or otherwise made operative by electric work wiring systems, the testing which will prove the proper functional performance of such wiring systems shall be conducted specifically by the trade responsible for the mechanical equipment. The electrical work, however, shall include cooperation in such testing and the making available of any necessary electrical testing equipment.

## 3.3 DISINFECTION OF POTABLE WATER SYSTEM

- A. New or repaired potable water systems shall be disinfected prior to use in accordance with the Plumbing Code and as required by the Administrative Authority. The method to be followed shall be as follows:
  1. The pipe system shall be flushed with potable water until no dirty water appears at the points of outlet.
  2. The system or part thereof shall be filled with a water-chlorine solution containing at least 50 parts per million of chlorine and the system or part thereof shall be valve-off and allowed to stand for 24 hours, or the system or part thereof shall be filled with a water-chlorine solution containing at least 200 parts per million of chlorine and allowed to stand for 3 hours.
  3. Following the allowed standing time the system shall be flushed with potable water until no chlorine remains in the water coming from the system.
  4. The procedure shall be repeated if it is shown by a bacteriological examination made by the Administrative Authority that contamination still persists in the system.

## 3.4 TEMPORARY WATER

Water for construction may be obtained from existing buildings during construction.

**END OF SECTION**

## **DIVISION 22 - PLUMBING**

### **SECTION 22 05 29 SUPPORTS AND ANCHORS**

#### **PART 1 – GENERAL**

##### 1.1 SUMMARY

- A. This section includes the following:
  - 1. Pipe and equipment hangers and supports.
  - 2. Sleeves and seals.
  - 3. Flashing and sealing of pipes.

##### 1.2 RELATED SECTIONS

- A. Division 03 - Cast-In-Place Concrete: Equipment bases
- B. Division 09 – Painting
- C. Division 22 – All Sections

##### 1.3 REFERENCES

- A. ASME B31.1 - Power Piping
- B. ASME B31.9 - Building Services Piping
- C. ASTM F708 - Design and Installation of Rigid Pipe Hangers.
- D. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
- E. MSS SP69 - Pipe Hangers and Supports - Selection and Application.
- F. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

##### 1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Shop Drawings: Indicate system layout with location and detail of trapeze hangers.
- C. Product Data: Provide manufacturers catalog data including load capacity.
- D. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- E. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

##### 1.5 REGULATORY REQUIREMENTS

Conform to 2009 National Standard Plumbing Code.

#### **PART 2 – PRODUCTS**

##### 2.1 PIPE HANGERS AND SUPPORTS

- A. Manufacturers: Grinnell or approved equal
- B. Plumbing Piping - DWV:
  - 1. Conform to MSS SP58.
  - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch (13 to 38 mm): Carbon steel, adjustable swivel, split ring.
  - 3. Hangers for Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
  - 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  - 5. Wall Support for Pipe Sizes 4 Inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.
  - 6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

## **DIVISION 22 - PLUMBING**

### **C. Plumbing Piping - Water:**

1. Conform to MSS SP58
2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch (13 to 38 mm): Copper, adjustable swivel, split ring
3. Vertical Support: Copper coated riser clamp
4. Copper Pipe Support: Carbon steel ring, adjustable, copper plated

## **2.2 ACCESSORIES**

Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

## **2.3 INSERTS**

- A. Manufacturers: Hilti or approved equal.
- B. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

## **2.4 SLEEVES**

- A. Sleeves for Pipes through Non-fire Rated Floors: 18 gage (1.2 mm thick) galvanized steel.
- B. Provide caulk and grout around and seal between pipe and sleeve with water-proof sealant.

## **PART 3 – EXECUTION**

### **3.1 INSTALLATION**

Install in accordance with manufacturer's instructions.

### **3.2 PIPE HANGERS AND SUPPORTS**

- A. Support horizontal piping as scheduled.
- B. Install hangers to provide minimum 1/2 inch (13 mm) space between finished covering and adjacent work.
- C. Place hangers within 12 inches (300 mm) of each horizontal elbow.
- D. Use hangers with 1-1/2 inch (38 mm) minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet (1.5 m) maximum spacing between hangers.
- F. Support vertical piping at every other floor. Support vertical cast iron pipe at each floor at hub.
- G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Support riser piping independently of connected horizontal piping.
- I. Provide copper plated hangers and supports for copper piping without insulation. If insulated, provide rigid support block under pipe for hanger.
- J. Design hangers for pipe movement without disengagement of supported pipe.

### **3.3 FLASHING**

Provide flexible flashing and metal counter flashing where piping and ductwork penetrate weather or waterproofed walls, floors. Roof penetrations shall be flashed under another Division of these specifications.

### **3.4 SLEEVES**

- A. Set sleeves in position in floors. Provide reinforcing around sleeves.
- B. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- C. Extend sleeves through floors 2 inch above finished floor level. Caulk sleeves.

**DIVISION 22 - PLUMBING**

- D. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with insulation and caulk air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- E. Install chrome plated steel escutcheons at finished surfaces.

**3.5 SCHEDULE**

- A. Provide piping supports as listed below for plumbing and hydronic piping (unless superseded by Plumbing and Mechanical Codes).

Pipe size	Hanger Rod Max. hanger spacing	Diameter
<u>Inches (mm)</u>	<u>Feet (m)</u>	<u>Inches (mm)</u>
1/2 to 1-1/4	6.5 (2) (12 to 32)	3/8 (9)
1-1/2 to 2	10 (3) (38 to 50)	3/8 (9)
2-1/2 to 3	10 (3) (62 to 75)	1/2 (13)
4 to 6	10 (3) (100 to 150)	5/8 (15)
PVC (All sizes)	6 (1.8)	3/8 (9)

**END OF SECTION**

**DIVISION 22 - PLUMBING**

**SECTION 22 07 00  
PIPING INSULATION**

**PART 1 – GENERAL**

**1.1 SUMMARY**

- A. This section includes the following:
  - 1. Piping insulation.
  - 2. Jackets and accessories.
  - 3. Heat tracing for pipes.

**1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION**

Section 22 10 00 - Plumbing Piping: Placement of hangers and hanger inserts.

**1.3 REFERENCES**

- A. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- B. ASTM C177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
- C. ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.
- D. ASTM C449 - Mineral Fiber Hydraulic-setting Thermal Insulating and Finishing Cement.
- E. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- F. ASTM C552 - Cellular Glass Block and Pipe Thermal Insulation.
- G. ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.
- H. ASTM E84 - Surface Burning Characteristics of Building Materials.
- I. ASTM E96 - Water Vapor Transmission of Materials.
- J. NFPA 255 - Surface Burning Characteristics of Building Materials.
- K. UL 723 - Surface Burning Characteristics of Building Materials.

**1.4 SUBMITTALS**

- A. Submit under provisions of Division 01.
- B. Product Data: Provide product description, list of materials and thickness for each service, and locations.
- C. Manufacturer's Installation Instructions: Indicate procedures which ensure acceptable workmanship and installation standards will be achieved.

**1.5 QUALITY ASSURANCE**

Materials: Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84.

**1.6 QUALIFICATIONS**

Applicator: Company specializing in performing the work of this section with minimum three years experience.

**1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, protect, and handle products to site under provisions of Division 01.
- B. Deliver materials to site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

## DIVISION 22 - PLUMBING

- C. Store insulation in original wrapping and protect from weather and construction traffic.
- D. Protect insulation against dirt, water, chemical, and mechanical damage.

### 1.8 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

## PART 2 – PRODUCTS

### 2.1 GLASS FIBER

- A. Manufacturers:
  - 1. Manville Products Co. Micro-Lok AP or AP-T
  - 2. Other acceptable manufacturers offering equivalent products:
    - a) Certainteed
    - b) Owens Corning
    - c) Knauf
    - d) Or approved equal.
- B. Insulation: ASTM C547; rigid molded, noncombustible
  - 1. 'K' ('ksi') value: ASTM C335, 0.24 at 75 degrees F
  - 2. Minimum Service Temperature: -20 degrees F
  - 3. Maximum Service Temperature: 850 degrees F
  - 4. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Vapor Barrier Jacket:
  - 1. ASTM C921, White kraft paper reinforced with glass fiber yarn and bonded to aluminized film
  - 2. Moisture Vapor Transmission: ASTM E96; 0.02 perm inches
  - 3. Secure with self sealing longitudinal laps and butt strips.
  - 4. Secure with outward clinch expanding staples and vapor barrier mastic.
- D. Tie Wire: 18 gage stainless steel with twisted ends on maximum 12 inch centers

### 2.2 JACKETS

- A. PVC Plastic
  - 1. Manufacturers:
    - a) Owens-Corning, Model Zeston 2000
    - b) Manville
    - c) Certainteed
    - d) Or approved equal.
  - 2. Jacket: ASTM C921, One piece molded type fitting covers and sheet material, off white color.
    - a) Minimum Service Temperature: -40 degrees F
    - b) Maximum Service Temperature: 150 degrees F
    - c) Moisture Vapor Transmission: ASTM E96; 0.002 perm inches
    - d) Maximum Flame Spread: ASTM E84; 25
    - e) Maximum Smoke Developed: ASTM E84; 50.
    - f) Connections: Brush on welding adhesive and tacks



**DIVISION 22 - PLUMBING**

**2.3 HEATING TRACING**

- A. Provide heat tracing for pipes as specified on the Drawings.
- B. Manufacturers:
  - 1. Nelson
  - 2. RayChem
  - 3. Chromalox
  - 4. Or approved equal.

**PART 3 – EXECUTION**

**3.1 EXAMINATION**

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

**3.2 INSTALLATION**

- A. Install materials in accordance with manufacturer's instructions.
- B. On exposed piping, locate insulation and cover seams in least visible locations.
- C. Insulated cold water pipes and sanitary pipes below modular office in crawl space and in ground as shown on the Drawings:
  - 1. Provide PVC exterior vapor barrier jackets on all pipes, field applied over pipe and heat tape.
  - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe.
  - 3. Finish with glass cloth and vapor barrier adhesive.
  - 4. PVC pipe and fitting covers shall be used.
  - 5. Continue insulation through floor, in crawl space and down into earth as shown on the Drawings. Provide insulation and covers over pipes and heat tracing.
  - 6. Insulate entire system including fittings, valves, unions, etc.
  - 7. Install heat tape in accordance with manufacturer's instructions.
- D. Finish insulation at supports, protrusions, and interruptions.

