

MANDATORY PRE-BID MEETING

PROJECT #	T0564-02 Re-Bid Salt Storage Structure
LOCATION	NJDOT Freehold Maintenance Facility 140 Daniels Way Freehold, NJ (Monmouth County)
DATE	December 15, 2020
TIME	10:00 AM
CONTACT PERSON	Ed Hedger
PHONE #	Office #: (609) 984-6238 Cell #: (609) 203-2584
MEETING LOCATION	NJDOT Freehold Maintenance Facility 140 Daniels Way Freehold, NJ (Monmouth County)

****ALL BIDDERS ARE URGED TO LIMIT THE NUMBER OF REPRESENTATIVES TO ATTEND THE PRE-BID MEETING IN ORDER TO KEEP THE NUMBER OF ATTENDEES TO A MINIMUM IN ORDER TO COMPLY WITH COVID-19 RELATED SOCIAL DISTANCING GUIDELINES. ALL ATTENDEES MUST WEAR FACE MASK COVERINGS****

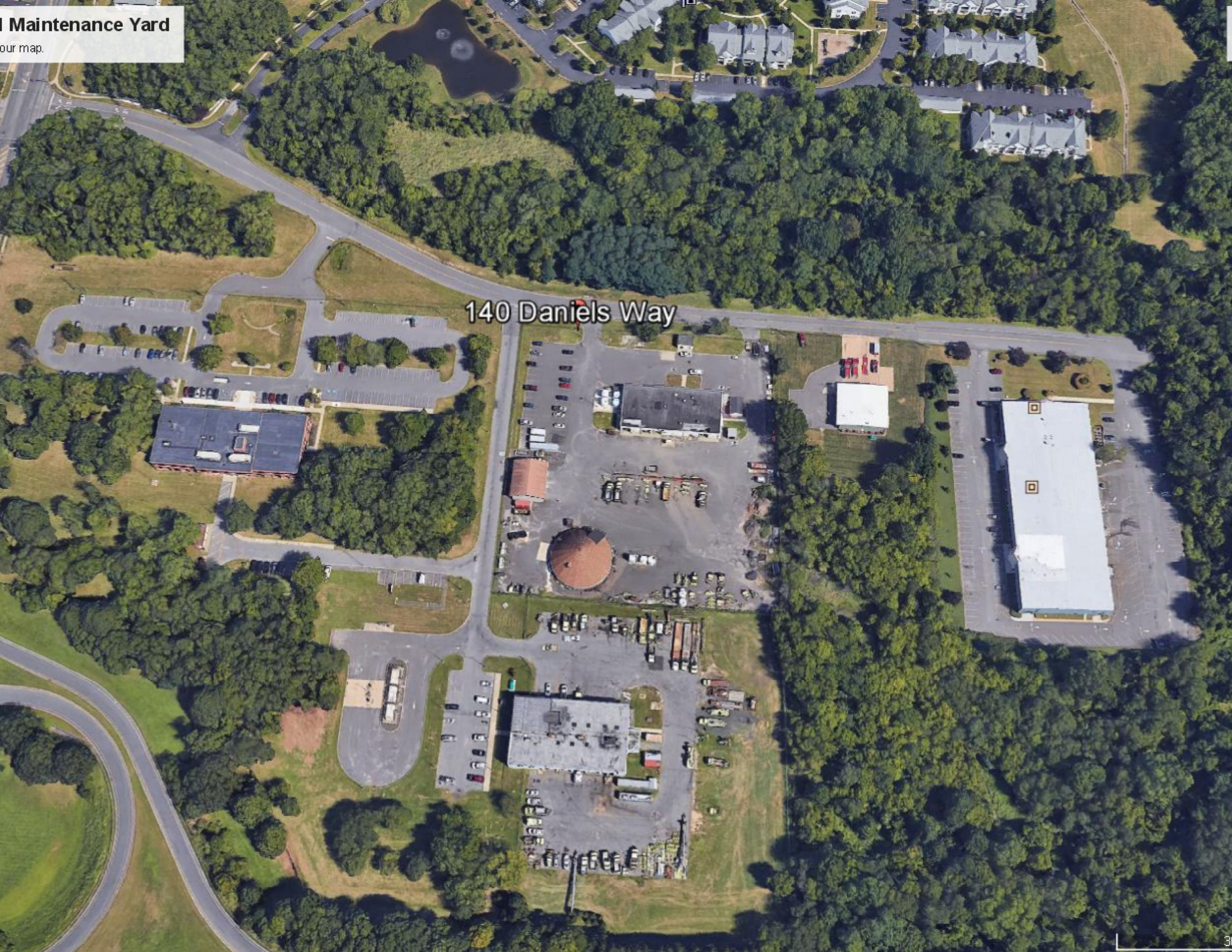
MUST ATTEND TO HAVE VALID BID

NOTE: It is each bidder's responsibility to determine the way to the location of the announced Pre-Bid meeting and to assure their timely arrival at the meeting. A maximum fifteen-minute grace period may be granted by the DPMC Project Manager, at his/her discretion, in case of extenuating circumstances determined prior to the scheduled start time. Bidders will be required to sign in at the beginning of the meeting. After the meeting has officially started, no other bidders will be permitted to sign-in. Failure to sign pre-bid sign in sheet will prohibit the bidder's proposal from being accepted.

Maintenance Yard

our map.

140 Daniels Way



1 Maintenance Yard

our map

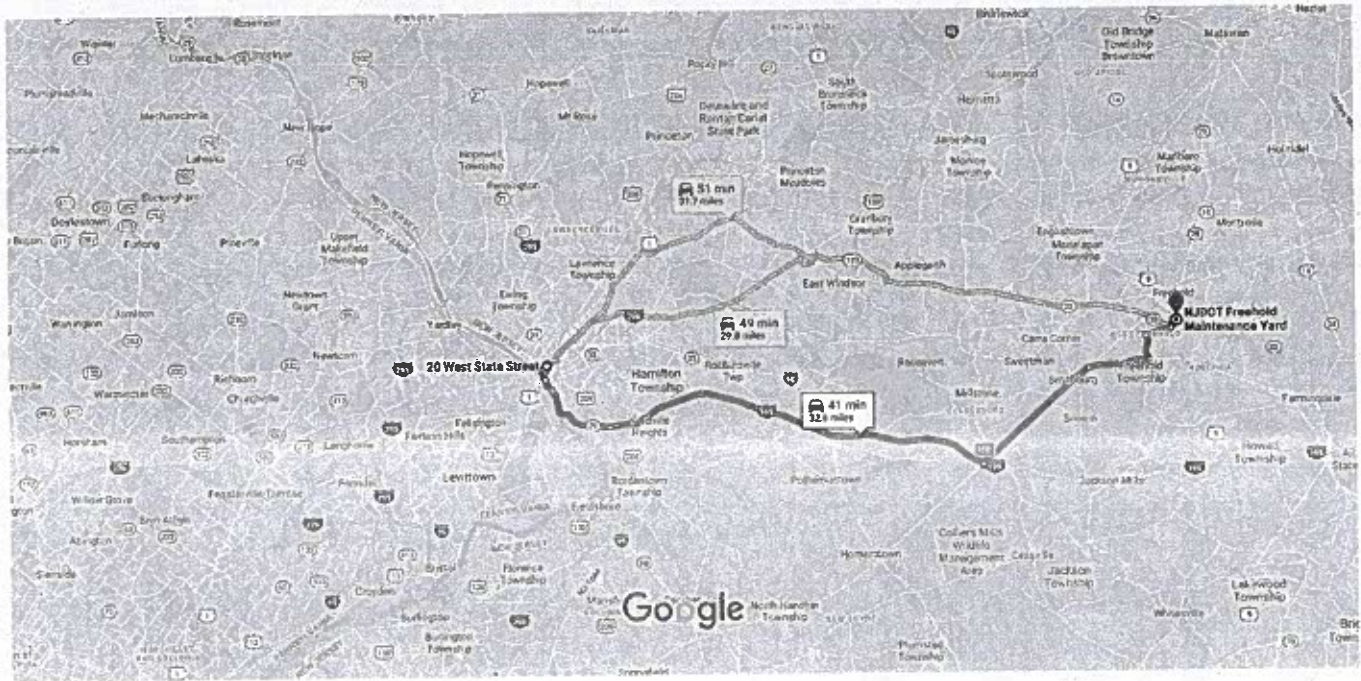
140 Daniels Way



Google Maps

20 W State St, Trenton, NJ 08608 to njdot freehold maintenance facility

Drive 32.6 miles, 41 min



Map data ©2020 2 mi




20 W State St
Trenton, NJ 08608

Get on NJ-29 S

- 3 min (0.9 mi)
- ↑ 1. Head west on W State St toward N Chancery Ln
476 ft
- ↶ 2. Turn left onto Barrack St
0.2 mi
- ↶ 3. Turn left onto Memorial Dr
0.1 mi
- ↗ 4. Turn right onto the ramp to NJ-29 S
0.4 mi
- ↘ 5. Keep left at the fork, follow signs for NJ-29 S/Interstate 195/Interstate 295 and merge onto NJ-29 S
0.1 mi












Take I-195 E to County Rd 537 E/Monmouth Rd/Trenton Lakewood Rd in Jackson Township. Take exit 16B from I-195 E

21 min (20.5 mi)

-  6. Merge onto NJ-29 S
3.8 mi
-  7. Continue onto I-195 E
16.5 mi
-  8. Take exit 16B to merge onto County Rd 537 E/Monmouth Rd/Trenton Lakewood Rd toward Freehold
0.2 mi

Continue on County Rd 537 E/Monmouth Rd to your destination in Freehold Township

18 min (11.2 mi)

-  9. Merge onto County Rd 537 E/Monmouth Rd/Trenton Lakewood Rd
 -  Continue to follow County Rd 537 E/Monmouth Rd
5.9 mi
-  10. Turn right onto Elton Adelpia Rd
2.6 mi
-  11. Turn left onto Stillwells Corner Rd
1.1 mi
-  12. Turn right onto Schanck Rd
 -  Pass by 7-Eleven (on the left in 1.0 mi)
1.1 mi
-  13. Continue onto Hwy 79 N/South St
0.4 mi
-  14. Turn right onto Daniels Way
0.2 mi
-  15. Turn right
 -  Restricted usage road
 -  Destination will be on the right

23 ft

NJDOT Freehold Maintenance Yard

140 Daniels Way, Freehold Township, NJ 07728

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

SPECIFICATION

SALT STORAGE STRUCTURE

NJDOT Freehold Maintenance Facility
Freehold, Monmouth County, N.J.

DPMC PROJECT #T0564-02

STATE OF NEW JERSEY

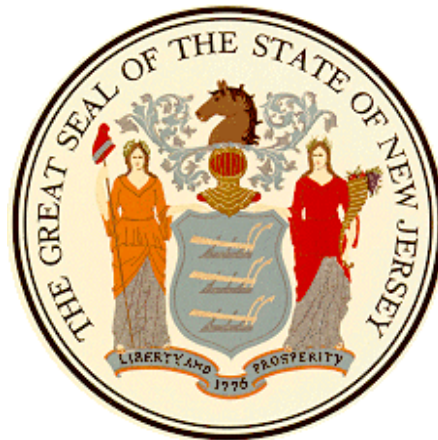
Honorable Philip D. Murphy, Governor
Honorable Sheila Y. Oliver, Lt. Governor

DEPARTMENT OF THE TREASURY

Elizabeth Maher Muoio, State Treasurer

NEW JERSEY DEPARTMENT OF TRANSPORTATION

Diane Gutierrez-Scaccetti, Commissioner



DIVISION OF PROPERTY MANAGEMENT AND CONSTRUCTION

Christopher Chianese, Director

NV5 – ARCHITECTURE, PC

7 CAMPUS DRIVE, SUITE 300, PARSIPPANY, NJ 07054-4495

Date: January 23, 2020 – “Issued for Bid”

Salt Storage Structure
NJDOT Freehold Maintenance Facility
Township of Freehold, Monmouth County, NEW JERSEY
DPMC PROJECT: # T0564-02

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STATE OF NEW JERSEY
DEPARTMENT OF THE TREASURY
DIVISION OF PROPERTY MANAGEMENT AND CONSTRUCTION



REVISED
DECEMBER 2015

INSTRUCTIONS TO BIDDERS
AND
GENERAL CONDITIONS

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INSTRUCTIONS TO BIDDERS

IB 1 Bid Proposals

IB 1.1 Sealed proposals for the work described herein must be received and time-stamped in the Plan Room, Division of Property Management and Construction (DPMC), 9th Floor, 33 West State Street, P O Box 034, Trenton, NJ 08625-0034. The closing date and time for bids will be stated in the Advertisement for Bid. Bidders are cautioned that reliance on the US Postal Service or other mail delivery or courier service for timely delivery of proposals is at the bidders' risk. Failure by a bidder to have a sealed proposal reach DPMC by the prescribed time will result in rejection of the unopened submission.

IB 1.2 Bids may be accepted on the following branches of work, as applicable:

- a. Lump Sum All Trades
- b. General Construction
- c. Structural Steel
- d. Plumbing
- e. Heating, Ventilating and Air Conditioning
- f. Electrical
- g. Special Categories as may be required

IB 1.3 Contractors classified by DPMC may obtain contract documents at the DPMC address above, or upon written request, subject to payment of applicable fees. Each bidder is herewith put on notice that its general classification by DPMC is not the sole basis for qualification for the award of work. The Director reserves the right to deny award to any bidder that is not clearly responsible, based upon experience, past performance, financial capability or other material factors, to perform the work required herein.

IB 1.4 The schedule of non-refundable bid fees below is based upon individual trade construction cost estimates. Upon request and at no cost the DPMC will furnish a set of the contract documents for review in the offices of the division at the address noted in paragraph IB1.1 above.

DPMC BID DOCUMENTS FEE SCHEDULE (PER PACKAGE):

<u>TRADE ESTIMATE</u>	<u>DOCUMENT FEE</u>	<u>MAILING FEE</u>
\$100,000 or less	No charge	\$25.00
Greater than \$100,000	\$ 65.00	\$25.00

IB 1.5 Bid proposals based upon the plans, specifications, general, special and supplementary conditions and bulletins shall be deemed as having been made by the contractor with full knowledge of the conditions therein. Bidders are required to visit the site prior to submitting proposals for the work herein described, and to have thoroughly examined the conditions under which the contract is to be executed, including those reasonably observable conditions of the premises which would hinder, delay, or otherwise affect the performance of the contractor required under the terms of the contract. The State will not allow claims for additional costs as a result of the contractor's failure to become aware of the reasonably observable conditions affecting its required performance. The bidder is required to make appropriate allowances in the preparation of the bid for the

accommodation of such conditions. Bidders must warrant in the bid documents that the bidder is familiar with conditions existing at the site at the time the bid is submitted.

IB 1.6 Bid proposals shall be submitted on the standard form provided by DPMC, enclosed in a sealed envelope issued by DPMC. The name and address of the bidder must be indicated on the envelope, as well as indication of the DPMC project number, project location and other appropriate identification.

IB 1.7 All amounts in the bid documents shall be stated in numerical figures only.