**3.3 TOLERANCE**

Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

**3.4 GLASS FIBER INSULATION SCHEDULE (PLUMBING)**

**A. Plumbing Systems**

Domestic Cold Water Supply:	Up to 1" pipe size:	1" thickness
Sanitary Pipes:	Up to 4" pipe size:	1" thickness

**END OF SECTION**

**DIVISION 22 - PLUMBING**

**SECTION 22 10 00  
PLUMBING PIPING**

**PART 1 – GENERAL**

1.1 SUMMARY

- A. This section includes the following:
  - 1. Pipe and pipe fittings
  - 2. Valves
  - 3. Sanitary sewer piping system
  - 4. Domestic water piping system
  - 5. Cleanouts

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

Not Used

1.3 RELATED SECTIONS

- A. Division 22 – All Sections
- B. Division 31 - Excavating, Backfilling and Trenching

1.4 REFERENCES

- A. ANSI B31.9 - Building Service Piping.
- B. ASME Sec. 9 - Welding and Brazing Qualifications.
- C. ASME B16.18 - Cast Bronze Solder-Joint Pressure Fittings.
- D. ASME B16.22 - Wrought Copper and Bronze Solder-Joint Pressure Fittings
- E. ASTM B32 - Solder Metal.
- F. ASTM B75 - Seamless Copper Tube.
- G. ASTM B88 - Seamless Copper Water Tube.
- H. ASTM B251 - Wrought Seamless Copper and Copper-Alloy Tube.
- I. ASTM D1785 - Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40.
- J. ASTM D2466 - Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- K. ASTM D2729 - Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- L. ASTM D2855 - Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
- M. AWWA Std. C800, ASTM B-62 and B-584: High-density Polyethylene (HDPE) Pipe.
- N. AWWA Std. C901: Stainless Steel Inserts for joining HDPE Pipe.

1.5 SUBMITTALS

- A. Submit under provisions of Section 220100 and Division 01.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

1.6 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 01.
- B. Record actual locations of valves.

## **DIVISION 22 - PLUMBING**

### **1.7 OPERATION AND MAINTENANCE DATA**

- A. Submit under provisions of Division 01.
- B. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

### **1.8 QUALITY ASSURANCE**

- A. Valves: Manufacturer's name and pressure rating marked on valve body.
- B. Soldering Materials and Procedures: Conform to National Standard Plumbing Code.
- C. Maintain one copy of each document on site.

### **1.9 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.
- B. Installer: Company specializing in performing the work of this section with minimum three years documented experience.

### **1.10 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, protect and handle products to site under provisions of Division 01.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

### **1.11 ENVIRONMENTAL REQUIREMENTS**

Do not install underground piping when bedding is wet or frozen.

## **PART 2 – PRODUCTS**

### **2.1 SANITARY SEWER PIPING**

- A. PVC Pipe and Fittings: ASTM D2665-97a
  - 1. Fittings: PVC
  - 2. Joints: ASTM F656-96a solvent primer and ASTM D2564-96a solvent weld cement.
- B. PVC piping as specified on the Drawings.

### **2.2 PUMPED SANITARY PIPING**

- A. High Density Polyethylene (HDPE) Pipe & Fittings: AWWA Std. C800, ASTM B-62 and B-584.
  - 1. Fittings: Brass Pack Fittings for Male Thread to PE and Female NPT Brass as specified on the Drawings.
  - 2. Joints: AWWA C901 "Ford" C66-77-IDR7 or approved equal.
  - 3. Rating: 160 psi.
- B. Other piping joints and fittings as specified on the Drawings for each site.

### **2.3 SERVICE WATER PIPING, BELOW GRADE**

- A. Polyethylene 2303 SDR9 Water Service Pipe rated at 160 psi at 73 degrees F.
  - 1. Fittings: Fittings: Brass Pack Fittings for Male Thread to PE and Female NPT Brass as specified on the Drawings.
  - 2. Joints: AWWA C901 "Ford" C66-77-IDR7 or approved equal

## **DIVISION 22 - PLUMBING**

### **2.4 WATER PIPING, ABOVE GRADE**

Copper Tubing: ASTM B88, Type L, hard drawn

1. Fittings: ASME B16.18, cast bronze, or ASME B16.22, wrought copper and bronze
2. Joints: ASTM B32, no-lead solder and water based flux

### **2.5 FLANGES, UNIONS, AND COUPLINGS**

Pipe Size 2 Inches (50 mm) and Under:

Copper tube and pipe: 150 psig (1 034 kPa) bronze unions with soldered joints.

### **2.6 BALL VALVES**

A. Manufacturers:

1. Milwaukee Valve Model BA-150
2. Watts
3. Jenkins
4. Or approved equal

B. Up to and including 2 Inches (50 mm): Full-port bronze one piece body, stainless steel ball, teflon seats and stuffing box ring, lever handle, solder ends.

### **2.7 CLEANOUTS**

A. Manufacturers:

1. Wade
2. J.R. Smith
3. Josam
4. Or approved equal

B. Exterior Areas (ECO): Line type with lacquered cast iron body and round epoxy coated gasketed cover.

C. See Drawing for model number of cleanout on the Drawings.

## **PART 3 – EXECUTION**

### **3.1 EXAMINATION**

Verify that excavations are to required grade, dry, and not over-excavated.

### **3.2 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

### **3.3 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient.
- D. Install piping to conserve building space and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

## **DIVISION 22 - PLUMBING**

- G. Provide clearance for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed.
- I. Establish elevations of buried water piping outside the building to ensure not less than 3'-6" of cover.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- K. Provide support for utility meters in accordance with requirements of utility companies.
- L. Excavate and backfill in accordance with Division 31.
- M. Provide fill 6" below and around pipes in accordance with the Plumbing code, and backfill and compact in accordance with Division 31.
- N. Provide Concrete in accordance with Division 03 to repair surface areas where existing concrete that was removed for trenching to install new pipes.
- O. Install valves with stems upright or horizontal, not inverted.

### **3.4 APPLICATION**

- A. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- B. Provide spring loaded check valves on discharge of water pumps.

### **3.5 ERECTION TOLERANCES**

- A. Establish invert elevations, slopes for sanitary lines drainage to 1/4 inch per foot minimum. Maintain gradients. (Minimum slope on 4" building drain or sewer 1/8" per foot)
- B. Slope water piping and arrange to drain at low points.

### **3.6 SERVICE CONNECTIONS**

- A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing. Coordinate the installation with the Municipal Sewer Department and the Using Agency.
- B. Provide new water service. Provide coordination with the local water company and the Using Agency.
- C. Provide connection of water service to the new water line in the modular office building.
- D. Provide connection to main sanitary drain from the Modular building and connection to the existing municipal sewer line as shown on the Drawings for each site.

**END OF SECTION**

**DIVISION 26 - ELECTRICAL**

**SECTION 26 01 00  
ELECTRICAL SUMMARY OF WORK**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This section includes the following:
1. New Electrical Service Conduit and Wires to the new Modular Building from JCP&L Co. Service pole.
  2. Provide new Electrical Feeder from the new Modular
  3. Power branch circuiting for outlets.
  4. Power feeders for Well Pump and Sewer pump.
  5. Cables and wires, raceways and fittings.
  6. Tagging of wires and cables, labeling and designation plates.
  7. Wiring devices, receptacles, special outlets, plates.
  8. Work in connection with other trades.
  9. Wiring and connections of equipment furnished and installed by others.
  10. Grounding system.
  11. Cutting and patching.
  12. Excavation, backfill, and compaction.
  13. Provide all testing require by Electrical Code and testing of telephone and data wiring.
  14. Provide conduits from service pole to new modular building and from new modular building to existing Garage building as shown on the Drawings.

**1.2 RELATED WORK**

Division 1	General Requirements
Division 3	Concrete
Division 22	Plumbing Work
Division 31	Earthwork

**1.3 WORK NOT INCLUDED**

- A. The following principle items of work will not be done under other contracts or by Using Agency:
1. Furnishing modular office building.
  2. Telephone and data wiring, punch downs and outlets in modular building and final connections to existing building telephone punch down blocks and patch panels.

**1.4 EXAMINATION OF BUILDING SITE**

- A. The Contractor shall visit the building site before submitting a proposal to fully acquaint themselves with all existing and limiting conditions.
- B. The Contractor shall assume full responsibility for the cost of additional work arising out of their failure to examine the building site.

**1.5 DRAWINGS**

- A. Drawings are diagrammatic and define the intent of the work. Locations of equipment, fixtures, devices, panelboards, ducts, pipes, diffusers, partitions, and openings are approximately correct but are subject to modifications caused by structural conditions and equipment furnished by other contractors or by the Using Agency. Coordinate all work with other trades. Minor modifications of location required to effect such coordination will be made at no cost to the Using Agency. Determine roughing locations from approved shop drawings only.

**DIVISION 26 - ELECTRICAL**

- B. Electrical work is shown on the Drawings.

**1.6 DEFINITIONS**

- A. "Wiring": Conduit, fittings, wire, junction and outlet boxes, switches, cutouts, and receptacles and items necessary or required in connection with or relating to such wiring.
- B. "Concealed": Embedded in masonry or other construction, installed behind wall furring, within double partitions or hung ceilings, in trenches, in crawl spaces, below floor or below grades.
- C. "Exposed": Not installed underground or "concealed" as defined above.
- D. "NEC": National Electrical Code, NFPA No. 70, 2011.

**1.7 PERMITS, CODES AND FEES**

- A. All shall be done in accordance with the N.J. Uniform Construction Code; the 2009 International Building Code, New Jersey Edition; and the Electrical Subcode, 2011 edition.
- B. Refer to Division 1 of these specifications for permits, codes, fees and inspection requirements.
- C. All electrical equipment furnished shall bear the Underwriters Laboratory label.
- D. Contractor shall submit copies of all test reports and inspections to the Architect for temporary rough-in and final electrical inspections.