IB 1.8 The bidder must include in the bid envelope: (1) the proposal signed by the bidder, (2) the executed affidavit of non-collusion, (3) the executed Source Disclosure Certification Form as further described in section IB1.11, (4) the executed Disclosure of Investment Activities in Iran Form and (5) bid security as further described in Section IB6.

IB 1.9 Proposals shall remain open for acceptance and may not be withdrawn for a period of 60 calendar days after the bid opening date.

IB 1.10 Proposals not submitted and filed in accordance with instructions contained herein and in the Advertisement for Bids may be rejected as non-responsive.

IB 1.11 Procurement Reform

- a. **RESTRICTIONS ON POLITICAL CONTRIBUTIONS** – In accordance with N.J.S.A. 19:44A-20.13, *et seq.*, bidders submitting a bid on or after October 15, 2004, shall be required to submit a Certification and Disclosure Form and Ownership Disclosure Form for all Business Entities. These forms must be submitted by the bidder and approved prior to contract award.

N.J.S.A. 19:44A-20.13, *et seq.*, prohibits State departments, agencies and authorities from entering into a contract that exceeds \$17,500 with an individual or entity that has made a contribution to that political party committee. N.J.S.A. 19:44A-20.13, *et seq.*, further requires the disclosure of all contribution to any political organization organized under section 527 of the Internal Revenue Code that also meets the definition of “continuing political committee” within the meaning of N.J.S.A. 19:44A-3(n) and N.J.A.C. 19:25-1.7. The successful bidder shall also be required to adhere to all continuing obligations contained in N.J.S.A. 19:44A-20.13, *et seq.*, regarding contributions and disclosures as required in N.J.S.A. 19:44A-20.13, *et seq.*

- b. **Source Disclosure Certification** - Pursuant to N.J.S.A. 52:34-13.2, *et seq.*, all bidders submitting a proposal shall be required to complete a Source Disclosure Certification that all services will be performed in the United States. The bidder shall disclose the location by country where services under the contract will be performed and any subcontracted services will be performed. The Source Disclosure Certification will be attached to the bid proposal.
- c. **MacBride Principles** - Pursuant to N.J.S.A. 52:34-12.2, a bidder must complete a certification on the DPMC form provided prior to contract award to attest, under penalty of perjury, that neither the person or entity, nor any of its parents, subsidiaries, or affiliates pursuant to N.J.S.A. 52:34-12.2, that the bidder has no ongoing business activities in Northern Ireland and does not maintain a physical

presence therein through the operation of offices, plants, factories, or similar facilities, either directly or indirectly, through intermediaries, subsidiaries or affiliated companies over which it maintains effective control; or will take lawful steps in good faith to conduct any business operations it has in Northern Ireland in accordance with the MacBride principles of nondiscrimination in employment as set forth in N.J.S.A. 52:18A-89.8 and in conformance with the United Kingdom's Fair Employment (Northern Ireland) Act of 1989, and permit independent monitoring of their compliance with those principles. If a contractor who would otherwise be awarded a contract or agreement does not complete the certification, then the Director may determine, in accordance with applicable law and rules, it is in the best interest of the State to award the contract or agreement to the next responsible bidder who has completed the certification. If the Director finds the contractor to be in violation of the principles which are the subject of this law, s/he shall take such action as may be appropriate and provided for by law, rule or contract, including, but not limited to, imposing sanctions, seeking compliance, recovering damages, declaring the contractor in default and seeking debarment or suspension of the contractor.

- d. Investment Activities in Iran - Pursuant to N.J.S.A. 52, 32-55, *et seq.*, any person or entity that submits a bid or proposal or otherwise proposes to enter into or renew a contract must complete a certification with their bid on the DPMC form provided to attest, under penalty of perjury, that neither the person or entity, nor any of its parents, subsidiaries, or affiliates, is identified on the Department of Treasury's Chapter 25 list as a person or entity engaging in investment activities in Iran. The Chapter 25 list is found on the Division of Purchase and Property's website at www.state.nj.us/treasury/purchase/pdf/Chapter25List.pdf. Bidders must review this list prior to completing the certification. Failure to complete the certification may render a bidder's proposal non-responsive. If the Director finds a person or entity to be in violation of law, s/he shall take action as may be appropriate and provided by law, rule or contract, including but not limited to, imposing sanctions, seeking compliance, recovering damages, declaring the party in default and seeking debarment or suspension of the party.

IB 2 Bid Modification

IB 2.1 A bidder may modify its bid proposal by electronic mail or letter at any time prior to the scheduled closing time for receipt of bids, provided such communication is received by the DPMC prior to such closing time. A mailed confirmation of any modification signed by the bidder must have been mailed and time-stamped by the US Postal Service prior to the specified closing time. Such confirmation, whether transmitted electronically or by mail, shall be accompanied by a newly executed affidavit of non-collusion.

IB 2.2 Communications shall not reveal the basic bid price but shall only provide the amount to be added, subtracted or modified so that the final prices or terms will not be revealed until the sealed proposal is opened. If written confirmation of the telegraphic modification is not received within two working days after the scheduled closing time, no consideration will be given to the telegraphic modification.

IB 2.3 Bids may be withdrawn upon receipt of a bidder's written request prior to the time fixed for the bid opening. A bidder's right to withdraw a bid is lost after a bid has been opened. If an error has been made in the bid amount, request for relief from the bid may be made in writing to the Director. The written request shall be signed by an authorized corporate officer. A determination of whether the bidder will be released shall be at the sole discretion of the Director, who shall issue a finding within five working days of receipt of all pertinent information relating to such request for relief.

IB 3 Consideration of Bids

IB 3.1 Award of Contracts or Rejection of Bids:

- a. Contracts will be awarded to the lowest responsible bidder. The awards will be made, or the bids rejected, within 60 calendar days from the date of the opening of bids. At the discretion of the Director, a bid extension may be requested from the bidders if circumstances warrant an extension.
- b. The Director reserves the right to award the contract on the basis of the single bid for the entire work, or on the basis of a separate bid and alternate, or any combination of separate bids and alternates, which the Director deems best serves the interest of the State.
- c. The Director reserves the right to waive any bid requirements when such waiver is in the best interests of the State, and where such waiver is permitted by law. Such waiver shall be at the sole discretion of the Director.
- d. The Director reserves the right to reject any and all bids when such rejection is in the best interests of the State. The Director also may reject the bid of any bidder which, in the Director's judgment, is not responsible or capable of performing the contract obligations based on financial capability, past performance, or experience. A bidder whose bid is so rejected may request a hearing before the Director by filing a written notice.

IB 3.2 The bidder to be awarded the contract shall execute and deliver the requisite contract documents, including payment and performance bonds, within the time specified. Upon the bidder's failure or refusal to comply in the manner and within the time specified, the Director may either award the contract to the next low responsible bidder or re-advertise for new proposals. In either case, the Director may hold the defaulting bidder and its surety liable for the difference between the applicable sums quoted by the defaulting bidder and the sum which the State may be obligated to pay to the contractor which is contracted to perform and complete the work of the defaulting bidder.

IB 4 Awards

IB 4.1 In executing a contract, the successful bidder agrees to perform the required work in a good and workmanlike manner to the reasonable satisfaction of the Director, and to complete all work within the number of calendar days specified in its contract.

IB 4.2 Successful bidders will be notified of the time and place for the signing of contracts. Key requirements in the contract, including, but not limited to, the number of days of performance of the contract, manner and schedule of payments, and other administrative details will be reviewed at the award meeting. The time and place of the first job meeting will be announced at the award meeting.

IB 4.3 The State reserves the right to award the contract upon the basis of a single bid for the entire work, or on the basis of separate bids for each prime trade when the total of the separate bids is less than the single bid. Alternates will be accepted or rejected in numerical sequence as cited in the bid documents and shall not be selected at random except as provided herein. Add alternates and deduct alternates will be specified separately. The State may choose from the add and deduct alternates without priority between the two groups so long as selection within each group is in numerical sequence from the first to the last. This limitation shall not apply, however, to any alternates concerning proprietary items. The Director, with the approval of the Using Agency, may accept alternates out of sequence, provided the Director states the reasons for so doing, in writing, within five working days following the opening of bids.

IB 4.4 Should submission of unit prices be required for specified items of work in bid proposals, they will be considered in the evaluation of bids as set forth in the bid proposal form.

IB 4.5 The successful bidder and all of its subcontractors are required to comply with the requirements of N.J.S.A. 10:5-31 et seq., regarding Equal Employment Opportunity in Public Works Contracts.

IB 5 Qualification of Bidders

IB 5.1 If the successful bidder is a corporation not organized under the laws of the State of New Jersey or is not authorized to do business in this State (foreign corporation), the award of the contract shall be conditioned upon the prompt filing by the said corporation of a certificate to do business in this State and complying with the laws of this State in that regard. This filing must be made with the Division of Revenue. No award of contract will be made until the Division of Revenue confirms this authorization.

IB 5.2 The State requires that each contractor, except in the case of a single contractor, shall perform a minimum of 35 percent of the contract work by the contractor's own forces. However, the Director has the sole discretion to reduce this percentage depending upon the nature and circumstances in any particular case, if the Director determines that to do so would be in the best interests of the State, and provided that the bidder submits a written request with the original bid proposal.

IB 5.3 The State reserves the right to reject a bidder at any time prior to the signing of a contract if information or data is obtained which, in the opinion of the Director, adversely affects the responsibility and/or the capability of the bidder to undertake and to complete the work, regardless of the bidder's previous qualification or classification. The State may

conduct any investigation as it deems necessary to determine the bidder's responsibility and capacity, and the bidder shall furnish all information and data for this purpose as requested by the State.

IB 5.4 Each bidder must be classified by DPMC in accordance with the provisions of the classification statute, N.J.S.A. 52:35-1, *et seq.*. In the case of a single bid for all of the work, the bidder shall include in the bid the names of its principal subcontractors (in categories as listed in IB1.2 above), which must also be classified in accordance with the said statute.

IB 5.5 At the time of the bid due date, the bidder and the subcontractors must be registered in accordance with “The Public Works Contractor Registration Act”, N.J.S.A. 34:11-56.48, *et seq.* All questions regarding registration shall be addressed to:

Contractor Registration Unit
New Jersey Department of Labor
Division of Wage & Hour Compliance
P O Box 389
Trenton NJ 08625-0389
Telephone: 609-292-9464
FAX: 609-633-8591

IB 5.6 In accordance with N.J.S.A. 52:32-44, *et seq.* Public Law 2001, Chapter 134, all contractors and subcontractors providing goods/services to State agencies and authorities are required to provide the contracting agency or authority with proof of registration with the Department of Treasury, Division of Revenue. The basic registration process involves the filing of Form NJ-Reg., which can be filed online at www.state.nj.us/njbgs/services.html or by calling (609) 292-7077 or (609) 292-1730.

IB 6 Deposit and Bid Bond

IB 6.1 The Proposal, when submitted, shall be accompanied by a Bid Bond satisfactory to the Director, for the sum of not less than fifty percent (50%) of the Total Bid including alternates, if applicable.

IB 6.2 The Bid Bond shall be properly filled out, signed, and witnessed.

IB 6.3 The Bid Bond shall be accompanied by a copy of the power of attorney executed by the surety company or companies. The power of attorney shall set forth the authority of the attorney-in-fact who has signed the bond on behalf of the surety company to bind the company and shall further certify that such power is in full force and effect as of the date of the bond.

IB 6.4 If the bidder whose proposal is accepted is unable to provide the performance and payment bonds or fails to execute a contract, then such bidder and the bid bond surety, where applicable, shall be obligated to pay to the State the difference between the amount of the bid and the amount which the State contracts to pay another party to perform the work. The bidder and the surety shall pay, upon demand, the entire amount of the State's difference in cost. Should there be a deficiency in excess of the bid deposit, the bidder shall make immediate payment to the State for any such deficiency. Nothing contained herein shall be construed as a waiver of any other legal remedies that the State may have against the contractor.

IB 6.5 Attorneys-in-fact who sign bid bonds or contract bonds must file a certified power-of-attorney with the State indicating the effective date of that power.

IB 7 Performance and Payment Bond

IB 7.1 The successful bidder shall furnish within ten (10) calendar days after notice of award both a performance bond in statutory form in an amount equal to one hundred percent (100%) of the total contract price as security for the faithful performance of this contract and a payment bond in statutory form in amount equal to one hundred percent (100%) of the contract price as security for the payment of all persons and firms performing labor and furnishing materials in connection with this contract. The performance bond and the payment bond may be combined or in separate instruments in accordance with law. If combined, they must be for 200% of the award amount. No contract shall be executed unless and until each bond is submitted to and approved by the State. The surety must be presently authorized to do business in the State of New Jersey. In addition to the other coverage provided, the Bond shall cover all Contract guarantees and any other guarantees/warranties issued by the Contractor.

IB 7.2 The cost of all performance and payment bonds shall be paid for by the successful bidder.

IB 7.3 If at any time the State, for justifiable cause, is dissatisfied with any surety which has issued or proposes to issue a performance or payment bond, the contractor shall, within ten calendar days after notice from the State to do so, substitute an acceptance bond (or bonds). The substituted bond(s) shall be in such form and sum and executed by such other surety or sureties as may be satisfactory to the State. The premiums on such bond(s) shall be paid by the contractor. No contract shall be executed and/or no payment made under a contract until the new surety or sureties shall have furnished such an acceptable bond to the State.

IB 7.4 Bonds must be legally effective as of the date the contract is signed. Each must indicate the contractor's name exactly as it appears on the contract. Current attorney-in-fact instruments and financial statement of the surety must be included with the bonds. Bonds must be executed by an authorized officer of the surety. Bonds furnished under this section shall conform in all respects to the requirement and language of NJSA 2A:44-143 to 147.

IB 8 Bulletins and Interpretations

IB 8.1 No interpretation of the meaning of the plans, specifications or other pre-bid documents will be provided to any bidder unless such interpretation is made in writing to all prospective bidders prior to the opening of bids. Any such interpretations must be identified in bid proposals submitted. Any interpretations which are not entered in accordance with this provision shall be unauthorized and not binding upon the State.

IB 8.2 Every request for an interpretation relating to clarification or correction of the plans, specifications, or other bid documents must be made in writing, addressed to the architect/engineer and the DPMC Director, and must be received at least five (5) working days prior to the date fixed for the opening of the bids. Any and all interpretations, clarifications or corrections and any supplemental instructions must be issued by the Director in the form of written bulletins and mailed by certified mail, return receipt requested, or by electronic notice to all prospective bidders not later than three (3) working days prior to the date of the opening of bids. All bulletins issued shall become part of the

contract documents and shall be acknowledged in all bid proposals. Failure of a bidder to acknowledge receipt of all such bulletins and interpretations by the time of bid opening shall result in its proposal being considered non-responsive, at the option of the Director.

IB 8.3 Each bidder shall be responsible for thoroughly reviewing the contract documents prior to the submission of bids. Bidders are advised that no claim for expenses incurred or damages sustained as a result of any error, discrepancy, omission, or conflict in the contract documents shall be recognized by the State unless, and only to the extent that, a written request for interpretation, clarification or correction has been submitted in compliance with Section IB8.2 and provided the matter has not been addressed by the State through the issuance of a bulletin interpreting, clarifying or correcting such error, discrepancy, omission or conflict.