**1.8 SHOP DRAWINGS**

- A. Shop drawings, catalog information, manufacturer's certification, etc., on materials or equipment, shall be submitted as directed in the number of copies required and as directed in Division 1 of the Specifications.
- B. Approval will not release the contractor from responsibility to provide all materials and labor necessary for the complete installation nor release the contractor from responsibility for errors or omissions originating with them.
- C. Furnish shop drawings with full information as to dimensions, materials, finish, gauge, installation detail, etc. Catalog sheets will not be accepted as shop drawings unless the item is specified by catalog number. Incomplete submission, such as shop drawings without contract number and contract specification reference or without detailed operational description, will not be examined. No shop drawing will be accepted for approval unless it bears a signed note that it has been fully checked by the contractor for suitability including coordination with other trades.
- D. Submit drawings of auxiliary steel used for hanging or supporting equipment, piping, conduit or ductwork. Indicate method of fastening to building structure, size of steel members and load to be supported by the member.
- E. Submit shop drawings of the following material and equipment. In addition, submit any other materials or equipment requiring fitting or coordination with other trades as well as any operating equipment specified elsewhere.

**ELECTRICAL:**

Conduits and Fittings	Phone wiring	Circuit breakers
Underground Pull Boxes	Boxes and covers	Wire, cable, connectors
Wiring devices and plates	Direct Burial Cables	Fastners

**1.9 COORDINATION OF WORK**

- A. The work shall be installed in cooperation with the other contractors installing inter-related work. Before installation, make proper provision to avoid interferences with other trades.

## **DIVISION 26 - ELECTRICAL**

- B. Location of pipes, ducts, electrical raceways, switches, panels, equipment, fixtures, etc., shall be adjusted to accommodate the work for interferences anticipated and encountered. Determine the exact route and location of each pipe, duct and electrical raceway prior to fabrication.
  - 1. Right-of-Way: Lines which pitch shall have the right-of-way over those which do not pitch. For example, steam, condensate, and plumbing drains shall normally have right-of-way. Lines whose elevations cannot be changed shall have the right-of-way over lines whose elevations can be changed. Lines containing liquid or gas have right-of-way over electrical lines.
  - 2. Offsets, transitions and changes in direction in pipes, ducts and electrical raceways shall be made as required to maintain proper headroom and pitch of sloping lines whether or not indicated on the Drawings. Furnish and install all offsets, pull boxes, etc., as required to effect these transitions and changes in direction.

### **1.10 AS-BUILT DRAWINGS**

- A. Keep on the jobsite one set of drawings upon which any changes in the work which may arise due to field conditions or other causes shall be recorded. These drawings shall be kept in good condition and shall be turned over for approval and for the Using Agency's record upon completion of the work.
- B. If the above drawings are not in good condition, or approved, obtain and pay for an additional set of drawings and neatly transfer such changes.
- C. Contractor shall keep and submit "As-Built" Plans as directed in Division 1, the General Conditions of the Specification.

## **PART 2 – PRODUCTS**

### **2.1 EQUIPMENT**

- A. General: All equipment shall be the capacity and types specified and shown on the equipment schedules and shall be the listed manufacturer and model number or shall be an equal approved in advance by the Architect.
- B. Single Source: For ease of maintenance and parts replacement, to maximum extent possible, use equipment of a single manufacturer.
- C. Material: All material required for a complete and proper installation shall be as specified and as selected by the Architect.

## **PART 3 – EXECUTION**

### **3.1 OPERATING AND MAINTENANCE DATA**

- A. See Division I General Requirements for operational and maintenance manual requirements.
- B. Instructions: The Contractor shall instruct a representative of the Using Agency as to the operation of the system. The instructions shall include the operation of the Electrical System. This Contractor shall go over the entire work with the Using Agency's representative showing him all locations of control devices, motors, etc., instructing him how to operate all such equipment.

### **3.2 TEMPORARY ELECTRIC AND LIGHTING**

- A. Provide temporary electric and lighting as called for in Division 01 and the General Conditions and related Supplementary Conditions.
- B. Contractor shall provide temporary electric service and lighting for new construction. Contractor may obtain power from existing building panels in building for construction site.
- C. Contractor must provide his own jobsite phones, hardwired or cellular.



## **DIVISION 26 - ELECTRICAL**

### **3.3 FINAL TESTS**

- A. Before an application for final acceptance of the work will be considered, all tests deemed necessary to show proper execution of the work will be performed, witnessed, approved, and completed. Scheduling of all testing procedures shall be submitted for approval.
- B. Where electricity-utilizing equipment, supplied by other trades is energized, controlled or otherwise made operative by electric wiring systems, the testing which will prove proper functional performance shall be conducted specifically by the trade responsible for the mechanical equipment.
- C. Testing to show the proper functioning of all lighting fixtures and lamps, including those supplied by others, shall be included in the electrical work.
- D. Perform all tests and inspections of equipment, material and wiring to determine whether all provisions of these specifications and Drawings have been fulfilled. Wiring shall be tested for proper connections, short circuit and grounds, using suitable testing instruments. All equipment shall be tested for proper performance.

### **3.4 GUARANTEES AND WARRANTIES**

- A. All work performed shall be guaranteed in writing by the Contractor for a period of one (1) year to include all equipment, material, and workmanship.
- B. Remedy any defects due to faulty materials or workmanship and pay for any damage to other work resulting therefrom which shall appear within a period of one year from the date of occupancy by the Using Agency or the date of the Certificate of Final Payment of the total contract and in accordance with the terms of any special guarantees provided in the contract.
- C. Unless the material suppliers or manufacturers extend such guarantees or warranties to the Using Agency, the Contractor shall be responsible to correct any deficiencies which arise after such warranties or guarantees expire and prior to one year after completion of work.
- D. See "General Conditions" and Division 1 for additional requirements.

### **3.5 ELECTRICAL DEMOLITION AND RELOCATION**

Provide the demolition of existing electrical equipment, wire and conduit, etc.

### **3.6 TELEPHONE SYSTEM AND DATA**

- A. Telephone service to the building by others, not in contract. Conduit from Utility pole to building by this Contractor.
- B. Provide new tele/data conduit from the existing Garage to the new modular office building as shown on the Drawings.

**END OF SECTION**

**DIVISION 26 - ELECTRICAL**

**SECTION 26 05 19  
BUILDING WIRE AND CABLE**

**PART 1 – GENERAL**

**1.1 SUMMARY**

- A. This section includes the following:
  - 1. Building wire and cable.
  - 2. Underground feeder and branch circuit cable.
  - 3. Wiring connectors and connections.

**1.2 RELATED SECTIONS**

- A. Section 26 05 33 - Conduit
- B. Section 26 05 34 - Boxes
- C. Section 26 05 53 - Electrical Identification

**1.3 REFERENCES**

ANSI/NFPA 70 - National Electrical Code

**1.4 SUBMITTALS**

- A. Submit under provisions of Division 01 and Section 26 01 00.
- B. Product Data: Provide for each cable assembly type.
- C. Test Reports: Indicate procedures and values obtained.
- D. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors.
- E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

**1.5 QUALIFICATIONS**

Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

**1.6 REGULATORY REQUIREMENTS**

- A. Conform to requirements of ANSI/NFPA 70
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

**1.7 PROJECT CONDITIONS**

- A. Verify that field measurements are as shown on Drawings.
- B. Conductor sizes are based on copper.
- C. Wire and cable routing shown on Drawings is approximate unless dimensioned. Contractor shall route wire, cables and conduits to meet Project Conditions. Include wire and cable lengths within 10 feet of length shown.
- D. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

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### **1.8 COORDINATION**

- A. Determine required separation between cable and other work.
- B. Determine cable routing to avoid interference with other work.

## **PART 2 – PRODUCTS**

### **2.1 BUILDING WIRE AND CABLE**

- A. Description: Single conductor insulated wire.
- B. Conductor: Copper
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation: ANSI/NFPA 70, Type THHN/THWN

### **2.2 WIRING CONNECTORS**

Provide UL-listed factory-fabricated, solderless metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Use connectors with temperature ratings equal to or greater than those of the wires upon which used.

### **2.3 DIRECT BURIAL CABLES**

Provide UL-listed direct burial cables with number and size of copper conductor and ground wires as shown on the drawings

## **PART 3 – EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that interior of building has been protected from weather.
- B. Verify that mechanical work likely to damage wire and cable has been completed.

### **3.2 PREPARATION**

Completely and thoroughly swab raceway before installing wire.

### **3.3 WIRING METHODS**

- A. For all locations: Use only building wire, Type THHN/THWN insulation, in raceway or armored cable.
- B. Use wiring methods indicated on Drawings.

### **3.4 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Use solid conductor for feeders and branch circuits 10 AWG and smaller.
- C. Use stranded conductors for control circuits.
- D. Use conductor not smaller than 12 AWG for power and lighting circuits.
- F. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
- G. Pull all conductors into raceway at same time.
- H. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- I. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Contractor shall tape uninsulated conductors and connectors with electrical tape to 150 percent of the insulation rating of conductor.

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- J. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
- K. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

### **3.5 INTERFACE WITH OTHER PRODUCTS**

- A. Identify wire and cable under provisions of Section 26 05 53.
- B. Identify each conductor with its circuit number or other designation indicated on Drawings.

### **3.6 FIELD QUALITY CONTROL**

- A. Perform field inspection and testing under provisions of Division 01.
- B. Inspect wire for physical damage and proper connection.
- C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
- D. Verify continuity of each branch circuit conductor.
- E. Verify continuity of neutrals and ground.

**END OF SECTION**

**DIVISION 26 - ELECTRICAL**

**SECTION 26 05 26  
GROUNDING AND BONDING**

**PART 1 – GENERAL**

**1.1 SUMMARY**

- A. This section includes the following:
  - 1. Grounding electrodes and conductors
  - 2. Equipment grounding conductors
  - 3. Bonding

**1.2 RELATED SECTIONS**

Section 03300 - Cast-In-Place Concrete

**1.3 REFERENCES**

- A. ANSI/NFPA 70 - National Electrical Code

**1.4 GROUNDING ELECTRODE SYSTEM**

- A. Metal underground water pipe
- B. Metal frame of the building
- C. Rod electrode
- D. Active electrode

**1.5 PERFORMANCE REQUIREMENTS**

Grounding System Resistance: 25 ohms maximum

**1.6 SUBMITTALS**

- A. Submit under provisions of Section 26 01 00 and Division 01.
- B. Product Data: Provide data for grounding electrodes and connections.
- C. Test Reports: Indicate overall resistance to ground and resistance of each electrode.
- D. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation and installation of exothermic connectors.