IB 9 Assignments

IB 9.1 The contractor shall not assign all or any part of this contract without written consent of the State. Money due (or to become due) the contractor hereunder shall not be assigned for any purposes whatsoever.

IB 10 Federal Excise Taxes and State Sales Tax

IB 10.1 In general, bidders, in preparing bids, must take into consideration applicable Federal and State tax laws.

IB 10.2 Materials, supplies or services for exclusive use in erecting structures or buildings or otherwise improving, altering or repairing all State-owned property are exempt from the State sales tax. The successful bidder must submit Division of Taxation form ST13, Exempt Use Certificate, to the seller of all materials, supplies or services that will be incorporated into the Work.

IB 10.3 Bidders must determine the current status and applicability of any tax laws, and the contractor may make no claim based upon any error or misunderstanding as to the applicability of any tax laws.

IB 10.4 Purchases or rentals of equipment are not exempt from any tax under the State Sales Tax Act.

IB 11 Restrictive Specifications

IB 11.1 Should any bidder determine before the bid due date that any portion of the specifications or drawings specify a particular product which can be provided by only one supplier or manufacturer, with the result that competitive prices are not available, the bidder shall immediately notify the Director in writing of such fact.

IB 11.2 If such notice is not given in a timely manner, it shall be assumed that the bidder has included the estimate of such sole source in the bid. However, if the Director is notified in a timely manner of the sole source of supply or manufacture, the Director may order the product re-bid or take other lawful action. Such action shall be at the Director's sole discretion.

IB 12 Offer of Gratuities

IB 12.1 Bidders are advised that the laws of New Jersey (NJSA 52:34-19) make it a misdemeanor to offer, pay or give any fee, commission, compensation, gift or gratuity to any person employed by the State. Also, Executive Order #189 (1988) requires that all requests for proposals and contracts issued by the State specify prohibitions on vendor (contractor) activities, the violation of which shall render the vendor liable to ineligibility for State contracts, pursuant to the debarment procedures set forth in N.J.A.C. 17:19-4.1., *et seq.* These prohibited activities include the following:

- a. No vendor shall pay, offer to pay, or agree to pay, either directly or indirectly, any fee, commission, compensation, gift, gratuity, or other thing of value of any kind to any State officer or employee or special State officer or employee, as defined by NJSA 52:34D-13b. and e., in the Department of Treasury or any other agency with which such vendor transacts or offers or proposes to transact business, or to any member of the immediate family, as defined by NJSA 52:13D-13i., of any such officer or employee, or any partnership, firm, or corporation with which they are employed or associated, or in which such officer or employee has an interest within the meaning of NJSA 52:13D-13g.
- b. The solicitation of any fee, commission, compensation, gift, gratuity or other thing of value by any State officer or employee or special State officer or employee from any State vendor shall be reported in writing forthwith by the vendor to the Attorney General and the Executive Commission on Ethical Standards.
- c. No vendor may, directly or indirectly, undertake any private business, commercial or entrepreneurial relationship with, whether or not pursuant to employment, contract or other agreement, express or implied, or sell any interest in such vendor to, any State officer or employee or special State officer or employee having any duties or responsibilities in connection with the purchase, acquisition or sale of any property or services by or to any State agency or any instrumentality thereof, or with any person, firm or entity with which he is employed or associated or in which he has an interest within the meaning of NJSA 52:13D-13g. Any relationships subject to this provision shall be reported in writing forthwith to the Executive Commission on Ethical Standards, which may grant a waiver of this restriction upon application of the State offer or employee or special State officer or employee upon a finding that the present or proposed relationship does not present the potential, actuality or appearance of a conflict of interest.
- d. No vendor shall influence, or attempt to influence or cause to be influenced, any State officer or employee or special State officer or employee in his official capacity in any manner which might tend to impair the objectivity or independence of judgment of said officer or employee.
- e. No vendor shall cause or influence, or attempt to cause or influence, any State officer or employee or special State officer or employee to use, or attempt to use, his official position to secure unwarranted privileges or advantages for the vendor or any other person.

- f. The provisions cited above in paragraphs IB12.1.a. through e. shall not be construed to prohibit a State officer or employee or special State officer or employee from receiving gifts from or contracting with vendors under the same terms and conditions as are offered or made available to members of the general public subject to any guidelines the State Ethics Commission on Ethical Standards may promulgate under paragraph IB12.1.c. above.

END OF INSTRUCTIONS TO BIDDERS

GENERAL CONDITIONS

ARTICLE 1 - GENERAL PROVISIONS

1.1 DEFINITIONS:

1.1.1 Architect/Engineer: The Architect/Engineer (“A/E”) is the consultant engaged by the DPMC to prepare the design and perform certain contract administration functions in accordance with the provisions of its contract with the DPMC.

1.1.2 Bulletin: A document, issued by DPMC prior to the opening of bids, which supplements, revises or modifies the bid document(s).

1.1.3 Change in the Work: A change in the Project and the Contract Documents, including, but not limited to, an increase or decrease in the Work, an acceleration or extension of time for the performance of the Work.

1.1.4 Change Order: A written order, directing or authorizing a Change in the Work executed by the DPMC and agreed to by the Contractor (except in the case of unilateral change orders executed by DPMC) that includes all adjustments to work, compensation and/or time warranted by the Change in the Work.

1.1.5 Code Official: the individual licensed by the NJ Department of Community Affairs authorized to enforce the NJ Uniform Construction Code (UCC) and approve or reject the Work for NJ UCC compliance.

1.1.6 Construction Management Firm or “CMF”: A person or firm that may be engaged by the DPMC to assist DPMC in the administration of its contracts.

1.1.7 Contract: The entire and integrated agreement between the Contractor and the DPMC encompassing all of the Contract Documents.

1.1.8 Contract Documents: The executed form of Contract, General Conditions, Supplementary Conditions, Supplementary Instructions, Bulletins, plans, specifications, instructions to bidders, addenda, responses to requests for information, Price Proposal, Change Orders, other amendments, including construction change directives, and all exhibits, appendices and documents attached to or referenced in any of the foregoing materials.

1.1.9 Contract Limit Lines The lines shown on the Contract Drawings that define the boundaries of the Project, and beyond which no construction work or activities may be performed by the Contractor unless otherwise noted on the drawings or specifications.

1.1.10 Contractor: The business entity with whom the DPMC enters a contract for the performance of the construction of a construction Project by the terms set forth in the Contract Documents.

1.1.11 Contract Price: The sum stated in the Contract, as it may be adjusted in accordance with the Contract Documents, that represents the total amount payable by the DPMC to the Contractor for performance of the Work.

1.1.12 Day: A calendar day, unless otherwise designated.

1.1.13 Director: The person authorized by statute to administer the design, engineering and construction of all State buildings and facilities. The Director is the contracting officer representing the State personally or through authorized representatives in all relationships with Contractors, consultants and Architects/Engineers. This includes designees or an authorized administrative contracting officer acting within the limits of his or her authority. The Director or his or her duly authorized representative is the interpreter of the conditions of this contract and the judge of its performance.

1.1.14 Division of Property Management and Construction (DPMC): The State of New Jersey's contracting agency for the design and construction of State facilities.

1.1.15 Final Acceptance and Completion: The date following receipt and acceptance by DPMC of all administrative and close-out documents. Following acceptance, the DPMC will issue a Certificate of Final Acceptance and Completion for the Project.

1.1.16 Generally Accepted Accounting Principles: The common set of accounting principles, standards and procedures that companies use to compile their financial statements. Accounting records must identify all labor and material costs and expenses, whether they are direct or indirect. The identity must include at least the Project number for direct expenses and/or account number for indirect expenses.

1.1.17 NJUCC or Code: The New Jersey Uniform Construction Code which governs the permit and approval process for construction projects.

1.1.18 Notice: A written directive or communication given by DPMC to the Contractor to act or perform work or carry out some other contractual obligation, or a written communication to be served by the Contractor upon the State. A notice served on the Contractor will be deemed to have been duly served if delivered to an individual or member of the firm or entity or to an officer of the corporation for whom it was intended. This includes regular mail, e-mail, delivery by courier, or registered or certified mail, or facsimile to the Contractor's business address cited in the Contract documents. A notice from the Contractor to the State shall be deemed to have been duly served only if delivered to the Director or the Director's duly authorized representative.

1.1.19 Notice to Proceed: The written communication issued by the DPMC to the Contractor directing the Contractor to begin the Work. The contract calendar day duration period will commence on the effective date noted.

1.1.20 Project: The term for the entire public works engagement. It includes the design, construction work and all administrative aspects required to fully complete the engagement.

1.1.21 Punch List: The list of incomplete or defective Work, compiled by DPMC and/or its authorized representative, which remains to be completed after achievement of Substantial Completion.

1.1.22 Schedule: The time tracking mechanism that establishes the Project's allotted time requirements for completion as more specifically described in Article 6 of these General Conditions. When the construction activity items of the schedule have a monetary value associated with them, the schedule is referred to as a "costed" or "cost-loaded" schedule.

1.1.23 Site: The geographical location of the facility or property at which the Work under the Contract is to be performed.

1.1.24 State or Owner: The State of New Jersey, acting through DPMC.

1.1.25 Subcontractor: The business entity that enters into an agreement with the Contractor for the performance of work or materials under this Contract. Also refers to any agreement between a Subcontractor and any of lower tier Subcontractors. Such an agreement creates no relationship, legal or otherwise, between the DPMC and the Subcontractor(s) and/or lower tier Subcontractor(s).

1.1.26 Substantial Completion: The date when all essential requirements of the Contract Documents have been satisfied so that the purpose of the Contract Documents is accomplished, as determined by the DPMC including training of staff by the Contractor on all equipment, and resulting in the issuance of a temporary Certificate of Occupancy, a permanent Certificate of Occupancy or a permanent Certificate of Acceptance and when the Work and the facility can be safely occupied and used in accordance with its intended purpose. DPMC may condition issuance of a Certificate of Substantial Completion upon satisfactory receipt of critical documents.

1.1.27 Unit Schedule Breakdown: A detailed list of the Work activities required for Project construction, other elements associated with fulfilling the requirements of the Contract (bonds, insurance, etc.), major items of material, labor or equipment, and the prices associated with each of them.

1.2.28 Using Agency: The State department or agency for whom the construction project is being completed.

1.1.29 Work: All construction, supervision, labor, material and equipment necessary to complete the obligations under the Contract including Operation and Maintenance Manuals, Punch List completion, and As-Built Documents.

1.2 CONTRACT DOCUMENTS TO BE PROVIDED BY DPMC

Upon Contract award, the DPMC will furnish to the Contractor, free of charge, three copies of the drawings and specifications, and any additional instructions by means of supplemental contract documents as otherwise necessary for the proper execution of the Work, unless otherwise provided in the Contract Documents. Upon request, additional copies of the contract documents will be furnished at the Contractor's expense.

1.3 INTENT OF THE CONTRACT

1.3.1 The drawings, specifications and all of the Contract Documents are intended to require the Contractor to provide for everything necessary to accomplish the proper and complete finishing of all work. For the Project, the Contractor shall perform all of the obligations and work identified in the Contract Documents, regardless of the manner in which it is divided among the trades or the order in which it appears in the Contract Documents. All work and materials included in the specifications and not shown on the drawings, or shown on the drawings and not in the specifications shall be performed and/or furnished by the Contractor. The Contractor shall include any incidental materials

and/or Work not indicated in the drawings and/or the specifications which are nevertheless necessary for the development of the Project and are reasonably inferable from the contract documents and industry practice. The Contractor shall perform all such work and furnish all such materials as if particularly delineated or described in the contract documents as part of the bid proposal.

1.3.2 The Contractor acknowledges that in preparing its bid, the Contractor had the obligation to raise any reasonably observable errors, omissions, ambiguities or discrepancies and request an interpretation of the alleged errors, omissions, ambiguities or discrepancies. If the Contractor failed to do so, it will have waived all rights to a Change Order or claim and the Contractor will be responsible to complete the Work as required, consistent with the intent of the Contract Documents as interpreted by the DPMC, without additional compensation.

1.3.3 No interpretation of the meaning of the plans, specifications or other Contract Documents provided prior to bid submission shall be binding upon the State for any purpose unless issued in a Bulletin.

1.3.4 The Contractor shall abide by and comply with the intent and meaning of the Contract Documents taken as a whole, and shall not take advantage of any error or omission, should any exist. Should the Contractor become aware of the existence of any error, omission or discrepancy, the Contractor shall immediately notify the DPMC and the Architect/Engineer of any such errors, omissions, ambiguities or discrepancies and seek correction or interpretation thereof prior to commencement of the Work at issue. The Architect/Engineer shall issue a written interpretation. The Contractor shall do no work outside of the Contract Documents, unless written authorization to proceed from the DPMC is received by the Contractor.

1.3.5 Each and every provision required by law to be inserted in the Contract Documents is deemed to have been inserted therein. If any such provision has been omitted or has not been correctly inserted, then upon application of either party, the Contract may be modified to provide for such insertion or correction.

1.3.6 The order of precedence pertaining to interpretation of Contract Documents is as follows:

- a. Executed Contract
- b. Bulletins and Instructions
- c. Supplemental General Conditions
- d. Specifications and General Conditions
- e. Drawings, in the following order of precedence:
 - (1) Notes on drawings
 - (2) Large scale details
 - (3) Figured dimensions
 - (4) Scaled dimensions

1.3.7 Where there may be a conflict in the Contract Documents not resolvable by application of the provisions of this Article, then the more expensive labor, materials, or equipment shall be assumed to be required and shall be provided by the Contractor.

1.3.8 On all work, it shall be the responsibility of the Contractor, by personal inspection of the existing building, facility, plant or utility systems, to ascertain the accuracy of any information given. This shall be the case, whether or not such information is indicated on the drawings, included in the specifications, or shown in any other documentation that is available. The Contractor shall have an affirmative duty to make reasonable inquiry for all available information. The Contractor shall include the costs of all material and labor required to complete the Work based on inspection and reasonably observable conditions.

1.4 WORKDAYS

Regular working hours will be defined in the Contract Documents. Changes thereto may be granted with written approval of the DPMC representative. Any work required to be performed after regular working hours or on Saturdays, Sundays, or legal holidays as specially set forth in the Contract documents, as may be reasonably required and consistent with contractual obligations, shall be performed at the amount set forth in the Contractor's bid without additional expense to the State. The Contractor shall obtain written approval of the DPMC representative for performance of work after regular working hours or on non-regular workdays at least forty-eight (48) hours prior to the commencement of overtime, unless such overtime work is caused by an emergency. If the Contractor seeks such approval for the overtime work, same shall be performed at no additional cost to the DPMC except in the event of an emergency, at which time, the DPMC, in its sole discretion, shall determine if the submitted overtime is compensable.

1.5 ASSIGNMENTS

The Contractor shall not assign all or any part of this Contract without the written consent of the Director. Money due (or to become due) the Contractor hereunder shall not be assigned for any purpose whatsoever without the written consent of the Director.

1.6 STATE SALES TAX

1.6.1 Materials, supplies or services for exclusive use in the construction of structures or buildings or otherwise improving, altering or repairing all State-owned property are exempt from the State sales tax.

1.6.2 Purchases or rentals of equipment are not exempt from any tax under the State Sales Tax Act.

ARTICLE 2 - OWNER/DPMC

2.1 DPMC'S REPRESENTATION

The DPMC will be represented on the Project by DPMC's designated representative(s). DPMC's designated representative(s) have only those duties that are required of the Owner under this Contract.

2.2 RIGHT TO PERFORM WORK

The DPMC may, and reserves the right to, enter upon the premises at any and all times during the progress of the Work, or cause others to do so, for the purpose of performing any work or installing any apparatus or carrying on any construction not included in the Contract Documents, or for any other reasonable purpose.

The DPMC shall have the right to defer the beginning of Work or to suspend the whole or any part of the Work whenever, in the sole discretion of the DPMC, it may be necessary or expedient for the State to do so.

2.3 MEANS AND METHODS

The State will not be responsible for, nor have control or charge of construction means, methods, techniques, sequences of procedures, or safety precautions and programs in connection with the Work. The State will not be responsible for, nor have control or charge of, the acts or omissions of the Contractor, Subcontractors, or any of their agents or employees, or any other person performing any of the Work.

ARTICLE 3 - ARCHITECT/ENGINEER

3.1 DUTIES AND RESPONSIBILITIES

3.1.1 The Architect/Engineer (“A/E”) is the consultant engaged by the DPMC to prepare the design and perform certain contract administration functions in accordance with the provisions of its contract with the DPMC.

3.2 PROGRESS MEETINGS

The Architect/Engineer will attend, chair and issue record minutes of bi-weekly job progress meetings.

3.3 SITE OBSERVATIONS

3.3.1 The Architect/Engineer will monitor the execution and progress of the Work. The Architect/Engineer will at all times be provided access to the Work. The Contractor shall provide facilities for such access so as to enable the Architect/Engineer to perform its functions.

3.3.2 The Architect/Engineer will not be responsible for, nor have control or charge of construction means, methods, techniques, sequences of procedures, or safety precautions and programs in connection with the Work. The Architect/Engineer will not be responsible for, nor have control or charge of, the acts or omissions of the Contractor, Subcontractors, or any of their agents or employees, or any other person performing any of the Work.

3.4 SHOP DRAWINGS AND SUBMITTALS AND INVOICES

As more specifically described in Article 4, the Architect/Engineer will review, approve or take other appropriate action relating to Contractor’s submittals, including shop drawings, product data and samples, and as – built drawings, to assure conformance with the requirements of the Contract. Such actions shall be taken with reasonable promptness. Approval of a specific item shall not indicate approval of an assembly of which the item is a component.

3.5 PAYMENT APPROVALS

3.5.1 The Architect/Engineer is responsible for the timely review of all invoices submitted by the Contractor. The Architect/Engineer shall inform the Contractor of any deficiencies therein. When the payment voucher is deemed accurate, the Architect/Engineer shall recommend approval of Contractor invoices.

3.5.2 The Architect/Engineer will review and recommend approval of Contractor closeout documentation in conjunction with the final application for payment.

ARTICLE 4 - THE CONTRACTOR

4.1 REVIEW OF THE CONTRACT DOCUMENTS AND FIELD CONDITIONS

4.1.1 The Contractor has the duty to thoroughly examine and be familiar with all of the Contract Documents and the Project site. The Contractor shall investigate and accurately determine the nature and location of the Work, the current building equipment and systems, labor and material conditions, and all matters which may in any way affect the Work or its performance.

4.1.2 The Contractor shall be deemed to have verified all reasonably observable conditions outside the Contract limit lines to determine whether any conflict exists with the Work that the Contractor is required to perform under the Contract. This includes but is not limited to a check on elevations, utility connections and other site data. If a condition changed from the time of the bid to the time of the issuance of the Notice to Proceed, the Contractor shall notify the Architect/Engineer immediately. The Contractor shall immediately report any conflicts prior to the bid proposal due date or waive any claim for additional compensation arising from such conflict.

4.1.3 During the progress of the Work, the Contractor shall immediately report in writing any alleged error, inconsistency, ambiguity or omission in the Contract Documents to DPMC. The Contractor shall not continue with any work that is affected by such alleged error, inconsistency, ambiguity or omission until the DPMC has had the opportunity to respond. Any error, inconsistency, ambiguity or omission shall be addressed pursuant to appropriate procedures set forth in these General Conditions.

4.1.4 Following notification of an alleged error, inconsistency, ambiguity or omission, the DPMC may issue supplemental instructions for the proper execution of the Work. The Contractor shall do no work without proper supplemental instructions. In giving such supplemental instructions, the DPMC will have the right to direct the Contractor to make minor changes in the Work without payment of additional monies. This provision is not intended to infringe upon or limit the DPMC's authority to otherwise direct changes in the Work, described elsewhere in these general conditions.

4.1.5 Where certain work is shown in complete detail, but not repeated in similar detail in other areas of the drawings, or if there is an indication of continuation with the remainder being shown only in outlines, the Work shown in detail shall be understood to be required in other like portions of the Project.

4.1.6 Unless otherwise directed in writing by the DPMC, the Contractor shall perform no portion of the Work without appropriate approvals as may be applicable and required by the Contract Documents.

4.1.7 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for all labor, equipment, materials, tools, construction equipment and machinery, water, heat, utilities, transportation and other facilities and services necessary for the proper execution, protection, and completion of the Work.

4.2 INSURANCE

The Contractor shall secure and maintain in force, for the term of the Contract, insurance coverage provided in Section 13.4. The Contractor shall provide the State of New Jersey with current certificates of insurance for all coverage and renewals thereof which must contain a provision that the insurance provided in the certificate shall not be canceled for any reason except after thirty (30) calendar day's written notice to the State of New Jersey. If cancellation occurs, the Contractor shall immediately procure new coverage, not allowing any lapse of coverage to occur.

4.3 PERMITS, LAWS, AND REGULATIONS

4.3.1 The DPMC shall obtain and pay for the construction permits and inspections (building, plumbing, electrical, elevator and fire), required by the Department of Community Affairs (DCA). When permits are issued by DCA, the appropriate licensed Contractors and/or Subcontractors shall be required to fill out the Contractor section of the Sub-Code Technical Section and sign and affix their raised seal thereto.

4.3.2 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for all other permits and governmental fees, licenses and inspections necessary for the proper execution and completion of the Work, and which are legally required at the time of receipt of bids.

4.3.3 All work must be done in accordance with the NJUCC. No work requiring inspections and approval by construction NJUCC code officials is to be covered or enclosed prior to inspection and approval by the appropriate NJUCC enforcement officials.

4.3.4 The Work performed pursuant to this Contract is exempt from local ordinances, codes and regulations as related to the building and the Site on which it is located, except in certain limited circumstances, where construction could adversely affect adjacent property, public sidewalks and/or streets. In those instances, the Contractor shall coordinate its activities with municipal and/or highway authorities having appropriate jurisdiction.

4.3.5 Immediately upon receipt of the contract award documents from the DPMC, the Contractor shall notify all utility companies involved regarding utility services required for completion of the Work. Such notification shall be in addition to any notification requirements imposed by law, including, without limitation, the Underground Facility Protection Act, N.J.S.A. 48:2-73, et seq.

4.3.6 The Contractor shall perform all soil conservation measures in accordance with County Soil Conservation District requirements.

4.3.7 The Contractor shall perform all sewage disposal work in conformance with the regulations of the State's Department of Environmental Protection.

4.3.8 The Contractor shall be responsible for obtaining timely NJUCC inspections of the Work from the applicable State agency. The Contractor shall request such

inspections through DPMC authorized representatives allowing for sufficient notice to enable NJUCC inspections to be scheduled without delay to the Work.

4.3.9 Consistent with section 4.4 of these General Conditions, the Contractor shall be responsible for its own actions and protect, defend and indemnify the State from all fines, penalties or loss incurred for, or by reason of, the violation of any municipal ordinance or regulation or law of the State while the said work is in progress.

4.3.10 The Contractor shall comply with the Federal Occupational Safety and Health Act of 1970 and all of the rules and regulations promulgated there under.

4.3.11 If the Contractor causes a substantial violation of a State, local or federal statute or regulation on the Project, DPMC may declare the Contractor to be in default, and/or terminate the Contract.

4.3.12 Prior to the start of any crane equipment operations, the Contractor shall make all necessary applications and obtain all required permits from the Federal Aviation Administration (F.A.A.). When the F.A.A. has jurisdiction, the sequence of operations, timing and methods of conducting the Work shall be approved by the F.A.A.

4.3.13 The Contractor will establish an approved Silica Health and Safety Program when tasks generating crystalline silica dust are being performed. This program shall include engineering, work practice, and respiratory protection controls to reduce worker exposure to airborne respirable crystalline dust to levels that are as low as reasonably achievable. When tasks are performed that generate airborne crystalline dust, the Contractor will minimize worker exposure to dust by one, or a combination of the following methods: 1) dust suppression with water, 2) local exhaust ventilation to a high-efficiency dust collector, and/or 3) appropriate respiratory protection devices. The Contractor shall provide a trained, competent person, as defined by OSHA 29 CFR 1926, on site at all times to implement the Silica Health and Safety Program when tasks generating crystalline silica dust are being performed.

4.4 RESPONSIBILITY FOR THE WORK

4.4.1 The Contractor shall be responsible to the State and to any separate Contractors and/or consultants including, without limitation, the Architect/Engineer, for the acts, errors and omissions of its employees, Subcontractors and their agents and employees that injure, damage or delay such other Contractors and/or consultants in the performance of their work.

4.4.2 The Contractor shall be responsible for all damage or destruction caused directly or indirectly by its operations to all parts of the Work, both temporary and permanent, and to all adjoining property.

4.4.3 The Contractor shall, at its own expense, protect all finished work and keep the same protected until the Project (or identifiable portions thereof, that are declared as substantially complete and being used) is completed and accepted.

4.4.4 The Contractor shall be responsible for safety and for any damage or injury which may result from the Contractor's failure or improper construction, maintenance or operation.

4.4.5 In order to protect the lives and health of its employees, the Contractor shall comply with all applicable statutes and regulations and pertinent provisions of the "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Inc. and shall maintain accurate records 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. If a conflict should exist with the requirements of the Federal Occupational Safety and Health Act of 1970, then the most stringent statute or pertinent provision shall apply.

4.5 INDEMNIFICATION

4.5.1 The Contractor shall assume all risk of and responsibility for, and agrees to protect, defend and indemnify the State of New Jersey, its agents, and its employees, from and against, any and all claims, demands, suits, actions, recoveries, judgment and costs of expenses in connection therewith on account of the loss of life, property, injury or damage to the person, body or property of any person or persons whatsoever, resulting from the Contractor's performance on the Project or through the use of any improper or defective machinery, implements or appliances, or through any act or omission on the part of the Contractor or its agents, employees or servants, which shall arise from or result directly or indirectly from the Work and/or materials supplied under this Contract. This indemnification obligation is not limited by, but is in addition to, the insurance obligations contained in this Contract.

4.5.2 In any and all claims against the State or any of its agents or employees, any employees of the Contractor or Subcontractor or anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation under this section shall not be limited in any way as to the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under worker's compensation acts, disability benefit acts, or other employee benefit acts.

4.6 SUPERVISION

4.6.1 The Contractor shall attentively supervise and direct the Work. The Contractor shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract.

4.6.2 The Contractor shall employ a full-time competent superintendent and necessary foremen and assistants, who shall be in attendance on the Project Site during the progress of the Work. The superintendent shall represent the Contractor, and all communications given to the superintendent shall be binding upon the Contractor. The State reserves the right to require a change in superintendent if the superintendent's performance, as judged by the DPMC, is deemed to be inadequate. Upon application in writing, and if deemed appropriate and expressly approved by the DPMC, the requirement for a full-time superintendent may be waived. If such a waiver is permitted, the Contractor shall employ a full-time competent foreman who shall be in attendance on the site during the progress of work and shall represent the Contractor, and all communications given to the foreman

shall be binding upon the Contractor. The Contractor shall not employ persons unfit or unskilled in the assigned area of work.

4.6.3 The Contractor shall ensure that its Subcontractors shall likewise have competent superintendents in charge of their respective portions of the Work at all times. Upon application in writing, and if deemed appropriate and expressly approved by the DPMC, the requirement for a full-time superintendent may be waived. If such a waiver is permitted, the Subcontractor shall employ a full-time competent foreman who shall be in attendance on the site during the progress of work and shall represent the subcontractor, and all communications given to the foreman shall be binding upon the subcontractor. The Subcontractor shall not employ persons unfit or unskilled in the assigned area of work. If it becomes apparent that a Subcontractor does not have its portion of the Work under control of a competent foreman, the Contractor shall have the obligation to take appropriate steps to immediately provide proper supervision.

4.6.4 The Contractor shall employ qualified competent craftsmen in their respective lines of work. The State may require evidence that all employees have received sufficient training to execute the Work.

4.6.5 If, due to a trade agreement or project labor agreement, standby personnel are required to supervise equipment installation or for any other purpose during the normal working hours of other trades, the Contractor normally required to provide the standby services shall be deemed to have evaluated and included the costs thereof in its bid price and shall provide said services without additional charge.

4.6.6 The Contractor shall at all times enforce strict discipline and good order among its employees and shall not employ any unfit person or anyone not skilled in the task assigned.

4.7 SHOP DRAWINGS AND OTHER SUBMITTALS

4.7.1 The Contractor shall, within two weeks of the Notice to Proceed, submit to the Architect/Engineer, shop drawings and sample submission schedule for approval, which shall be used as a basis for complying with the overall progress schedule. The Contractor shall obtain, from its Subcontractor(s), all submittals including shop drawings, details, and schedules. The Contractor shall review the submittals for completeness and conformity with the Contract Documents, and shall stamp the submittals "approved". The Contractor shall promptly forward two copies of each submittals in reproducible form to the Architect/Engineer, so as to cause no delay in its own work or that of any other contractor. The DPMC Project number and the drawing and specification references shall be written or typed on all submissions. Failure to comply with these instructions will be sufficient reason to return the drawing to the Contractor without approval and any resulting delay in the Project shall be the sole responsibility of the Contractor.

4.7.2. The Architect/Engineer will review shop drawings and other submittals with reasonable promptness. The Contractor shall promptly make any corrections, if required by the Architect/Engineer, and resubmit a reproducible copy for approval. Within five (5) working days of final approval, the Contractor shall send the Architect/Engineer a

minimum of seven (7) prints of the finally approved shop drawings as well as seven (7) copies of all catalog cuts.

4.7.3 The Contractor shall prepare original shop drawings, and not simply copy the Contract Drawings for submission as shop drawings. All shop drawing sizes shall be in multiples of 9" x 12" (e.g., 18" x 24", 24" x 27", 24" x 36", etc.) as approved by the Architect/Engineer.

4.7.4 Any deviations or changes from the requirements of the Contract Documents, must be approved by the Architect/Engineer. A Contractor seeking approval for any deviations or changes must: a) make a written request for the proposed change; b) provide to the Architect/Engineer a detailed narrative description of the proposed change; c) highlight on the applicable drawing the proposed change; and d) furnish a detailed description of all potential impacts on the schedule and project budget.