**1.7 PROJECT RECORD DOCUMENTS**

- A. Submit under provisions of Division 01.
- B. Accurately record actual locations of grounding electrodes.

**1.8 QUALIFICATIONS**

Manufacturer: Company specializing in manufacturing Products specified in this Section with a minimum of three years documented experience.

**1.9 REGULATORY REQUIREMENTS**

- A. Conform to requirements of ANSI/NFPA 70.

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- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown on the drawings.

### **PART 2 – PRODUCTS**

#### **2.1 ROD ELECTRODE**

- A. Manufacturers: Provide the quantity of electrodes shall meet requirements of NFPA 70 and satisfy local code official.
- B. Material: Copper or Copper-clad steel.
- C. Minimum Diameter: 3/4 inch.
- D. Minimum Length: 8 feet.

#### **2.2 MECHANICAL CONNECTORS**

- A. Manufacturers: Manufacturers who have demonstrated 3 years or more experience and also have U.L. listed equipment.
- B. Material: Bronze.

#### **2.3 WIRE**

- A. Material: Stranded copper
- B. Grounding Electrode Conductor: Size to meet NFPA 70 requirements

### **PART 3 – EXECUTION**

#### **3.1 EXAMINATION**

Verify that final backfill and compaction has been completed before driving rod electrodes.

#### **3.2 INSTALLATION**

- A. Install Products in accordance with manufacturer's instructions.
- B. Provide bonding to meet Regulatory Requirements.
- C. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

#### **3.3 FIELD QUALITY CONTROL**

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Use suitable test instrument to measure resistance to ground of system. Perform testing in accordance with test instrument manufacturer's recommendations using the fall- of-potential method.

**END OF SECTION**

**DIVISION 26 - ELECTRICAL**

**SECTION 26 05 29  
HANGERS AND SUPPORTS**

**PART 1 – GENERAL**

1.1 SUMMARY

- A. This section includes the following:
  - 1. Conduit and equipment supports
  - 2. Anchors and fasteners

1.2 REFERENCES

- A. NECA - National Electrical Contractors Association
- B. ANSI/NFPA 70 - National Electrical Code

1.3 SUBMITTALS

- A. Submit under provisions of Section 26 01 00 and Division 01.
- B. Product Data: Provide manufacturer's catalog data for fastening systems.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

**PART 2 – PRODUCTS**

2.1 PRODUCT REQUIREMENTS

- A. Materials and Finishes: Provide adequate corrosion resistance.
- B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.
- C. Anchors and Fasteners:
  - 1. Concrete Structural Elements: Use expansion anchors, powder actuated anchors and preset inserts.
  - 2. Steel Structural Elements: Use beam clamps, steel ramset fasteners and welded fasteners.
  - 3. Concrete Surfaces: Use self-drilling anchors and expansion anchors.
  - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts and hollow wall fasteners.
  - 5. Solid Masonry Walls: Use expansion anchors
  - 6. Sheet Metal: Use sheet metal screws.
  - 7. Wood Elements: Use wood screws.

2.2 STEEL CHANNEL

- A. Pre-drilled channel supports for Panel and Meter Bases where shown on Drawings.
- B. Description: Stainless steel

## **DIVISION 26 - ELECTRICAL**

### **2.3 POWDER ACTUATED ANCHORS**

Manufacturer: Meeting NECA Standards commercially produced

## **PART 3 – EXECUTION**

### **3.1 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation".
- C. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.
- D. Do not use spring steel clips and clamps.
- E. Obtain permission from Architect/Engineer before using powder-actuated anchors.
- F. Do not drill or cut structural members.
- G. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- H. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- I. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch (25 mm) off wall.

**END OF SECTION**



**DIVISION 26 - ELECTRICAL**

**SECTION 26 05 33  
CONDUIT**

**PART ONE - GENERAL**

**1.1 SUMMARY**

- A. This section includes the following:
  - 1. Metal conduit
  - 2. Fittings and conduit bodies

**1.2 RELATED SECTIONS**

- A. Section 260534 - Boxes
- B. Section 260526 - Grounding and Bonding
- C. Section 260529 - Hangers and Supports
- D. Section 260553 - Electrical Identification

**1.3 REFERENCES**

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated
- B. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated
- C. ANSI C80.5 - Rigid Aluminum Conduit
- D. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
- E. ANSI/NFPA 70 - National Electrical Code
- F. NECA "Standard of Installation"

**1.4 DESIGN REQUIREMENTS**

Conduit Size: ANSI/NFPA 70

**1.5 SUBMITTALS**

- A. Submit under provisions of Division 1.
- B. Product Data: Provide for metallic conduit, metallic tubing fittings and conduit bodies.

**1.6 PROJECT RECORD DOCUMENTS**

- A. Submit under provisions of Division 1.
- B. Accurately record actual routing of conduits larger than 2 inches.

**1.7 REGULATORY REQUIREMENTS**

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

**1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, protect, and handle Products to site under provisions of Division 01.
- B. Accept conduit on site. Inspect for damage.
- C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

## **DIVISION 26 - ELECTRICAL**

### **1.9 PROJECT CONDITIONS**

- A. Verify that field measurements are as shown on Drawings.
- B. Verify routing and termination locations of conduit prior to rough-in.
- C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

## **PART 2 – PRODUCTS**

### **2.1 CONDUIT REQUIREMENTS**

- A. Minimum Size: 3/4 inch unless otherwise specified
- B. All electrical conduits: Use rigid steel conduit and fittings.
- C. Telephone and Data Conduits: Dry Locations/ Indoors only:
  - 1. Dry Locations/ Indoors only: Use EMT conduit and fittings.
  - 2. Outdoors and Underground: Use rigid steel conduit and fittings.

### **2.2 METAL CONDUIT**

- A. Rigid Steel Conduit and EMT: ANSI C80.1 and NEC 70.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; material to match conduit.

### **2.3 NON-METALLIC CONDUIT**

- A. Polyvinyl Chloride (PVC) UL Listed Rigid Conduit and Fittings, Schedule 40 and 80.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; material to match conduit.

### **2.4 FIRE SEALANT**

- A. Manufacturers: 3 M Co., Hilti, Fire-Safe, or approved equal
- B. Description: Fire caulk sealant and system approved for the application

## **PART 3 – EXECUTION**

### **3.1 INSTALLATION**

- A. Install conduit in accordance with NECA "Standard of Installation."
- B. Install nonmetallic conduit in accordance with manufacturer's instructions.
- C. Arrange supports to prevent misalignment during wiring installation.
- D. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- E. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
- F. Fasten conduit supports to building structure and surfaces under provisions of Specification.
- G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports
- H. Do not attach conduit to ceiling support wires.
- I. Arrange conduit to maintain headroom and present neat appearance.
- J. Route conduit parallel and perpendicular to walls.
- K. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- L. Route conduit in and under slab from point-to-point.
- M. Do not cross conduits in slab.
- N. Maintain adequate clearance between conduit and piping.
- O. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F (40 degrees C).

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- P. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- Q. Bring conduit to shoulder of fittings; fasten securely.
- R. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- S. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2 inch (50 mm) size.
- T. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- U. Provide suitable pull string in each empty conduit except sleeves and nipples.
- V. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- W. Ground and bond in accordance with NFPA 70.
- X. Provide excavation, compaction and backfill for all underground conduits and pipe markers installed above the conduits in trench. Conduits shall be buried a minimum of 24" below grade or as noted on the Drawings.

### **3.2 INTERFACE WITH OTHER PRODUCTS**

- A. Install conduit to preserve fire resistance rating of partitions, walls, floors, and other elements, using 3M brand fire barrier caulk CP-25 or equal to seal off openings around conduit.
- B. Route conduit through wall and floor openings for conduits. Coordinate location with Modular Building Supplier and the Using Agency.

**END OF SECTION**

**DIVISION 26 - ELECTRICAL**

**SECTION 26 05 34  
BOXES**

**PART 1 – GENERAL**

1.1 SUMMARY

- A. This section includes the following:
  - 1. Wall and ceiling outlet boxes
  - 2. Pull and junction boxes
  - 3. Underground pull boxes

1.2 RELATED SECTIONS

- A. Section 26 05 33 - Conduit
- B. Section 26 27 28 - Equipment Wiring Systems

1.3 REFERENCES

- A. ANSI/NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies
- B. ANSI/NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports
- C. ANSI/NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports
- D. ANSI/NFPA 70 - National Electrical Code
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum)

1.4 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 01.
- B. Accurately record actual locations and mounting heights of outlet, pull, and junction boxes.

1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.6 PROJECT CONDITIONS

- A. Verify field measurements are as shown on Drawings.
- B. Verify locations of outlets in Boiler Room prior to rough-in.
- C. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose. Include installation within 10 feet.

**PART 2 – PRODUCTS**

2.1 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, galvanized steel.
  - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch (13 mm) male fixture studs where required.
  - 2. Use with EMT conduits only.
- B. Cast Boxes: NEMA FB 1, Type FD, aluminum, cast fer alloy. Provide gasketed cover by box manufacturer. Provide threaded hubs. Use with rigid steel conduit.

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### **2.2 PULL AND JUNCTION BOXES**

Sheet Metal Boxes: NEMA OS 1, galvanized steel. Use with EMT

### **2.2 UNDERGROUND PULL BOXES**

- A. Provide polymer concrete boxes and covers where shown on the Plans.
- B. Provide underground enclosure with cover for feeder circuit in sizes as listed on the Drawings.
- C. Provide box extensions as required for bottom of box to be 6" (min) below deepest existing conduit.
- D. Provide with tool to remove cover.
- E. Boxes shall meet ASTM D-543 chemical resistance, D-2444 impact resistance, C1028 for coefficient of friction; Code of Federal Regulations CFR 1755.910 for fire resistance, and ANSI/SCTE-77 2002 Specification for Underground Enclosure Integrity.
- F. Boxes must be U.L. listed and have label on both box and cover.
- G. The box shall be buried in the ground with top flush with grade. Provide concrete composite junction boxes with integral covers suitable for ANSI/SCTE77 Tier 8 loading.
- H. See Drawings for additional specifications.

## **PART 3 – EXECUTION**

### **3.1 INSTALLATION**

- A. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- B. Install electrical boxes to maintain headroom and to present neat mechanical appearance.
- C. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- D. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches (150 mm) from ceiling access panel or from removable recessed luminaire.
- E. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods under the provisions of Section 26 05 29.
- F. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.
- G. Use flush mounting outlet boxes in finished areas.
- H. Do not install flush mounting boxes back-to-back in walls; provide minimum 6 inch (150 mm) separation. Provide minimum 24 inches (600 mm) separation in acoustic rated walls.
- I. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- J. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- K. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- L. Use adjustable steel channel fasteners for hung ceiling outlet box.
- M. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.
- N. Use gang box where more than one device is mounted together. Do not use sectional box.
- O. Use gang box with plaster ring for single device outlets.
- P. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- Q. Provide excavation and 4" pea gravel below and around the underground junction boxes and mount top of box 2" above adjacent grade and taper finish grade up to top of box.

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### **3.2 INTERFACE WITH OTHER PRODUCTS**

- A. Coordinate installation of outlet box for products furnished under Division 22.
- B. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- C. Coordinate mounting heights and locations of outlets mounted above counters, benches and backsplashes.

### **3.3 ADJUSTING**

- A. Adjust flush-mounting outlets to make front flush with finished wall material.
- B. Install knockout closure in unused box opening.

**END OF SECTION**

## DIVISION 26 - ELECTRICAL

### SECTION 26 05 53 ELECTRICAL IDENTIFICATION

#### PART ONE - GENERAL

##### 1.1 SECTION INCLUDES

- A. Nameplates and labels
- B. Wire and cable markers
- C. Conduit markers

##### 1.2 REFERENCES

NFPA 70 - National Electrical Code

##### 1.3 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data: Provide catalog data for nameplates, labels, and markers.

##### 1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

#### PART 2 – PRODUCTS

##### 2.1 NAMEPLATES AND LABELS

- A. Nameplates: Engraved three-layer laminated plastic, white letters on black background.
- B. Locations: Each electrical distribution and control equipment enclosure.
- C. Letter Size:
  - 1. Use 1/4 inch letters for identifying individual equipment and loads.
  - 2. Use 1/2 inch letters for identifying grouped equipment and loads.
- D. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background. Use only for identification of individual wall switches and receptacles, control device stations, and telephone outlets.

##### 2.2 WIRE MARKERS

- A. Manufacturers: Seton
- B. Description: Tape, split sleeve, or tubing type wire markers.
- C. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.
- D. Legend:
  - 1. Power and Lighting Circuits: Branch circuit or feeder number indicated on Drawings.
  - 2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on shop drawings.

##### 2.3 UNDERGROUND WARNING TAPE

- A. Manufacturers:
  - 1. Seton or approved equal.

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2. Substitutions: Under provisions of Division 01

- B. Description: 4 inch wide plastic tape, colored yellow with suitable warning legend describing buried electrical lines.

### **PART 3 – EXECUTION**

#### **3.1 PREPARATION**

Degrease and clean surfaces to receive nameplates and labels.

#### **3.2 APPLICATION**

- A. Install nameplate and label parallel to equipment lines.
- B. Secure nameplate to equipment front using adhesive.
- C. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.
- D. Identify underground conduits using underground warning tape. Install one tape per trench at 3 inches below finished grade.

**END OF SECTION**



**SECTION 26 06 20  
PANELBOARDS**

**PART 1 – GENERAL**

**1.1 SUMMARY**

- A. This section includes the following:
  - 1. Branch circuit panelboards and breakers

**1.2 RELATED WORK**

- A. Section 26 05 29 – Hangers and Supports
- B. Section 26 05 53 - Electrical Identification: Engraved nameplates

**1.3 REFERENCES**

- A. NECA (National Electrical Contractors Association) "Standard of Installation"
- B. NEMA AB 1 - Molded Case Circuit Breakers
- C. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies
- D. NEMA KS 1 - Enclosed Switches
- E. NEMA PB 1 - Panelboards
- F. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less
- G. NFPA 70 - National Electrical Code

**1.4 SUBMITTALS**

- A. Submit under provisions of Section 26 01 00 and Division 1.
- B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

**1.5 PROJECT RECORD DOCUMENTS**

- A. Submit under provisions of Section 26 01 00 and Division 1.
- B. Record actual locations of Products; indicate actual branch circuit arrangement.

**1.6 OPERATION AND MAINTENANCE DATA**

- A. Submit under provisions of Section 26 01 00 and Division 1.
- B. Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

**1.7 QUALITY ASSURANCE**

- A. Perform Work in accordance with NECA Standard of Installation.
- B. Maintain one copy of each document on site.

## **DIVISION 26 - ELECTRICAL**

### 1.8 QUALIFICATIONS

Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

### 1.9 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by UL as suitable for purpose specified and indicated.

### 1.10 FIELD MEASUREMENTS

Verify that field measurements are as indicated on shop drawings.

### 1.11 MAINTENANCE MATERIALS

- A. Provide maintenance materials under provisions of Division 1.
- B. Provide two of each panelboard key.

### 1.12 EXTRA MATERIALS

- A. Furnish under provisions of Division 1.
- B. Provide four 20 amp, 1 pole spare breakers in each panel.

## **PART 2 – PRODUCTS**

### 2.1 MANUFACTURERS

- A. New circuit breakers to be same manufacturer and style as existing panel manufacturer for use in existing panels.
- B. AIC rating to match existing breaker ratings in panels.

## **PART 3 – EXECUTION**

### 3.1 INSTALLATION

- A. Install breakers in panelboards in accordance with NEMA PB 1.1.
- B. Provide filler plates for unused spaces in panelboards.
- C. Provide revised typed circuit directory for each branch circuit panelboard where breakers are added into existing panels. Revise directory to reflect circuiting changes required to balance phase loads. Include copy of panel directory in maintenance manuals.
- D. Provide engraved plastic nameplates under the provisions of Section 26 05 53.

### 3.2 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Division 1.
- B. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.
- C. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

**END OF SECTION**

**DIVISION 26 - ELECTRICAL**

**SECTION 26 27 26  
WIRING DEVICES**

**PART ONE - GENERAL**

1.1 SUMMARY

- A. This section includes the following:
  - 1. Receptacles
  - 2. Device plates and box covers

1.2 RELATED SECTIONS

Section 26 05 34 - Boxes

1.3 REFERENCES

- A. NEMA WD 1 - General Purpose Wiring Devices
- B. NEMA WD 6 - Wiring Device Configurations

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
- C. Manufacturer's Instructions:
  - 1. Indicate application conditions and limitations of use stipulated by product testing agency specified under regulatory requirements.
  - 2. Include instructions for storage, handling, protection, examination, preparation, operation and installation of product.

1.5 QUALIFICATIONS

Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

**PART 2 – PRODUCTS**

2.1 RECEPTACLES

- A. Ground Fault Duplex Convenience Receptacle:
  - 1. Bryant Model 5362-GFI
  - 2. Equals by Hubbell, Arrow-Hart, or approved equal.

2.2 OUTLET COVERS

Cover Plate: Provide weatherproof outlet covers on outlets which remain closed when plug is installed in receptacle.

## **DIVISION 26 - ELECTRICAL**

### 2.3 SPECIAL CONDITIONS

Special outlets shall be as noted on the Plans.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Verify outlet boxes are installed at proper height.
- B. Verify wall openings are neatly cut and will be completely covered by wall plates.
- C. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

### 3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

### 3.3 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install devices plumb and level.
- C. Connect wiring device grounding terminal to outlet box with bonding jumper.
- D. Connect wiring devices by wrapping conductor around screw terminal.

### 3.4 INTERFACE WITH OTHER PRODUCTS

Coordinate locations of outlet boxes provided under Section 26 05 34.

### 3.5 FIELD QUALITY CONTROL

- A. Inspect each wiring device for defects.
- B. Operate each wall switch with circuit energized and verify proper operation.
- C. Verify that each receptacle device is energized.
- D. Test each receptacle device for proper polarity.
- E. Test each GFCI receptacle device for proper operation.
- F. Adjust devices and wall plates to be flush and level.

### 3.6 LOCATION OF OUTLETS

- A. Locations of outlets, appliances, etc., are approximate and this contractor shall be responsible for proper locations in order to make them fit with the architectural details and also instructions from the Architect's representative at the jobsite. Verify with Architectural Plans before installation of outlets.
- B. The Using Agency, Architect and Engineer reserve the right to move each outlet location to better adapt them for usage, prior to installation, within a distance of 20'-0" as presently indicated, at no additional cost.

**END OF SECTION**

**DIVISION 26 - ELECTRICAL**

**SECTION 26 27 28  
EQUIPMENT WIRING SYSTEMS**

**PART 1 – GENERAL**

1.1 SUMMARY

- A. This section includes the following:
  - 1. Electrical connections to equipment specified under other sections.

1.2 RELATED SECTIONS

- A. Division 22 – Plumbing Equipment
- B. All Division 26 - Sections.

1.3 REFERENCES

- A. NEMA WD 1 - General Purpose Wiring Devices
- B. NEMA WD 6 - Wiring Device Configurations
- C. ANSI/NFPA 70 - National Electrical Code

1.4 SUBMITTALS

- A. Submit under provisions of Section 26 01 00 and Division 01.
- B. Product Data: Provide wiring device manufacturer's catalog information showing dimensions, configurations, and construction.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.6 COORDINATION

- A. Coordinate work with Division 22 plumbing sections and other Division 26 electrical sections.
- B. Obtain and review shop drawings, product data, and manufacturer's instructions for equipment furnished under other sections.
- C. Determine connection locations and requirements.
- D. Sequence rough-in of electrical connections to coordinate with installation schedule for equipment.
- E. Sequence electrical connections to coordinate with start-up schedule for equipment.