4.7.5 Substitutions

4.7.5.1 Where any particular brand or manufactured article is specified, it shall be regarded as a standard. Similar products of other manufacturers, capable of equal performance and quality, may be accepted if approved by the Architect/Engineer and accepted by DPMC in writing.

4.7.5.2 In the event that a Contractor proposes a substitution to the specified equipment or materials, it shall be the Contractor's responsibility to submit proof of equality and to provide and pay for any tests which may be required by the DPMC in order to evaluate the proposal. If there is a substantial cost savings between the substitution and the specified equipment or material, the difference will be returned to the State in the form of a credit Change Order.

4.7.5.3 The application for the approval of a substitution must be submitted on the State form within 10 days of Notice to Proceed. Further, the submission shall include the following requirements:

- a. A Full and complete identification information;
- b. The identification of the paragraph and section of the specifications for which the substitution is proposed. The attachment of data indicating in detail whether and how the equipment or material differs, if at all, from the article specified;
- d. A detailed explanation of any effect the proposed substitution will have on the scope of the Work and a certification that the Contractor agrees to be responsible for any and all resulting added costs to its Work and to any additional costs incurred by the Architect/Engineer in time, labor and/or redesign of the Contract Documents;
- e. The submission of documents that demonstrate proof of equality, along with an agreement to have such tests performed at the Contractor's own expense as may be required for approval by the DPMC and/or the Architect/Engineer. The Contractor shall be responsible for the cost of reviews by the Architect/Engineer of subsequent submissions of additional information.

4.7.5.4 No Contractor shall base a bid on a substitution that may have been approved on previous Projects. Bids shall be based solely on plans and specifications of this Project.

4.7.5.5 The Contractor shall not proceed with the purchase or installation of a substitution without the written approval of DPMC. Any such installation may result in the assessment of costs for its removal at the Contractor's expense, and/or other damages and/or termination of the Contract for default.

4.7.6 Additional Submissions

4.7.6.1 Samples: The Contractor shall furnish, for approval, all required samples. Such samples shall be submitted in accordance with the shop drawing and sample submittal schedule. All work must be installed in accordance with approved samples.

4.7.6.2 Utility Service Connections: With respect to plumbing, fire-protection, HVAC, electrical and other machinery and mechanical equipment items requiring utility service connections, the Contractor must submit the respective shop drawings with the manufacturer's certified rough-in drawings, indicating accurate locations and sizes of all service utility connections.

4.7.6.3 Sleeve and Opening Drawings: Prior to installing service utilities or other piping, through structural elements of the building, the Contractor shall prepare and submit, for approval by the Architect/Engineer, accurate dimensional drawings indicating the positions and sizes of all sleeves and openings required to accommodate the Work and installation of the Contractor's piping, equipment, etc. All such drawings must contain reference to the established dimensional grid of the building. Such drawings must be submitted in accordance with the approved shop drawing and sample submission schedule.

4.7.6.4 Control Valve and Circuit Location Charts and Diagrams: For all plumbing, fire-protection, HVAC and electrical work, the Contractor shall prepare a complete set of inked or typewritten control valve and circuit location diagrams, charts and lists identifying and locating all such items, and shall place the charts, diagrams and lists under frame glass in designated equipment rooms. The Contractor shall also furnish one-line diagrams, as well as such color-coding of piping, wiring and other necessary identifications as specified or required. This information is to be framed under glass and displayed where directed.

4.7.6.5 Coordination Drawings: The Contractor shall create and update a complete, composite set of Coordination Drawings. The purpose of these drawings is to identify coordination and interference problems prior to installation. Coordination Drawings are required for all equipment rooms, above ceiling spaces, shared chases, and other areas where the Work of two or more trades is to be installed. The drawings shall be drawn to a scale not smaller than 1/4"=1'-0" (30"x42" sheet size) and shall show clearly in both plan and elevation that all Work can be installed without interference. At a minimum these drawings shall indicate:

- a. The interrelationship of equipment and systems;
- b. Required installation sequences;

- c. Equipment foundations and pads, equipment, piping, conduits, racks, ductwork, insulation, panels, control centers, sprinkler and fire protection systems etc. and required clearances.

The Contractor shall prepare the coordination drawings based on the submitted shop drawings and Contract Documents. The Contractor shall prepare, submit and receive approvals for the Coordination Drawings before any sleeves or inserts are set, any floor openings are core drilled, or any equipment, equipment foundations, or related work is installed. The cost of preparing approved Coordination Drawings shall be included in the Contractor's price. DPMC may require the Contractor to identify Coordination Drawings as an item within the Schedule of Values, and incorporate them into in the Project schedule.

4.8 AS-BUILT DRAWINGS

4.8.1 The Contractor and each Subcontractor shall maintain on the Project Site at all times one set of drawings to be marked "AS-BUILT." The DPMC has the right to rely on accuracy of the "as-built" drawings provided by the Contractor. During the course of the Project, the Contractor shall mark these drawings with colored pencils to reflect any changes, as well as the dimension and the location of all pipe runs, conduits, traps, sprinkler and fire protection lines, footing depths or any other information not already shown on the drawings or differing therefrom. All buried utilities outside the building shall be located by a survey performed by a licensed surveyor who shall certify as to its accuracy. These marked-up drawings and surveys shall remain current and shall be made available to the DPMC or Architect/Engineer at all times during the progress of the Work.

4.8.2 In instances where shop drawings and/or erection drawings, of a scale larger than the Contract Drawings, are prepared by the Contractor, such drawings may be acceptable "as-built" drawings provided they are updated. A master sheet of the same dimensions as the Contract Drawings shall be prepared by the Contractor that shall indicate, sheet by sheet, a cross-reference to all shop drawings pertaining to that drawing.

4.8.3 The Contractor shall submit the "as-built" documents to the Architect/Engineer with a certification as to the accuracy of the information thereon at the time of Contract completion and before final payment will be made to the Contractor. After acceptance by the Architect/Engineer, the Contractor will furnish two sets of all shop drawings used for "as-built" documentation.

4.8.4 All "as-built" drawings as submitted by Contractors shall be dated and labeled "AS-BUILT" above the title block. This information shall be checked, edited and certified by the Architect/Engineer, who will then transpose such information from the Contractor's "as-built" drawings to the original drawings. Where shop drawings have been used by the Contractor for "as-built" documentation, the master sheet providing cross reference information, as described in section 4.8.2, shall be included in the set of "as-built" drawings furnished to DPMC.

4.9 EXCAVATIONS, CUTTING AND PATCHING

4.9.1 Soil borings, test pits or other subsurface information may be secured by an independent Contractor retained by the State prior to design and construction of the Project and, if obtained, may be included in the Contract Documents for the Contractor's use. The Contractor assumes full responsibility for interpretation of said information.

4.9.2 The Contractor shall be responsible for furnishing and setting of sleeves, built-in items, anchors, inserts, and other necessary materials for its work and for all cutting, fitting, closing in, patching, finishing, or adjusting of its work in new and/or existing construction, as required for the completed installation.

4.9.3 Approval in writing from the DPMC and the Architect/Engineer must first be obtained by the Contractor before cutting or boring through any roof, floor beams, floor construction or structural members.

4.10 TESTING

4.10.1 The Contractor shall notify the DPMC in writing of all work required to be inspected or tested. The notice shall be provided no later than five working days prior to the scheduled inspection or test. The Contractor shall bear all costs of such inspections or tests, except for Code inspections as stated in section 4.3 of this document.

4.10.2 When mechanical, electrical or other equipment is installed, it shall be the responsibility of the installing Contractor to maintain, warrant and operate it for such period of time as required by the Contract Documents or as necessary for the proper inspection and testing of the equipment and for adequately instructing the State's operating personnel. All costs associated with the maintenance, warranty, operations, inspection and testing of equipment, as well as instructing State personnel, shall be borne by the Contractor installing the equipment. All tests shall be conducted in the presence of, and upon timely notice to, the DPMC, prior to acceptance of the equipment.

4.10.3 DPMC shall have the authority to direct in writing that special or additional inspections or tests be performed. The Contractor shall comply and give notice as detailed above.

4.10.4 In the event such special or additional inspections or testing reveal a failure of the Work to comply with the terms and conditions of the Contract, the Contractor shall bear all costs thereof, including all costs incurred by the State made necessary by such failures.

4.10.5 The Contractor shall utilize inspection or testing from those firms/entities pre-qualified by DPMC. Failure to use a firm/entity pre-qualified by DPMC shall be grounds for rejection of the inspection or test as non-conforming.

4.10.6 All submittals of inspections, test reports or requests for approval shall be accompanied by a certification signed by the Contractor, attesting to: the Contractor's knowledge of the submittal; acceptance of its findings; acknowledgment that material testing meets the required standards; and a certification of the report's representation of

the facts. Failure to provide the written certification shall be grounds for rejection of the submittal.

4.10.7 The Contractor shall ensure that a copy of the inspection report is transmitted directly to the Architect/Engineer and the DPMC. The Contractor shall ensure that it includes in all of its subcontracts and purchase orders for inspection and testing, the requirement for the inspection or testing firm/entity to submit a copy of the report directly to the DPMC representative. The Contractor shall ensure that all such reports are submitted within fourteen (14) calendar days of the test or inspection.

4.10.8 In addition to tests performed by the Contractor, the State reserves the right to engage an independent testing agency or firm to perform testing inspections. The Contractor shall provide full access, provide samples, and cooperate fully with this testing agency.

4.10.9 Testing requirements for real property installed equipment (RPIE) to be furnished by the Contractor, when such testing is required by Code, Contract, or the manufacturer, shall be performed by a testing laboratory pre-qualified by DPMC, or in the absence of such, by the manufacturer or its authorized representative. The Contractor shall provide five working days' notice to the DPMC representative, to allow sufficient opportunity to witness the test.

4.10.10 The DPMC may order that any part of the Work be re-examined by the DPMC, and if so ordered, the Contractor shall open or uncover such work for re-inspection by the DPMC. If such work is found to be in accordance with the Contract, the DPMC shall pay the cost of re-inspection; however, if such work is not found to be in accordance with the Contract, the Contractor shall be responsible for the cost of re-inspection and replacement of any defective or non-conforming work.

4.11 EQUIPMENT AND MATERIALS

4.11.1 The Contractor warrants that all materials and equipment furnished under the Contract will be new, unless otherwise specified, and that all work will be of good quality, free from faults, defects, and installed in conformance with the Contract Documents. All work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective and rejected by the DPMC or the Architect/Engineer. If required by the Architect/Engineer or the DPMC, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. This warranty shall be in addition to but not in lieu of any other warranty or guarantee provided for in the Contract.

4.11.2 The Contractor shall submit to the Architect/Engineer an original and six copies of the request for approval of materials on the form provided by DPMC for approval. Each item of material listed shall be marked "As Specified", "Substitution" or "Unspecified" as appropriate.

4.11.3 The Contractor shall furnish and deliver the necessary equipment and materials in ample quantities and as frequently as required to avoid delay in the progress of the Work and shall store them so as not to cause interference with the orderly progress of the Project.

4.11.4 The Contractor shall furnish and pay for all necessary transportation, storage, scaffolding, centering, forms, water, labor, tools, light and power and mechanical appliances and all other means, materials and supplies for properly executing the Work under this Contract, unless expressly specified otherwise in the Contract Documents. The Contractor shall have its representatives at the Site to accept delivered materials. State agencies employees and/or representatives will not accept materials, nor will State agency employees and/or representatives be responsible for damage, theft, or disappearance of the Contractor's materials, equipment, tools, or other property.

4.11.5 Products manufactured in the United States shall be used in this work, whenever available. Wherever practicable, preference shall be given at all times to material and equipment manufactured or produced in the State of New Jersey, where such preference is reasonable and will best serve the interest of the State.

4.11.6 No materials, equipment, or supplies for the Work shall be purchased by the Contractor subject to any lien or encumbrance or other agreement by which an interest is retained by the seller. This clause shall be a condition included in all agreements between the Contractor and its Subcontractors. The Contractor warrants, by signing its invoice, that it has good and sufficient title to all such material, equipment and supplies used by it in the Work, free from all liens, claims or encumbrances.

4.12 TEMPORARY FACILITIES

The Contractor shall be responsible for providing for its own storage areas, employee vehicular parking and staging areas, excavation borrow/spoils designated areas, commercial canteen areas, and all other areas necessary for use by the Contractor. The Contractor shall locate these areas to suit Project requirements, subject to DPMC approval.

4.12.1 Field Offices - The Contractor will provide and maintain during the contract duration an on-Site suitable weather-tight insulated field office conveniently located, and shall maintain therein a complete set of Contract Documents including plans, specifications, CPM network diagrams, Change Orders, logs and other details and Project correspondence. Subject to the DPMC's written approval and at a date designated by DPMC, the field office may be removed upon enclosure of the building and space may be allocated for field offices within the building. The contents and operations will be transferred to the interior of the Project building by the Contractor, and said office(s) shall be maintained by the Contractor until final acceptance or until the DPMC approves its removal. The Contractor will be responsible to obtain and pay for all permits required for the Contractor's field offices.

4.12.2 Telephones - The Contractor shall provide its own telephones. The State will be responsible only for the cost of calls made by State employees. if there is a documented cost for same.

4.12.3 Storage - The Contractor will provide and maintain, for its own use suitable and safe temporary storage, tool shops, and employees' sheds for proper protection, storage work and shelter. The Contractor shall maintain these structures properly and remove the structures at the completion of work. The Contractor shall be responsible to maintain

these facilities and the areas around the facilities in a clear and clean manner. The Contractor shall be responsible for correcting defects and damage caused by such use. Rooms in buildings at the Project Site may be used as shops and storerooms, conditioned upon written approval from DPMC.

4.12.4 Toilet Facilities

- a. The Contractor shall provide and pay for suitable temporary toilets at an approved location on the Site and prior to the start of any field work. The toilet facilities shall comply with federal, State and local laws and regulations. The Contractor will be responsible for maintenance, removal and relocation as described hereinafter.
- b. The Contractor shall provide a temporary toilet and/or indoor toilet connected to water and sewer to accommodate the meeting room and the Architect/Engineer's office, as well as the DPMC office.
- c. Toilets shall be serviced by a qualified and experienced firm authorized to maintain services.
- d. Each portable toilet facility shall be maintained in a neat and clean condition and serviced at least twice a week, including the removal of waste matter, sterilizing, recharging tank, refilling tissue holders, and thoroughly cleaning and scrubbing entire interior.
- e. Toilet facilities in a multiple-story building shall be located on no less than every other floor, unless otherwise directed in writing.
- f. Toilet service shall be relocated inside the building and connected to water and sewer as the progress of the Work will allow.
- g. When temporary toilets are connected to water and sewer lines, precautions shall be taken to prevent freezing.
- h. The Contractor shall remove the temporary toilet units from the Work Site at the completion of the Work, or when so directed by the DPMC or the Architect/Engineer.
- i. Workers are not to use the finished bathroom and toilet facilities in the Project buildings. Reasonable steps must be taken by the Contractor to enforce this rule.