**PART 2 – PRODUCTS**

2.1 CORDS AND CAPS

- A. Attachment Plug Construction: Conform to NEMA WD 1.
- B. Configuration: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
- C. Cord Construction: ANSI/NFPA 70, Type SJO multi-conductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.

## **DIVISION 26 - ELECTRICAL**

- D. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

### **2.2 RACEWAY CONNECTIONS**

- A. Most equipment shall be hard wired into panels by running conduit and building wires into cabinets, starters or disconnects.
- B. This Contractor shall wire return starters and disconnect switches and motor starters to equipment.

## **PART 3 – EXECUTION**

### **3.1 EXAMINATION**

Verify that equipment is ready for electrical connection, wiring, and energization.

### **3.2 ELECTRICAL CONNECTIONS**

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using plug cords.
- C. Make wiring connections using wire and cable with insulation suitable for temperatures encountered in heat producing equipment.
- D. Provide receptacle outlet where connection with attachment plug is indicated. Provide cord and cap where field-supplied attachment plug is indicated.
- E. Provide suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- F. Provide interconnecting conduit and wiring between devices and equipment where indicated.

**END OF SECTION**

**DIVISION 33 - EARTHWORK**

**SECTION 31 10 00  
SITE CLEARING**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This work shall consist of:
  - 1. Clearing of the site
  - 2. Removal of poles, posts, and other such objects
  - 3. Removal of miscellaneous existing materials that interfere with new construction.
- B. Related work:
  - 1. Excavation and Fill is specified in Section 31 23 00
  - 2. Grading is specified in Section 31 22 00
  - 3. Soil Erosion Controls is specified in Section 31 25 00

1.3 STANDARD SPECIFICATIONS

- A. All work to be performed under this section shall comply with the provisions of Section 201 of The "NJDOT Standard Specification for Road and Bridge Construction, 2007," as amended herein.

**PART 2 – PRODUCTS – (NOT USED)**

**PART 3 – EXECUTION**

3.1 CONSTRUCTION

- A. The following is added to Subsection 201.03.01:
  - 1. No unnecessary clearing of trees or vegetation shall be performed. Only those trees and landscape features that interfere with the construction shall be removed. Trees, shrubs, and other landscape features that do not interfere with the project shall be protected during the progress of the work. Trees shown on the plan to remain shall be protected against damage during construction.

**END OF SECTION**

**DIVISION 33 - EARTHWORK**

**SECTION 31 22 00  
GRADING**

**PART 1 – GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The work under this Section includes the following:
  1. Grading
  2. Disposition of excess excavated materials and debris
  3. Final cleanup

1.3 RELATED WORK

- A. The following similar work is specified under other Sections:
  1. Excavation and Fill is specified in Section 31 23 00
  2. Site Clearing is specified in Section 31 10 00
  3. Soil erosion Controls is specified in Section 31 25 00

1.4 QUALITY ASSURANCE TESTING

- A. Compaction operations shall be controlled by testing. The contractor shall engage and pay for, a testing agency approved by the Division of Property Management and Construction, to control testing operations. Compaction Testing requirements is specified in 31 23 00

**PART 2 – PRODUCTS (Not Used)**

**PART 3 – EXECUTION**

3.1 GRADING

- A. Rough grading: Grade in accordance with the elevations indicated on the drawings for the proper execution of work.
- B. Bring subgrades, after final compaction, to the grades and sections for preparation of the final grading operations.
- C. Final Grading: Spread and compact all soil material as required to bring final grades to those indicated on the drawings. For areas to receive landscape mulch, rake entire surface removing all debris, roots, sticks and other miscellaneous material in preparation of installation of final covering.

3.2 EXCESS MATERIAL

- A. Excess soil material from excavation, where unsuitable or in excess of material required on the site for construction, shall be removed from the Project Site and disposed of by the Contractor.

3.4 FINAL CLEANUP



**DIVISION 33 - EARTHWORK**

- A. All areas occupied by the Contractor in connection with the Project shall be cleaned of all rubbish; excess materials, temporary structures and equipment, and all parts of the site shall be left in an acceptable condition.

**END OF SECTION**

**DIVISION 33 - EARTHWORK**

**SECTION 31 23 00  
EXCAVATION AND FILL**

**PART 1 – GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The work under this Section includes the following:
  - 1. Building excavation
  - 2. Excavation for site improvements
  - 3. Filling, backfilling, and compaction
  - 4. Compaction testing
  - 3. Parking lot excavation
  - 4. Stockpiling of excavated materials
  - 5. Barrow excavation
  - 7. Filling, backfilling, and compaction
  - 8. Disposition of excess excavated materials and debris
  - 9. Final cleanup

1.3 RELATED WORK

- A. The following similar work is specified under other Sections:
  - 1. Site Clearing is specified in Section 31 10 00
  - 2. Grading is specified in Section 31 22 00
  - 3. Soil Erosion Controls is specified in Section 31 25 00

1.4 STANDARDS

- A. All work to be performed under this Section shall comply with the provisions of Sections 202, 203, 204, 207 and 208 of the “NJDOT Standard Specification for Road and Bridge Construction,” as amended herein.

1.5 SUBMITTALS

- A. If excess excavated material is to be used for structural fill, provide Certificate from testing agency, approved by Architect, that the fill material meets the Specifications.
- B. Certification for each type of fill material, certifying that the material is clean in accordance with New Jersey Administrative Code (NJAC 7:26E-6).
- C. Provide an underground utility survey of all utilities in the area, including, but not limited to, underground water, sewer, telecom/data lines, and electrical duct banks including owner owned distributions.

1.6 REFERENCES

- A. ASTM C 136 Method for Sieve Analysis of Fine and Course Aggregates
- B. ASTM C 136 Test Method for Particle Size Analysis of Soils
- C. ASTM D 698 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 Pound Rammer and 12 inch Drop
- D. ASTM D 1556 Test Method for Density of Soil in Place by the Sand-Cone Method

## DIVISION 33 - EARTHWORK

- E. ASTM D 2167 Test Method for Density and Unit Weight of Soil In-Place by the Rubber Balloon Method
- F. ASTM D 2487 Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- G. ASTM D 2922 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- H. ASTM D 3017 Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- I. ASTM D 4318 Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- J. ASTM D-1557 ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>(2,700 kN-m/m<sup>3</sup>))

### 1.7 QUALITY ASSURANCE TESTING

- B. Backfilling/compaction operations shall be controlled by testing. Compaction shall be determined by ASTM D-698. The contractor shall engage and pay for, a testing agency approved by DPMC, to control testing operations.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

- A. Fill Material: Well graded sand and gravel free of deleterious material and organic matter and containing no more than 12% fines (minus No. 200 sieve size).
- B. Reuse of On-Site Soils: The upper soil strata consisting of clayey silt is considered marginal for re-use as fill. The presence of clayey silt makes the soils moisture sensitive during periods of ran or wet site conditions. Moisture sensitive soils may be difficult to place or compact in a manner that will prevent excess settlement or unstable site grades. The clayey soils can be used with appropriate moisture content or it can be mixed with dry granular soils to lower the overall moisture content. Use upper strata of existing soil for fill in non-structural areas of the site. Insitu soils meeting the specifications for load bearing fill or imported granular fill may be utilized under observation and testing by the Testing Laboratory.
- C. Load Bearing Fill: Controlled fill should consist of inorganic, readily compactable, predominantly well-graded granular soils with no more than 15% fines (material passing the No. 200 sieve). Fragments having a maximum dimension greater than 3 inches are excluded from the fill. The moisture content of the fill materials shall be controlled to within tolerable limits of the optimum by wetting, aeration or blending to facilitate compaction. The field moisture-density relationship of materials being used will be as per ASTM D-1557 and monitored by the Testing Agency during fill placement activities.
- D. Controlled fill: Controlled fill shall be placed in loose horizontal lifts with a maximum thickness of 8". Controlled fill within the construction area shall be compacted to at least 95% of the maximum dry density as determined by the Modified Proctor Test (ASTM D 1557). Fills shall be stable without significant movement under construction traffic, as judged by the Testing Agency and Architect. Quality control testing of in-place fill densities shall be conducted throughout the entire earthwork operation, load bearing fills and areas where pavement and structures are proposed.
- E. Imported granular fill material, if required, shall be well-graded and should conform to the following material gradation requirements. Alternate material submission such as dense graded aggregate and recycled concrete aggregates may be made to the Architect for approval.

**ALLOWABLE GRADATION ENVELOPE  
IMPORTED GRANULAR FILL**

U. S. Standard Sieve Size	Percent Fines by Weight
2"	100
1"	80 - 100
3/8"	70 - 100
No. 10	50 - 100
No. 30	30 - 85
No. 60	15 - 65
No. 200	5 - 15

- F. Samples and analysis of all imported materials to be submitted in accordance with Division 1 Specifications.
- G. Under Slab Fill: 6" layer of ¾" clean crushed stone shall be placed beneath all grade slabs and compacted
- H. Geotextile Filter Fabric: TC Mirafi N-Series type 140N, as manufactured by TC Mirafi, 363 South Holland Drive, Pendergrass, Georgia, 30567, or an equal manufactured by Amoco Fabrics and Fibers, or SI Geosolutions.

**PART 3 – EXECUTION**

**3.1 GENERAL EXCAVATION**

- A. Excavation shall be carried to the limits required by the construction. Material shall be removed to the lines and depth to allow construction of the various portions of the project.
- B. All excavation shall be unclassified, and all material of whatever character encountered shall be removed, including bituminous and concrete pavements, footings and foundations, whether shown on the plan, or as may be encountered during the course of construction.
- C. Strip building site of all pavement and unclassified material. Excavate to depth required for footings and precast pits. Compact excavations as herein after specified. Install a 6" layer of granular fill below footings and compact. Back fill excavations within the building perimeter with load bearing controlled fill and compact as herein after specified to levels required.

**3.2 SITE PREPARATION**

- A. Site Improvements: Strip the area delineated for construction of the first 6" to remove surface materials, including top soils, grass, shrubs, pavement, concrete and unclassified material. Stockpile top soil for use in final grading operations. Cut site to subgrade elevation. Proof roll the parking lot, walkways and areas where site improvements are to be constructed, a minimum of five (5) overlapping passes using at least ten (10) ton vibratory compactor or equivalent. Any soft areas detected during proof rolling shall be excavated and replaced with control compacted fill material. Conduct compaction tests on the prepared subgrade as specified under Section 3.7 of these specifications, prior to construction of any improvements or placement of any pavement.

**3.3 EXCESS MATERIAL**

- B. Excess soil material from excavation, where unsuitable or in excess of material required on the site for construction, shall be removed from the Project Site and disposed of by the Contractor.

**3.4 DEWATERING**

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- A. If ground or rain water occurs in excavated areas, the Contractor shall dewater by pumping, well pointing or other approved methods except as herein provided.

### 3.5 FILL PLACEMENT

- A. Do not place fill until the required excavation and foundation preparation have been completed, and have been observed by the Architect and approved by the Testing Agency.
- B. Do not place fill on subgrades that have not been compacted or contain high moisture content.
- C. Do not place fill on frozen surfaces, or on surfaces covered, or partially covered by snow or ice.
- D. Do not place fill that contains frozen material.
- E. Place fill in approximately horizontal layers. The thickness of each layer before compaction must be suitable for the final compacted layer thickness for the fill being placed.
- F. Filling and backfilling shall consist of depositing, spreading and compacting of approved materials to be required elevation indicated. Materials shall consist of suitable earth material, free from debris, organic substances, frozen materials, clay, or other undesirable material. Borrow of excavated earth shall be permitted if it is determined by testing to meet the requirements for fill or load bearing fill.
- G. Fill material shall be placed in maximum 8" layers. Each layer shall be spread evenly and shall be thoroughly placed and mixed during the spreading to ensure uniformity of material in each layer. Surface of the fill shall be kept at a slight slope to facilitate drainage of any ground or surface water that enters the excavation. The moisture content of the fill material shall be at or slightly below the optimum moisture content for the soils being utilized during the entire compaction operation. If in the opinion of the Architect, the fill is too dry for proper compaction, the Contractor shall spray the fill with sufficient quantity of clean water to bring the fill to the proper moisture content. No fill material shall be placed, spread or compacted while the ground or fill is frozen or thawing or during unfavorable conditions. When work is interrupted by heavy rain, fill operations shall not be resumed unless the moisture content and density of the fill are as previously specified. The ground water shall be kept a minimum of 2' below the surface of the fill during the backfilling operation. Compaction of the fill shall be achieved by suitable methods using roller and/or vibratory compactors of the proper size commensurate with the construction area. Manual compactors shall be used within five (5) feet of constructed or existing foundations, walls, slabs.
- H. After excavation for footings and pits, exposed subgrade shall be compacted by a minimum of two passes with a "jumping jack" compactor immediately prior to placement of stone fill, footing concrete and tested for compaction of 95% maximum dry density.
- I. The minimum density to be obtained in the earth backfill and porous fill shall be 95% of "maximum density" as defined in ASTM D-1557; compacted soil not meeting required density when tested in place shall be replaced or removed until additional tests, at Contractor's expenses, indicate compliance with specifications.

### 3.6 SUBSURFACE STRUCTURE EXCAVATION

- A. Excavations or portions of excavations shall be dug by hand when in proximity to utilities.
- B. Previously excavated or existing material for Class B Bedding shall consist of sand or sandy soil, all of which shall pass a 3/8 inch sieve and not more than 10 percent of which shall pass a No. 200 sieve. Should existing soils not meet these conditions; pipes shall be bedded in No. 57 aggregate.

### 3.7 TESTING

- A. The Contractor shall employ a testing laboratory prequalified by New Jersey Department of Treasury, Division of Property Management and Construction and approved by the Architect to preform all testing required under this section.
- B. Backfilling/compaction operations shall be controlled by testing. Compaction shall be determined by ASTM D-1557 and meet the following:

**DIVISION 33 - EARTHWORK**

<b>Location</b>	<b>Percent Maximum Dry Density (ASTM D-1557)</b>
Supporting Foundations	95%
Supporting Grade Slabs	95%
Drives and Parking Areas	95%
Site (non Load Bearing)	95%

- C. Inspection results shall be reported in writing to Architect and Contractor on same day that inspections are made. Reports shall contain location, depth of fill, depth of lift, thickness of aggregate base course. The Architect and Contractor are to be notified verbally at the time of inspection of any deviations from the construction documents. Report shall note all deviations that were not corrected prior to continued operations.
- D. Fill placed at densities lower than that specified, or at moisture contents outside the specified acceptable range, or otherwise not in conformance with the requirements of this specification, must be re-worked to meet those requirements, or removed and replaced with acceptable material, placed in accordance with all of the requirements of this specification, and at no additional cost to the Owner.

**3.8 FINAL CLEANUP**

- A. All areas occupied by the Contractor in connection with the Project shall be cleaned of all rubbish; excess materials, temporary structures and equipment, and all parts of the site shall be left in an acceptable condition.

**END OF SECTION**

**DIVISION 33 - EARTHWORK**

**SECTION 31 25 00  
EROSION AND SEDIMENTATION CONTROLS**

**PART 1 – GENERAL**

1.5 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.6 SUMMARY

- A. This section includes the following:
  - 1. Construction of temporary and permanent measures to control soil erosion and sedimentation including, but not limited to, vegetative cover, mulching, tree protection, grading, diversions, sediment basins, slope protection, conduit outlet protection, siltation barriers, dust control, and other such methods and materials necessary or directed by the Architect to control soil erosion and sedimentation during construction.
- B. Related Work:
  - 1. Excavation and Fill is specified in Section 31 23 00
  - 2. Site Clearing is specified in Section 31 10 00
  - 3. Grading is specified in Section 31 22 00
  - 4. Plantings is specified in Section 31 25 00

1.7 STANDARDS

- A. All work shall conform to the latest edition of “Standards for Soil Erosion and Sediment Control in New Jersey,” as published by The NJ State Soil Conservation Committee, NJ Department of Agriculture.

1.8 SUBMITTALS

- A. Product Data: Manufacturer's Catalogue cuts indicating material compliance and specified options.

**PART 2 - PRODUCTS**

2.1 GENERAL

- A. Materials shall conform to the following Subsection of the NJDOT Standard Specifications for Road and Bridge Construction, 2007:

1. Rip-rap Stone	901.08
2. Mulch Binder	917.07
3. Fertilizer	917.03
4. Limestone	917.04
5. Mulch	917.06
6. Seed Mixture	917.05
7. Geotextiles	919.01
8. Soil Stabilization Matting	917.08
9. Miscellaneous Materials	909

- B. Any other materials required shall conform to the “Standards for Soil Erosion and Sediment Control in New Jersey.”

**DIVISION 33 - EARTHWORK**

**PART 3 – EXECUTION**

**3.1 INSTALLATION**

- A. Soil erosion and sediment control devices shall be installed and erected in accordance with the sequence of construction shown on the certified soil erosion and sediment control plan.
- B. Soil erosion and Sediment Control devices shall be installed in accordance with the “Standards for Soil Erosion and Sediment Control in New Jersey,” latest edition, and as shown on the certified plan, and the “NJDOT Standard Specification For Road And Bridge Construction, 1989,” as amended herein.

**END OF SECTION**



**DIVISION 32 – EXTERIOR IMPROVEMENTS**

**SECTION 32 11 23  
AGGREGATE BASE COURSE**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section

1.2 SUMMARY

- A. This work shall consist of the construction of base courses of soil aggregate or dense graded aggregate for pavement and pavement repair.
- B. Related Work:
  - 1. Excavation and Fill is specified in Section 31 23 00
  - 2. Site Clearing is specified in Section 31 10 00
  - 3. Grading is specified in Section 31 22 00
  - 4. Soil Erosion Controls is specified in Section 31 25 00
  - 5. Flexible Paving is specified in Section 32 12 00

1.3 STANDARDS:

- A. All work to be performed under this section shall comply with the provisions of Section 302 of the “NJDOT Standard Specification for Road and Bridge Construction, 2007,” as amended herein.

1.4. SUBMITTALS

- A. Product Data: Certified material statements from Suppliers.

**PART 2 - MATERIALS**

2.1 SOIL AGGREGATE BASE COURSE

- A. The following is added to Subsection 301.02:
  - 1. Soil aggregate for base course shall be NJDOT Designation I-5, conforming to Subsection 901.11.
  - 2. Soil aggregate for base course may also be Dense Graded Aggregate conforming to Subsection 901.11.

**PART 3 - EXECUTION**

3.1 CONSTRUCTION

- A. Prior to placing base course material the subgrade shall be shaped and compacted to grade and contour in accordance with Section 31 22 00 - Grading.
- B. Material shall not be placed when the subgrade is frozen, or when it is unstable because of excessive moisture. The material shall be spread with mechanical spreaders, except in limited or restricted areas. If approved, the material may be dumped in windrows or end dumped. Material dumped in windrows or end dumped shall be spread so as to eliminate segregation and all ruts and ridges caused by dumping or hauling over the material.
- C. The base course shall be constructed in layers not exceeding a compacted thickness of 8 inches. If the required compacted depth of the base course is greater than 8 inches, the base course shall be constructed in layers of approximate equal thickness. Each layer shall be compacted as specified.

**DIVISION 32 – EXTERIOR IMPROVEMENTS**

- D. Compaction of each layer shall achieve an in-place minimum average ASTM dry density of 95 percent of maximum. Compaction methods shall be as specified under Section 31 23 00.
- E. The base course shall be maintained, by the Contractor, smooth and uniform until covered by the following stage of construction.

**END OF SECTION**

**DIVISION 32 – EXTERIOR IMPROVEMENTS**

**SECTION 32 12 00  
FLEXIBLE PAVING**

**PART 1 – GENERAL**

1.4 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section

1.5 SUMMARY

- A. This work shall consist of the construction of base courses and surface courses of bituminous concrete.
- B. Related Work:
  - 1. Excavation and Fill is specified in Section 31 23 00
  - 2. Site Clearing is specified in Section 31 10 00
  - 3. Grading is specified in Section 31 22 00
  - 4. Soil Erosion Controls is specified in Section 31 25 00
  - 5. Aggregate Base Course is specified in Section 32 11 23

1.6 STANDARDS

- A. All work to be performed under this section shall comply with the provisions of Section 401 of the “NJDOT Standard Specification for Road and Bridge Construction, 2007,” as amended herein.