4.12.5 Access, Roads and Walks

- a. The Contractor shall be responsible for providing and maintaining unobstructed traffic lanes on the designated construction access routes shown on the Contract Drawings or as reasonably required so as to perform the Work. The Contractor shall provide and maintain all reasonably required safety devices. The Contractor shall provide any necessary additional materials, grading and compaction, and shall remove snow and debris as necessary to provide and maintain the access roadbed and pedestrian ways in serviceable condition.
- b. The Contractor shall be responsible for constructing and maintaining all roadways, drives and parking areas within or proximate to the Site free and clear

of debris, gravel, mud, snow, ice, or any other Site materials, by ensuring that all reasonably necessary measures are taken to prevent such materials from being deposited on such surfaces. This includes, as may be appropriate, the cleaning of vehicle wheels and/or other necessary maintenance, prior to exit from the Construction Site. Should such surface require cleaning, the Contractor will clean these surfaces without additional cost to the State. The Contractor will be held accountable for any citations, fines, or penalties imposed on the State for failing to comply with local rules and regulations related to Site and off-Site maintenance.

c. The Contractor shall not commence final construction of permanent driveways, parking areas or walks without the written approval of the DPMC. The Contractor shall provide additional materials and labor for maintaining and reworking the sub-grade prior to completion of the Work, to ensure improvements conform fully to the specifications.

d. The Contractor shall obtain written permission from the State for the use of any existing driveways or parking areas not specifically designated for such use in the Contract Documents. If permission is granted, the Contractor shall maintain such driveways and areas in good condition during the construction period, and at the completion of the Project, shall leave them in the same or better condition as at the start of the Work. Conditions before use shall be carefully photographed and documented by the Contractor.

4.12.6 Light and Power

a. The Contractor shall extend electrical service to the building or buildings at locations approved by the DPMC. Temporary electrical service shall be independent of the existing permanent service. Initial temporary service shall be three phase or single phase as indicated in the Contract Documents. The Contractor is responsible to investigate and verify the appropriateness and availability of electrical service with the local utility company prior to the bid date. The Contractor's bid shall be deemed to include all costs associated with providing this power. Temporary light and power installations, wiring, and miscellaneous electrical hardware must meet the electrical Code and will be inspected by NJUCC officials. The Contractor shall provide the necessary distributing facilities and a meter, and shall pay the cost of running temporary services from the nearest utility company power pole. All costs shall be included in the Contractor's bid.

b. In the event that a water well is the source of water supply for the Project, the extension of electrical service shall include the necessary wiring of sufficient capacity to the location of the well for the operation of the well pump. Where service of a type other than herein mentioned is required, the Contractor requiring it shall install and pay all costs of such special service. The size and incoming service and main distribution switch and panel shall be sized as any service by NEC requirements.

c. The Contractor shall provide all electrical service for the operation of elevator equipment during construction.

d. The Contractor shall pay for the cost of all electric energy used on distribution lines installed.

e. The Contractor shall provide and pay for all maintenance, servicing, operation and supervision of the service and distribution facilities.

f. If the Contractor fails to carry out its responsibility in the supplying uninterrupted light and power as set forth herein, the Contractor shall be held responsible for such failure, and the DPMC shall have the right to take such action as is deemed proper for the protection and conduct of the Work. Any costs associated with DPMC obtaining or supplying light and power shall be deducted from any payment due to the Contractor.

g. The Contractor shall comply with the requirements of the Federal Occupational Safety and Health Act of 1970 with regard to temporary light and power.

4.12.7 Temporary Enclosures

Whenever necessary in order to maintain proper temperatures for the execution or protection of the Work, the Contractor shall furnish and maintain temporary enclosures for all openings in exterior walls that are not enclosed with finished materials. Temporary wood doors shall be provided at door openings.

4.12.8 Temporary Heating, Ventilation and Air Conditioning

a. Prior to Enclosure - Prior to the building being enclosed by walls and roof, if the outside temperatures falls below 45 degrees Fahrenheit ("F") at any time during the day or night, and heat is required for work in progress or for its protection or curing, the Contractor shall furnish, at its expense, acceptable means to provide sufficient temporary heat to maintain a temperature required by the Work being performed but in no case less than 45 degrees F.

b. Generally Enclosed

(1) For the purposes of establishing the beginning of the Contractor's obligation to provide temporary heat, a building or major unit thereof shall be considered generally enclosed when (a) the exterior walls have been erected, (b) a temporary roof or permanent roof is installed and in a watertight condition, and (c) temporary or permanent doors are hung and window openings are closed with either permanent or temporary weather-tight enclosures. A major unit of buildings as referred to herein shall be: (a) an entire separate structure, or (b) a fully enclosed wing which shall have a floor area equal to at least 50% (fifty percent) of the total floor area of the Project.

(2) As soon as the DPMC determines that the building, or a major unit thereof, is "generally enclosed" by walls and roof, and when the outside temperature falls below 55 degrees F. at any time during the day or night, the Contractor shall furnish sufficient heat by the use and maintenance of LP gas heaters or other acceptable means to maintain a temperature of not less than 55 degrees F. within the enclosed area of the building at all

times, and shall remove such heaters when no longer required. The Contractor will be held responsible for providing temporary heat and for all damages resulting from freeze-ups, for the duration of the Project from the time the building is generally enclosed to final acceptance and occupancy. The Contractor shall remove soot, smudges, and other deposits from walls, ceilings, and all exposed surfaces which are the result of the use of heating equipment, including the permanent heating system, during the period of its use for supplying heat. The Contractor shall not do any finish work until the areas are properly cleaned. The Contractor shall provide or arrange, at its own expense, supervision of the heating equipment at all times prior to providing heat, using the permanent heating system. This obligation shall commence immediately after the acknowledged permanent enclosure of the building or buildings, as confirmed by the DPMC. The Contractor shall furnish and pay for all fuel for heat required during the period when the building is generally or permanently enclosed.

(3) The Contractor shall not assume that the permanent heating system or any part thereof will be available for furnishing of temporary heat during the period for which temporary heat is required. The Contractor's base bid price shall therefore include the cost of all equipment necessary for providing temporary heat as required by the Contract Documents. The Contractor may use the permanent heating system, with written approval from DPMC. Such use however does not cause to commence the equipment's warranties and guarantees. The equipment's warranties and guarantees shall not commence to run until the State takes beneficial use of the Project and facility for the purposes intended.

(4) All heating equipment shall be NFPA-approved and connected to approved flues to the atmosphere. Heaters shall be approved by a recognized testing laboratory and must be equipped with a positive shut-off safety valve.

(5) Storage of gas cylinders within the building will not be permitted at any time.

(6) The Contractor shall provide fire extinguishers on each floor where heaters are used, and the areas must be adequately ventilated.

c. Permanent Enclosure

(1) When the building enclosure has been confirmed by the Architect/Engineer has been completed in accordance with the Contract Documents, and to the satisfaction of DPMC, it shall be considered permanently enclosed. The Architect/Engineer will also confirm in the job meeting minutes that the building, or a major unit thereof, is permanently enclosed.

(3) The Contractor shall install adequate controls to make such temporary connection as required for the operation of the HVAC system.

Should the heating system be designed for the tie-in to existing steam lines for resource of heat, the State will provide steam for temporary heat through the Project permanent heating system, at no cost to the Contractor, after the tie-in is completed by the Contractor.

(4) When the building enclosure has been confirmed by the A/E as completed, the Contractor may request permission to operate the permanent HVAC system to meet its temporary HVAC obligation. The Contractor shall maintain a minimum temperature of 55 degrees F., or a higher temperature, not to exceed 75 degrees F., as may be directed by the Contract Documents for the proper conduct and protection of the Work. The Contractor shall do so until such time as its work is completed and accepted and the Contractor is relieved of this requirement in writing by the DPMC. The Contractor shall pay for and be responsible for the maintenance in accordance with the manufacturer's recommendations, operation and supervision of the HVAC system, including the cost of all water, electricity, and fuel, until the State assumes beneficial occupancy/use of the Project.

4.12.10 Temporary Water

a. The Contractor shall provide, protect and maintain an adequate valved water supply. If the source of water supply is a well, provisions covering the supply water will include the installation of necessary power-driven pumping facilities. The well shall be protected against contamination. The water supply shall be tested periodically by the Contractor, and if necessary, shall be chlorinated and filtered. All costs of providing water will be paid for by the Contractor.

b. The Contractor is responsible to protect all temporary and permanent water lines from damage or freezing. Should water connections be made to an existing line, the Contractor shall provide a positive shut-off valve at its own cost and expense.

4.12.11 Standby Personnel

If, pursuant to trade agreement to which the Contractor is a party, the Contractor is obligated, to employ standby personnel then the Contractor shall determine and include all such costs thereof in its bid proposal. The Contractor shall not, at any time, make a claim to the State for costs relating to standby maintenance or standby supervision for electric motor-driven or other equipment.

4.12.12 Dust Control

a. The Contractor shall provide and maintain necessary temporary dust-proof partitions around areas of Work in any existing building or in new building areas as directed by the Architect/Engineer or the DPMC.

b. The Contractor shall provide and maintain Site dust control of Projects with on-Site construction as directed by the Architect/Engineer or the DPMC.

4.13 STORAGE AND SITE MAINTENANCE

4.13.1 The Contractor shall confine its apparatus, the storage of its equipment, tools and materials, and its operations and workers to areas permitted by law, ordinances, permits, and Contract as set forth in the Contract Documents, the rules and regulations of the State, or as ordered by the DPMC. The Contractor shall not unreasonably encumber the Site or the premises with materials, tools and equipment.

4.13.2 The Contractor shall, at all times during the progress of the Work keep the premises and the job Site free from the accumulation of all refuse, rubbish, scrap materials and debris caused by its operations and/or the actions of its employees, Subcontractors and/or workers, to ensure that, at all times, the premises and Site shall present a neat, orderly and workmanlike appearance. This is to be accomplished as frequently as is necessary by the removal of such refuse, rubbish, scrap materials and debris from the Site and the State's premises. Loading, cartage, hauling and dumping of same will be at the Contractor's expense.

4.13.3 At the completion of the Work, the Contractor shall remove all of its tools, construction equipment, machinery, temporary staging, false work, mock-ups, form work, shoring, bracing, protective enclosures, scaffolding, stairs, chutes, ramps, runways, hoisting equipment, elevators, derricks, cranes, and any other materials and equipment brought onto the Project Site.

4.13.4 Should the Contractor not promptly and properly discharge its obligation relating to Site maintenance and/or final clean up, the State shall have the right to employ others and to charge the resulting cost to the Contractor after first having given the Contractor a three-working day written notice of such intent.

4.13.5 The Contractor's responsibilities for final clean up shall include:

- a. Removal of all debris and rubbish resulting from or relating to the Contractor's work. Rubbish shall not be thrown from building openings above the ground floor unless contained within chutes.
- b. Removal of stains from glass and mirrors. Glass shall be washed and polished inside and outside.
- c. Removal of marks, stains, fingerprints, soil, dust or dirt from painted, decorated or stained woodwork, plaster or plasterboard, metal acoustic tile and equipment surfaces.
- d. Removal of spots, paint and soil from resilient, glazed and unglazed masonry and ceramic flooring and wall work.
- e. Removal of temporary floor protections; and cleaning, washing or otherwise treating and/or polishing, as directed, all finished floors.
- f. Cleaning of exterior and interior metal surfaces, including doors, window frames and hardware, of oil stains, dust, dirt, paint, etc. Polishing and removal of fingerprints or blemishes from such surfaces shall be completed, as applicable.

- g. Restoration of all landscaping, roadways and walkways to preexisting condition. Damage to trees and plantings shall be repaired in the next planting season, and such shall be guaranteed for one year from the date of repair and/or replanting.

4.13.6 All construction equipment, materials and/or supplies of any kind, character or description, regardless of value, which remain on the job Site for more than 30 (thirty) calendar days from the date of the Certificate of Final Acceptance, shall become the property of the State. Such construction equipment, materials and/or supplies will be disposed of in any manner the State shall deem reasonable and proper. The cost of this disposal will be deducted from any sums due the Contractor. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the State.

4.14 CUT-OVERS AND INTERRUPTIONS

All cut-overs of mechanical and electrical services to existing buildings shall be approved, scheduled and coordinated in advance with the DPMC's representative and performed at a time convenient to the occupants of said buildings so as not to unreasonably interfere with its operations.

4.15 PROTECTION/SAFETY

4.15.1 Safety Precautions and Programs – The Contractor shall be responsible for initiating, maintaining and supervising all required safety precautions and programs in connection with the Work. The Contractor shall designate a responsible member of its organization at the Site whose duty shall be the prevention of accidents. This person shall be competent to review, implement and coordinate the safety programs being performed as required by Occupational Safety and Health Administration (OSHA) or any other agency having authority over safety on a State Construction Site.

4.15.2 Protection of Persons

- a. The Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury or loss to:
 - (1) Every employee on the Site and all other persons who may be affected thereby;
 - (2) All the Work and all materials and equipment to be incorporated therein, whether in storage on or off the Site, under the care, custody or control of the Contractor, or any of its Subcontractor(s) or lower tier sub-Subcontractor(s); and
 - (3) Other property at the Site or adjacent thereto (whether owned by the State or not), including but not limited to trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

b. The Contractor shall give all notices and comply with all applicable laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the safety of persons or property or their protection from damage, injury or loss.

c. The Contractor shall erect and maintain, as required by existing conditions and progress of the Work, all reasonable safeguards for safety and protection, including but not limited to rails, night-lights, aircraft warning lights, the posting of danger signs and other warnings against hazards, promulgating safety regulations, notifying Owners and users of adjacent utilities and other means of protection against accidental injury or damage to persons and property.

d. The Contractor shall not load or permit any part of the Work to be loaded so as to endanger the safety of the project, its employees, or any other person on the project Site.

e. The Contractor shall promptly remedy all damage or loss to any property caused in whole or in part by the Contractor, any of its Subcontractors, lower tier Subcontractors, or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable and for which the Contractor is responsible. These obligations are in addition to those stated elsewhere herein.

4.15.3 Protection of Property

The Contractor shall have full responsibility to install, protect, and maintain all materials and supplies in proper condition whether in storage or off the site and to immediately repair and/or replace any such damage until Final Acceptance. The Contractor shall maintain an inventory of all materials and supplies for the Work at the Site, that are delivered to the site, or delivered to approved off-site storage facilities. The State shall not be liable for any damage, theft or negligent injury to the Contractor's property.

4.15.4 Hazardous Materials

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

b. The Contractor shall maintain all records, reports and files of the general storage and handling of hazardous materials as required by any and all federal, State and/or local regulatory agencies.

4.16.5 Emergencies

In any emergency affecting the safety of persons or property, the Contractor shall act with diligence to prevent threatening injury, damage or loss. In such case, the Contractor shall immediately, but in no case, not more than 24-hours following the emergency, notify the DPMC and the Architect/Engineer of the action taken.