1.7 SUBMITTALS

- A. Product Data: Job Mix Formula for bituminous concrete.

**PART 2 - MATERIALS**

2.1 PRIME COAT

- A. Prime Coat shall be cut-back asphalt, grades MC-30 or MC-70, conforming to NJDOT Standard Specification Section 902.

2.2 TACK COAT

- A. Tack Coat shall be Cut-Back Asphalt, Grades RC-70 or RC-T; Emulsified Asphalt, Grades RS-1, SS-1 or SS-1h; or Cationic Emulsified Asphalt, Grades CSS-1 or CSS-1h; conforming to NJDOT Standard Specification Section 902.

2.3 BITUMINOUS STABILIZED BASE COURSE

- A. Bituminous Concrete shall conform to NJDOT Standard Specification Section 902.
- B. The mixture shall be NJDOT Standard HMA 19M-64.

2.4 BITUMINOUS CONCRETE SURFACE COURSE

- A. Bituminous concrete shall conform to NJDOT Standard Specification Section 902.
- B. Bituminous concrete mixture for Surface Course shall be Standard NJDOT HMA 9.5M-64.

2.5 JOB MIXTURE

## DIVISION 32 – EXTERIOR IMPROVEMENTS

- A. Job Mix formula for each mixture shall be submitted on standard forms. Conformance to job mix formula will be made and pay reductions may be made in accordance with NJDOT Standard Specification Section 903.

### PART 3 - EXECUTION

#### 3.1 EQUIPMENT

- A. The plant and equipment shall consist of one or more bituminous concrete plants, bituminous concrete pavers and rollers, sufficient vehicles for transporting bituminous mixtures, small tools and other equipment necessary for the construction of the bituminous concrete courses.
- B. Bituminous concrete plant shall be as specified in NJDOT Standard Specification Section 1009.
- C. A plant laboratory shall be provided in accordance with Section 1009 of the NJDOT Standard Specifications.
- D. The mixture shall be transported from the mixing plant to the Project in trucks equipped with tight, clean bodies that shall be coated with a suitable release agent. Each truckload shall be protected from the weather by a covering tarpaulin. Any truck that causes excessive separation of aggregate, leaks, or causes delay, shall be removed from the work.
- E. Bituminous concrete pavers shall be self contained, power-propelled units, provided with as activated screed or strike-off assembly, heated if necessary, and capable of spreading and finishing the bituminous concrete in the lane widths and thicknesses required. Bituminous Concrete Pavers shall conform to Subsection 404.08 of the NJDOT Standard Specifications.
- F. Rollers shall consist of steel wheel rollers, or vibratory rollers equipped with adjustable scrapers to keep the wheels clean and with means of keeping the wheels moist to prevent bituminous concrete from sticking to the wheels. Wheels shall also be free of flat areas, openings, or projections that may mar the surface. Rollers shall be capable of reversing without backlash. Rollers shall conform to the NJDOT Standard Specification Subsection 401.03.03.
- G. Pressure distributor for prime and tack coat shall conform to NJDOT Subsection 401.03.02.
- H. Small tools shall have a suitable means supplied for keeping them clean and free from accumulation of bituminous material.

#### 3.2 SURFACE CONDITIONS

- A. The surface upon which the bituminous concrete is to be placed shall be swept with a power broom and shall be clean of all foreign and loose material, dry and free from ice when the paving operations are about to start and shall be maintained in that condition.
- B. Preparation of the Base Course or Subgrade shall be as specified under Section 31 00 00 - Earthwork and 32 11 33 - Aggregate Base Course.
- C. Bituminous concrete courses shall be placed only when the combination of laydown and base surface temperatures are within the proper limits, when it is not raining, and when the base is in a satisfactory condition. Laydown temperatures shall be as specified in NJDOT Standard Specification Subsection 401.03.03
- D. Tack Coat shall be applied on previously constructed layers if the layers become coated with dust, dirt, or other foreign material that would inhibit proper bonding, and on existing pavements to be overlaid. Tack coat application shall be in accordance with NJDOT Standard Specification Subsection 401.03.02.
- E. Prime Coat shall be applied on soil aggregate or dense graded aggregate base courses. Prime coat application shall be in accordance with NJDOT Standard Specification Subsection 401.03.02.

#### 3.3 CONSTRUCTION

## DIVISION 32 – EXTERIOR IMPROVEMENTS

- A. Plant production and the number of trucks used for transportation shall be such as to ensure delivery of the mixture in sufficient quantities and at such intervals to permit continuous placement of the material with minimal stopping and starting of the paving operation.
- B. No paving shall take place at night.
- C. The mixture shall be laid upon an approved surface, spread, and struck off to the grade and elevation required. Bituminous concrete HMA 9.5M-64 shall be used in transition (run-out) areas, where directed. On areas inaccessible to mechanical spreading and finishing equipment, the mixture shall be dumped, spread raked, luted and screeded by hand tools to give the required compacted thickness.
- D. Spreading and finishing of the mixture shall be in accordance with NJDOT Standard Specification Subsection 401.03.03, except the third and fourth paragraphs of Subpart (a) shall read as follows:
  - 1. The longitudinal vertical joint shall be formed between all abutting layers except that it shall be optional for paving the longitudinal joint between the previously laid material when paving in echelon.
  - 2. The material being placed in the abutting previously laid material shall be tightly crowded against the face of the previously placed laid material. The paver shall be positioned so that in spreading, the material overlaps the top edge of the lane previously placed by 2 to 3 inches. The overlapped material shall be luted back onto the uncompacted mat and should be left sufficiently high to allow for compaction. To assure a true line, the paver shall closely follow the lines or markings placed along the joint for alignment purposes. The width and depth of the overlapped material shall be kept uniform at all times.
- E. After the bituminous mixture has been spread, struck off and surface irregularities adjusted, it shall be compacted thoroughly and uniformly with rollers. The surface shall be rolled when the mixture is in the proper condition and when the rolling does not cause undue displacement, cracking, or shoving. Rolling shall begin at the sides, and progress gradually toward the center. All procedures shall be in conformance with the NJDOT Standard Specification Subsection 401.03.03.
- F. Traffic or construction equipment will not be permitted upon the bituminous surface until 12 hours after its placement. Opening to traffic as provided above shall not relieve responsibility for the work of the contract.

### 3.4 TESTING

- A. The base course surface will be tested using a 10-foot straightedge at selected locations. The variation of the surface, from the testing edge of the straightedge, between any two contacts with the surface, shall at no point exceed 3/8 inch. All humps and depressions exceeding 3/8 inch shall be corrected by removing the defective work and replacing it with new material.
- B. The in-place air voids of each mixture in a completed lot shall be a minimum of 2 percent and a maximum of 8 percent. Conformance will be determined on the basis of the average of five air void measurements for each lot of approximately 10,000 square yards or less of bituminous concrete surface area. Reduction in payment may be made in accordance with NJDOT Standard Specification Subsection 401.03.03.
- C. The paving operation is acceptable if the top layer of bituminous concrete surface course has no surface variation greater than 1/8 inch in 10 feet. Should the surface be found to be in non-conformity, the Architect may direct that paving operations be discontinued until mutually acceptable paving methods or equipment are utilized.
- D. The thickness requirements contained herein shall apply only when each component bituminous mixture in the pavement structure is specified to be a uniform thickness. When such uniform thickness bituminous mixtures are specified, percent pay adjustment will be determined in accordance with the requirements of Section 401.03.03.I.
- E. When an unacceptable lot is overlaid, the overlay shall be of the top layer mixture specified for that lot and shall be a minimum of 1 inch thick if that mixture is HMA 9.5M-64 and 1-1/2 inches thick if that mixture is HMA 12.5M-64.

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- F. The overlaid or replaced lot is only that material placed up to the specified total thickness of the combined bituminous mixtures. For an overlaid or replaced lot, the quantity of material shall be determined using the computed average weight of the top course mixture, the area of the lot and the difference between the specified total thickness and the average thickness of the five lot cores.

**END OF SECTION**

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### **SECTION 32 17 23 PAVEMENT MARKINGS**

#### **PART 1 – GENERAL**

##### 1.8 RELATED DOCUMENTS

- B. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section

##### 1.9 SUMMARY

- A. This work shall consist of the construction of pavement markings on pavement for traffic delineation.
- B. Work Includes:
  - 1. Painted Lines
  - 2. Painted Markings
- C. Related Work:
  - 1. Section 32 12 00 – Flexible Paving

##### 1.10 STANDARDS

- A. Construction of Pavement Markings shall with the provisions of Section 610 of the “NJDOT Standard Specification for Road and Bridge Construction, 2007,” as amended herein.

#### **PART 2 – PRODUCTS**

##### 2.1 TRAFFIC STRIPES AND MARKINGS

- A. Epoxy Traffic Lines shall conform to the Subsection 911.03.01 of the NJDOT Standard Specifications.
- B. Thermoplastic Traffic Markings shall conform to Subsection 911.03.02 of the NJDOT Standard Specifications.
- C. Manufacturers; Traffic Paint:
  - 1. Synray Corporation, Kenilworth, NJ
  - 2. Garon Products, Wall, NJ
  - 3. Insl-X Products, Montvale, NJ
  - 4. Or Equal
- D. Manufacturers; Traffic Markings:
  - 1. Swarco Traffic, Tennessee
  - 2. Sherwin-Williams, Georgia
  - 3. Ennis Paint, Texas
  - 4. Or Equal

#### **PART 3 – EXECUTION**

##### 3.1 TRAFFIC LINES

- A. Conform to Subsection 610.03.01 of the NJDOT Standard Specifications.

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3.2 TRAFFIC MARKINGS

- A. Conform to Subsection 610.03.02 of the NJDOT Standard Specifications.

**END OF SECTION**