4.16 UNCOVERING AND CORRECTION OF WORK

4.16.1 Uncovering of Work

- a. The Contractor is obligated to provide reasonable notice to the DPMC and/or the Architect/Engineer of all work scheduled to be covered, to permit DPMC and the Architect/Engineer the opportunity to inspect the Work prior to actual covering. If any portion of the Work is covered prior to inspection by the DPMC or the Architect/Engineer, it shall be uncovered for observation. Uncovering and replacement of the covering shall be at the Contractor's expense.
- b. The DPMC and/or the Architect/Engineer may request any work be uncovered by the Contractor for inspection. If such work is found to be in accordance with the Contract Documents, the cost of uncovering and replacement shall, by appropriate Change Order, be reimbursed to the Contractor. If such work is found not to be in accordance with the Contract Documents, the Contractor shall pay all associated costs.

4.16.2 Correction of Work

- a. The Contractor shall promptly correct all work rejected by the DPMC or the Architect/Engineer as defective or failing to conform to the Contract Documents, whether observed before or after final acceptance and whether or not fabricated, installed or completed. The Contractor shall bear all costs of correcting such rejected work, including the costs of all consultant services including but not limited to the Architect/Engineer's additional services.
- b. The Contractor shall remove from the site, at its own expense, all portions of the Work which are defective or non-conforming and which have not been corrected, unless removal is waived by the DPMC.
- c. If the Contractor fails to correct defective or non-conforming work in a reasonable time fixed by written notice from DPMC, then DPMC may make arrangements for such correction by others and charge the cost of so doing to the Contractor.
- d. If the Contractor does not proceed with the removal and correction of such defective or non-conforming work within a reasonable time, fixed by written notice from the DPMC or the Architect/Engineer, any materials or equipment shall become the property of the State and the DPMC may remove and dispose the non-conforming work in any manner to best meet the interest of the State. If such material is sold and the proceeds of the sale do not cover all costs which the Contractor should have borne and any additional cost incurred by the State in the uncovering, removal, disposal and correction of non-conforming work, the difference shall be charged to the Contractor and an appropriate credit Change Order shall be issued. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the State.
- e. The Contractor shall be responsible for the cost of making good all work destroyed or damaged by such correction or removal.

- f. Notwithstanding other obligations within the Contract Documents, nothing contained herein shall be construed to establish a time or date limitation upon which the DPMC must discover non-conforming work.

4.16.3 Acceptance of Non-Conforming Work

The DPMC may determine that the best interests of the State will be served by accepting defective or non-conforming work instead of requiring its removal and correction. In such instance, the DPMC may, by any means available, exact an appropriate reduction in the Contract sum. Such adjustment shall be effected regardless of final payment having previously been made, and the Contractor and/or its surety shall be responsible for promptly remitting any funds due the State as a result thereof.

4.17 LAYOUT AND DIMENSIONAL CONTROL

4.17.1 The Contractor shall be responsible for locating and laying out the building and all of its parts on the site, in strict accordance with the Contract Documents, and shall accurately establish and maintain dimensional control. The Contractor shall employ and pay for the services of a competent and licensed New Jersey engineer or land surveyor who shall be pre-qualified by DPMC to perform all layout work, and to test the level of excavations, footing base plates, columns, walls and floor and roof lines, and furnish to the Architect/Engineer, as the Work progresses, certifications that each of such levels is as required by the drawings. The plumb lines of walls, shall be tested and certified by the surveyor as the Work progresses.

4.17.2 The Contractor's engineer/surveyor, in the course of layout work either on the site or within any building, shall establish all points, lines, elevations, grades and bench marks for proper control and execution of the Work. The Contractor's engineer/surveyor shall establish a single permanent benchmark as set forth in the Contract Documents to which all three coordinates of dimensional control shall be referenced. The Contractor's engineer/surveyor shall verify all Owner-furnished survey data including but not limited to topographical and utility location points, lines, elevations, grades and benchmarks, and buildings. Should any discrepancies be found between information given on the Contract Documents and the actual site or field conditions, the Contractor shall notify DPMC and the Architect/Engineer in writing of such discrepancy, and shall not proceed with any work affected until receipt of written instructions from the DPMC.

4.18 PROJECT SIGN

The Contractor shall erect and maintain one sign at the Project Site, as set forth in the Contract Documents and located as directed by the Architect/Engineer. Painting shall be done by a professional sign painter, with two coats of exterior paint, colors, letter face and layout as shown. No other sign will be permitted at the site. Upon completion of the Project, and when directed by the Architect/Engineer or the DPMC, the Contractor shall remove the sign.

4.19 SECURITY

4.19.1 The Contractor shall provide all locks, doors and security construction and personnel as required to secure the Project building throughout the period of construction.

4.19.2 The Contractor shall be responsible for the security of any temporary structures located on the premises outside of the building and/or any stored materials.

4.20 DPMC FIELD OFFICE

4.20.1 The Contractor will provide on-site, suitable, separate, weather-tight, insulated (floor, walls, ceilings) field office facilities for the use of DPMC personnel, as more fully described in the Contract Documents. At a minimum, the Contractor is to supply this field office with toilet facilities, heating and air conditioning, tables and chairs, and phone and data communication lines. At a time determined by the DPMC or the Architect/Engineer, the Contractor shall remove field facilities upon enclosure of the Project building and shall relocate the contents and operations of the field office to the interior of the Project building until completion of the Project.

4.20.2 The Contractor shall be responsible for the maintenance of both offices and the meeting room, including the cost of heating, air conditioning, electric current, and janitorial service.

4.21 PHOTOGRAPHS

4.21.1 The Contractor shall submit monthly progress photographs in duplicate to the DPMC, giving six (6) views of the Work with each application for payment until the Project is completed,.

4.21.2 The photographs shall be 8" by 10" shall bear the date and time of the exposure, the DPMC Project number and title, the names of the Contractor and the name of the Architect/Engineer. All photographs shall also be submitted in digital format.

4.22 REPAIR OF FINISHED SURFACES, APPLIED FINISHES, GLASS

4.22.1 The Contractor accepts sole responsibility for repair of uncontrolled dislodging, cracking, delaminating or peeling of finished surfaces such as concrete, pre-cast concrete, cast and natural stone, unit masonry, millwork, plaster, glass and applied finishes such as compound, paint, and special coatings, within the Contract Work and the limits of specified guarantee periods, regardless of the cause.

4.22.2 The Contractor shall be responsible for replacement of all broken glass, regardless of the cause. The Contractor shall replace all broken, scratched or otherwise damaged glass before the completion and acceptance of the Work. If breakage is caused by the Owner, the Contractor will be reimbursed for the replacement costs. The Contractor shall wash all glass on both sides at completion, or when directed, removing all paint spots, stains, plaster, and other materials.

ARTICLE 5 - SUBCONTRACTORS

5.1 SUBCONTRACTORS AND MATERIAL SUPPLIER APPROVALS

5.1.1 Upon their execution, but not less than fourteen (14) calendar days prior to Subcontractor mobilization on the site, and/or Subcontractor billing, the Contractor shall forward to the Architect/Engineer on the form provided by the DPMC the names of all its Subcontractors and suppliers, of such others as the DPMC may direct, proposed to perform the principal parts of the Work. The Contractor shall forward the appropriate DPMC form to the Architect/Engineer for approval. Department of Labor Contractor Registration and New Jersey Business Registration Certificate are required for all Subcontractors.

5.1.2 If the DPMC has objection to any proposed or approved Subcontractor and/or material supplier, the Contractor shall substitute another Subcontractor and/or material supplier acceptable to DPMC. Under no circumstances shall the State be obligated for additional cost due to such substitution.

5.1.3 After the acceptance of bids, the Contractor shall make no substitution of any Subcontractor person or firm previously selected and approved, without prior written approval from the Architect/Engineer and DPMC. A Contractor seeking to substitute a Subcontractor person or firm shall provide written request for substitution no less than fourteen (14) calendar days prior to the execution of Work by the Subcontractor or material supplier.

5.1.4 Approval of a Subcontractor or material supplier by the DPMC and Architect/Engineer shall not relieve the Contractor of the responsibility of complying with all provisions of the Contract Documents. The approval of a Subcontractor or material supplier does not imply approval of any construction, material, equipment or supplies.

5.2 CONTRACTOR-SUBCONTRACTOR RELATIONSHIP

5.2.1 The Contractor acknowledges its full responsibility to the State for the acts and omissions of its Subcontractors and lower tier subcontractors, and of persons and firms either directly or indirectly employed by them, equally to the extent that the Contractor is responsible for the acts and omissions of persons and firms directly or indirectly employed by it. The Contractor acknowledges that it remains fully responsible for the proper performance of its Contract regardless of whether work is performed by the Contractor's own forces or by Subcontractors engaged by the Contractor.

5.2.2 Nothing contained in the Contract Documents shall create any contractual relationship between any Subcontractor and the State. Further, no Subcontractor or material supplier shall be deemed an intended third party beneficiary under this Contract.

5.2.3 The Contractor and all Subcontractors agree that, in the employment of both skilled and unskilled labor, preference shall be given to residents of the State of New Jersey, if such labor force is available.

5.2.4 The Contractor shall require, in its agreements with Subcontractors and as a condition of agreement, that each Subcontractor require in its agreement(s) with lower tier Subcontractors and Suppliers, that the Subcontractor understands that there is no contractual obligation of any kind between the State and Subcontractor and the Subcontractor's sole recourse lies with the Contractor and/or the surety, and not with the State, that each Subcontractor and lower tier Subcontractor, bound by the terms of the Contract Documents for this Contract, and assume toward the Contractor all the obligations and responsibilities which the Contractor assumes, pursuant to the Contract Documents.

ARTICLE 6 - CONSTRUCTION PROGRESS SCHEDULE

6.1 GENERAL

The State may contract for the services of a Critical Path Method (CPM) scheduling consultant for Project planning, scheduling and cost control. If such has been arranged, then section 6.2 shall apply to the Contract between the State and the Contractor. In the absence of a statement in the bid documents that a CPM consultant has been retained by the State, then section 6.3 shall apply.

6.2 CONSTRUCTION PROGRESS SCHEDULE (CRITICAL PATH METHOD -- CPM CONSULTANT RETAINED BY THE STATE)

6.2.1 Critical Path Method

- a. The Project will be monitored by a detailed critical path method scheduling system. This system shall be the basis for the evaluation of the Contractor's performance and for progress payments to the Contractor.
- b. The Contractor shall provide all the information necessary for the CPM consultant employed by DPMC to develop a CPM network plan demonstrating complete fulfillment of all construction Contract requirements and, as necessary, for the CPM consultant to maintain an accurate CPM schedule throughout the Project. The Contractor, in consultation with the CPM consultant, will establish construction logic and activity time duration consistent with Contract documents and Project requirements. The CPM consultant will establish the level of detail to be reflected on the CPM schedule. The Contractor shall utilize the schedule in planning, coordinating and performing the Work, including all activities of Subcontractors, equipment vendors and material suppliers.
- c. The Contractor agrees that the CPM consultant's Project network schedule is the designated plan for completion of all work in the allotted time, and the Contractor will assume full responsibility for the execution of the Work as shown. The Contractor shall indicate formal acceptance of the schedule by signing the final initial (baseline) network diagrams and computer schedule listing.
- d. The Contractor shall furnish sufficient labor and construction equipment to ensure the execution of the Work in accordance with the approved CPM progress schedule. If, in the opinion of the DPMC, a Contractor falls behind the CPM progress schedule, the Contractor shall take any and all such steps as may be necessary to bring its work into compliance with the CPM progress schedule. The DPMC may require the Contractor to increase the number of shifts, days of work and/or the amount of construction labor, plant and equipment, all without additional cost to the State.
- e. The Contractor shall make no claim for, and have no right to, additional payment or extension of time for completion of the Work, or any other concession because of any misinterpretation or misunderstanding on the Contractor's part of the CPM progress schedule, the Contractor's failure to attend the pre-bid

conference, or because of any failure on the Contractor's part to become fully acquainted with all conditions relating to the CPM progress schedule and the manner in which it will be used on the Project, or because of any Subcontractor's failure to properly participate in the development of a CPM progress schedule or to perform the Contract in accordance with the CPM progress schedule.

6.2.2 Initial Submittal

a. To the extent necessary for the CPM consultant to reflect in the network diagrams the plan for completion of this Contract, the Contractor shall meet with and assist the CPM consultant and furnish, within ten (10) calendar days after award of this Contract, all necessary information for the preparation of the CPM progress schedule. This information shall include, but not necessarily be limited to, a logical sequencing of work operations, activity time estimates, intended crew flow, activity costs and estimated manpower requirements for each activity.

(1) The network diagram shall show the sequence and interdependence of activities required for the Project. In preparing the network diagram, the Contractor shall assist the CPM consultant by breaking up the Work into activities of a duration of no longer than ten (10) working days each, except as to non-construction activities (such as procurement of materials, delivery of equipment and concrete curing) and any other activities for which the CPM consultant may approve the showing of longer duration. The diagram shall show not only the activities for actual construction but also such activities as the Contractor's submittal of shop drawings, templates and equipment, material fabrication, delivery of equipment and material, substantial completion, final completion, punch list and closeout, and the delivery of Owner-furnished equipment, if applicable. The Contractor shall provide activity durations to the CPM consultant for each activity on the diagram.

(2) If requested by the CPM consultant, the Contractor shall furnish any information needed to justify the reasonableness of activity time duration. Such information shall include, but not be limited to, estimated activity manpower, unit quantities, and production rates.

(3) Failure by either the Contractor or the CPM consultant to include any element of work required for the performance of the Contract shall not excuse the Contractor from completing all work required within any applicable date, notwithstanding DPMC approval of the network diagrams.

(4) The CPM consultant will establish the level of detail to be reflected in the CPM system.

(5) Seasonal weather conditions shall be considered in the planning and scheduling of all work influenced by high or low ambient temperatures for the completion of all Contract work within the allotted Contract duration. In addition, appropriate allowances shall be made for anticipated time losses due to normal rain and snow conditions based on

the previous five year average for that geographical area, by statistically expanding the estimated time duration for weather-sensitive activities, to ensure that the required completion date is achieved.

b. The Contractor shall be prepared to meet as many times as necessary with the CPM consultant to develop the information required for the timely development of the progress CPM schedule.

c. The Contractor shall furnish a breakdown of its total Contract price by assigning dollar values to each applicable network activity, coded for the Contractor and each Subcontractor, which cumulatively equals the total Contract amount. Upon acceptance by DPMC, the values will be used as a basis for determining progress payments. Progress payments to the Contractor shall be dependent upon final acceptance by DPMC of the cost-loaded progress CPM schedule.

d. Accompanying the network diagram and computer scheduling listing, the CPM consultant will furnish a computer-generated cost requisition listing, which will provide a separate tabulation of each activity shown on the CPM schedule in order of bid item or trade responsibility code as agreed to by DPMC. This listing will show, for each activity, the Contractor and each Subcontractor, the estimated dollar value of Work in place for totally or partially completed activities, including subtotals by bid items and grand totals for the entire Project. The cost requisition listing will also contain monthly activities reflecting the cost of Project overhead and administrative expenses, and activities reflecting the monthly cost of administering Project General Conditions.

6.2.3 Review and Approval:

a. After receipt of the initial network diagram, computer-produced schedule and cost requisition listing, the DPMC representative shall meet with the Contractor and CPM consultant for joint review, correction, or adjustment of the proposed plan and progress CPM schedule to evaluate the cost values assigned to each activity. Within ten (10) calendar days after the joint review, the CPM consultant will revise the network diagram and/or computer-produced schedule in accordance with agreements reached during the joint review, and shall submit two (2) copies each of the revised network diagram, computer-produced schedule and cost requisition listing to DPMC. The revised schedule documents will be reviewed by DPMC and, if found to be as agreed upon, will be approved. A copy of each will be returned to the CPM consultant for distribution and the CPM consultant shall forward same to the Contractor by email and/or overnight mail. The Contractor shall review these documents and shall indicate acceptance by signing the schedule documents. If the Contractor objects to the schedule documents, the Contractor shall forward these objections in writing to DPMC within ten (10) calendar days of the date of receipt of same or be deemed to have accepted the schedule documents. Objections shall include the precise activities of the schedule to which the Contractor objects and identify the basis of the objection. The Contractor will then meet with the DPMC representative and the CPM consultant to review the Contractor's objections. The CPM consultant may

revise the network diagram and the computer-produced schedule in accordance with the agreements reached during this final review and shall submit two (2) copies each of the revised network diagram, computer-produced schedule and cost requisition listing to DPMC. The re-submission will be reviewed by DPMC and, if found to be as agreed upon, will be approved and a copy of each will be returned to the CPM consultant for distribution and the CPM consultant shall forward same to the Contractor by email and/or overnight mail. The Contractor shall review these schedule documents to ensure that that the documents reflect all changes agreed upon, accept and sign. The Contractor shall indicate its acceptance by signing the scheduling documents, computer-produced schedule and cost requisition. Approval will be without reservation, and the Contractor will be deemed to have accepted the schedule as adequate, proper and binding in all respects and shall not raise further objections to the schedule.

b. After the network diagrams and computer-produced schedule have been signed by the Contractor, the CPM consultant shall forward to the Contractor and DPMC one set of copies of the network diagrams and computer-produced schedule. The network diagram and the computer-produced schedule with approved signatures shall constitute the Project work schedule until subsequently revised in accordance with the requirements of this section.

6.2.4 Progress Reporting and Changes:

a. Once every month, or more often if required by DPMC, the Contractor shall meet with the CPM consultant and DPMC's representative(s) and provide the information necessary for the CPM consultant to prepare and submit to DPMC a revised (updated) network diagram and computer-generated schedule listing showing:

- (1) Approved changes in activity sequencing;
- (2) Changes in activity duration for activities not started or partially completed where agreed upon;
- (3) The effect on the network of any delays in any activities in progress, and/or the impact of known delays which are expected to affect future work;
- (4) The effect of Contractor modifications (activity duration, logic and cost estimates) to the network;
- (5) Changes to activity logic, where agreed upon, to reflect revision in the Contractor's work plan, i.e., changes in activity duration, cost estimates, and activity sequences for the purposes of regaining lost time or improving progress; and
- (6) Changes to milestones, due dates, and the overall Contract completion date which have been agreed upon by DPMC since the last revision of the CPM schedule.

b. The CPM schedule shall accurately reflect the manner in which the Contractor intends to proceed with the Project and shall incorporate the impact of

all delays, Change Orders and change events as soon as these factors can be defined. All changes made to the schedule shall be subject to approval by DPMC prior to inclusion in the CPM schedule. If the DPMC representative and the Contractor are unable to agree as to the amount of time to be allowed for Change Order work, or the manner in which the Work is to be reflected on the network diagram, the CPM consultant will reflect the logic and time duration furnished by the Contractor for the Change Order work pending final DPMC decision. If non-approved Contractor logic and time durations are used, the Contractor agrees that any time which is projected to be lost on the Project as a result of these schedule changes will be considered the responsibility of the Contractor until a final agreement has been made or a final decision rendered by DPMC regarding the manner in which the Change Order work is to be reflected on the schedule. When this final decision has been made by DPMC, the CPM consultant shall revise the CPM schedule in accordance with such decision and issue a final analysis of the effect of the change on the Project.

c. If the Contractor desires to revise the logic of the approved progress CPM schedule to reflect a sequence of construction that differs from that to which was previously agreed, the Contractor must first obtain the approval of DPMC.

(1) Once each month, at the same time the network is updated, the CPM consultant, the Contractor and the DPMC representative(s) shall jointly make entries on the preceding network diagram schedule to show actual progress, identify those activities started by date and those completed by date during the previous period, show the estimated time required to complete each activity started but not yet completed, show activity percent completed and/or dollars earned, and reflect any changes in the network diagram approved in accordance with the preceding paragraph. After completion of the joint review and DPMC's approval of all entries, the CPM consultant will submit updated network diagrams, an updated computer-produced calendar-dated schedule and cost requisition listing to DPMC.

(2) The resultant monthly CPM computer printout and network diagrams shall be recognized by the Contractor as its sole updated construction schedule to complete all remaining Contract work.

(3) In addition to the foregoing, once each month the Contractor will receive a narrative report prepared by the CPM consultant. The narrative report will include a description of the amount of progress made during the last month in terms of completed activities in the plan currently in effect, a description of problem areas, current and anticipated delaying factors and the estimated impacts the delays have on the performance of other activities and completion dates, and recommendations on corrective action for the Contractor. Within seven (7) calendar days after receipt of this report, the Contractor shall submit to DPMC a written explanation of corrective action taken or proposed. The DPMC, after reviewing the written submission, may take appropriate action.

6.2.5 Payments to Contractor

- a. The monthly submission of the computer-produced calendar-dated schedule shall be an integral part and basic element of the estimate upon which progress payments shall be made pursuant to the provisions of Article 9 of these General Conditions. The Contractor shall be entitled to progress payments only upon receipt by DPMC of an updated computer-produced calendar-dated schedule and cost requisition listing.
- b. Payments to the Contractor shall be based upon the results of the computer-generated cost requisition listing which shall be prepared in conjunction with each updating of the CPM system as described above. The Contractors shall provide sufficient documentation to confirm reported progress for any cost items appearing in the scheduling and requisition system.
- c. Payments to the Contractor shall be dependent upon the Contractor furnishing all of the information which, in the judgment of DPMC, is necessary to ascertain actual progress, and all the information and data necessary to prepare any necessary revisions to the computer-produced calendar-dated schedule, cost requisition listing and/or the network diagram. DPMC's determination that the Contractor has failed or refused to furnish the required information shall constitute a basis for withholding payments until the required information is furnished and the schedule and/or diagram is prepared or revised on the basis of such information.

6.2.6 Biweekly Progress Meetings

- a. Every two (2) weeks or as otherwise directed by DPMC, the Contractor shall attend a coordination and CPM scheduling meeting on the job site. At this meeting, the Contractor shall provide detailed information regarding the Work schedule to be performed during the upcoming two weeks to permit the CPM consultant to prepare schedules for the subsequent two week period. Biweekly scheduling by the Contractor shall be in accordance with the priorities and degree of concurrent work required by the official CPM schedule for the Project. The Contractor shall be prepared to explain any difference between the Contractor's biweekly schedules and the priorities required by the latest updating of the official CPM schedule.
- b. At the biweekly scheduling meeting, the CPM consultant shall review the schedule for the preceding two (2) weeks, and the Contractor shall report the progress actually achieved for each activity which was scheduled to be performed during the two weeks, including the actual dates on which the Work was performed. The Contractor agrees that this information shall constitute the official historical record of Project progress.
- c. At each biweekly scheduling meeting, the Contractor shall document any current delays to work operations. In addition, the Contractor shall provide any available information regarding any potential delays.
 - (1) Following the biweekly scheduling meeting, the CPM consultant will issue to the Contractor a two-week look-ahead schedule as developed

at the meeting that shall constitute the construction schedule for the coming two weeks. The CPM consultant will also issue a narrative biweekly progress analysis documenting progress achieved during the preceding two weeks and analyze delays reported to constitute current or anticipated impacts to timely construction.

(2) The Contractor shall be represented at the biweekly scheduling meeting by its superintendent, who shall have complete authority to provide the information required for the development of the next two (2) weeks schedule, which includes documentation of past progress and documentation of delays. The Contractor's representatives shall also be authorized to commit to the implementation of corrective action planned to overcome delaying conditions.

6.2.7 Responsibility for Completion

a. The Contractor agrees that, when it becomes apparent from the current project CPM schedule that any Contract completion date will not be met, the Contractor will take any or all of the following actions, as required, at no additional cost to the State:

- (1) Increase construction manpower.
- (2) Increase the number of working hours per shift, shifts per working days, working days per week, or the amount of construction equipment, or any combination of the above; and/or
- (3) Reschedule activities to achieve maximum practical concurrence.

6.2.8 Adjustment of Contract Completion Date

a. The Contract completion dates will not be adjusted except under the specific and limited conditions set forth in the Contract Documents. In the event that the Contractor requests an extension of any Contract completion date, the Contractor shall furnish a justification of such extension and provide any and all supporting evidence that DPMC requires to evaluate the Contractor's request. The DPMC shall either approve, in whole or in part, or reject the Contractor's request and will advise the Contractor in writing of its decision. If the DPMC finds that the Contractor is entitled to any extension of any Contract completion date under the provisions of this Contract, the determination as to the total number of calendar days extension permitted shall be based upon the currently approved Project CPM schedule and on all data relevant to the extension request. Such data will be included in the next updating of the CPM schedule.

b. The Contractor acknowledges and agrees that the evaluation of Project delays and determinations regarding Project time extension will be based upon the Project CPM schedule and the following criteria:

- (1) Float time shown on the Project CPM schedule is not for the exclusive use of either the Contractor or DPMC. It is agreed that float time is available for use by all performing Work on the Project, including the Contractor, other contractors, subcontractor, lower tier subcontractors,

and suppliers to facilitate the effective use of available resources and to minimize the impact of problems of Change Orders which may arise during construction. The Contractor specifically agrees that float time may be used by DPMC or its representatives or consultants in conjunction with the review activities or to resolve Project problems. The Contractor agrees that there will be no basis for a Project time extension as a result of any Project problem, Change Order or delay which only results in the loss of available positive float on the Project CPM schedule. The Contractor further agrees that there will be no basis for a claim for cost escalation for any activity which is completed on or before its initially required late end date as shown on the initial approved Project CPM schedule, regardless of the justifiability or any delaying factors which might have resulted in the elimination of float which was originally available for the activity. If the Contractor refuses to perform work that is available to it, the DPMC may consider, the Contractor to be in breach of the Contract, regardless of the float shown to be available for the Work. In such instances, the DPMC may, without prejudice to any other right or remedy, declare the Contractor to be in default and terminate the employment of the Contractor pursuant to Article 12 of the General Conditions.

(2) The Contractor agrees that no time extension will be granted for time lost due to normal seasonal weather conditions. In order to qualify for consideration for a time extension due to adverse weather conditions, it must be shown by clear and convincing evidence that the weather conditions during a given quarterly period (summer, fall, winter, spring) were more severe than the previous five-year (5) average for the Project geographical area, and that these weather conditions critically impacted the final Project completion date by delaying the performance of work on the main Project critical path. If abnormal weather losses can be shown to have affected the Project critical path, a non-compensable time extension will be considered for that portion of the proven weather-related delays, which exceeded normal weather losses that should have been anticipated for the quarterly period in question.

(3) No time extensions will be considered for any weather conditions that do not affect work on the Project critical path as set forth on the current Project CPM schedule. The Contractor agrees that there will be no basis for a claim for any additional compensation resulting from any time extension issued for weather-related delays.

(4) In order for a given cause (i.e., delay, Change Order, etc.) to be considered as a basis for a total Project time extension, it must meet both of the following criteria:

- (a) It must be totally beyond the control of the Contractor and due to no direct or indirect fault of the Contractor; and
- (b) It must result in a direct delay to work on the main Project critical path.

(5) The Contractor acknowledges and agrees that actual delays to activities that, according to the Project CPM schedule, do not directly affect the main Project critical path and do not have any effect on the Contract completion date or dates, will not be the basis for a change therein.

(6) Concurrent delays are defined as two or more delays or areas of work slippage that are totally independent of one another and which, if considered individually, would each affect the final Project completion date according to the Project CPM schedule. Where the CPM consultant determines that concurrent delays exist, the Contractor acknowledges and agrees that the following criteria will be used to evaluate time extension:

- (a) If the current Project CPM schedule shows two (2) or more concurrent delays, with one analyzed to be the responsibility of DPMC and the other analyzed to be the responsibility of the Contractor, a non-compensable time extension will be considered only if the excusable delay affects the main Project critical path and this delay is shown to be a greater amount than the other concurrent delays when the impacts of the concurrent delays are independently considered. In this event, a compensable time extension will be considered only for that portion of time by which the excusable delay exceeds all concurrent non-DPMC caused delays. For example, if an excusable impact delays the Project by one-hundred (100) calendar days and concurrent contract-caused slippage independently delays the final completion date by ninety (90) calendar days, a time extension will only be considered for a maximum of ten (10) calendar days, provided the excusable delay is on the project critical path.
- (b) If the CPM schedule shows concurrent delays with some excusable delays and some the fault of the Contractor, and if the Contractor-caused delays are analyzed to be the main determining impact to the main Project critical path, then there will be no basis for a total Project time extension regardless of the nature of the concurrent excusable delays. A concurrent time extension may, however, be considered for that portion of the total Project slippage which is shown on the CPM schedule to be totally attributable to excusable delays.
- (c) If a time extension request is being made for concurrent delays which did not affect the Project critical path, this must be clearly stated in the Contractor's time extension request and all CPM activities which are claimed to have been affected by the cited delay must be specifically identified with all applicable impact dates.

6.3 CONSTRUCTION PROGRESS SCHEDULING PROVIDED BY THE CONTRACTOR

6.3.1 The Project shall be completed within the specified number of calendar days from the effective date of the Notice to Proceed.

6.3.2 The Contractor shall be responsible for preparing and furnishing to the DPMC through the Architect/Engineer before the first Contract requisition date, but in no event later than 30 (thirty) days after the effective date of the Notice to Proceed, a coordinated combined progress schedule that incorporates the progress schedules of the Contractors and all Subcontractors engaged on the Project. The schedule shall be in the form of a network diagram or other recognized graphic critical path progress schedule format that indicates, among other things, predecessor and successor activities, and major and intermediate milestones, in sufficient detail to satisfy the DPMC. (See also section 6.3.4 below.) The Contractor's initial invoice will not be processed by the DPMC until and unless such a single coordinated progress schedule has been submitted to and approved by the DPMC. Thereafter, the Contractor shall submit an updated coordinated progress schedule on a monthly basis. Receipt and approval of the updates will be a mandatory condition to payment.

6.3.3 Once each month, or more often if required by the DPMC, the Contractor shall meet with the Architect/Engineer and the DPMC representative to gather the information necessary for the Contractor's preparation of the revised/updated computer generated scheduling reports.

6.3.4 The progress schedule, based upon the logic and time estimates, shall indicate in suitable detail for display, all significant features of the Work of the Contractor and each Subcontractor, including but not limited to, the placing of orders, manufacturing durations, anticipated delivery dates for critical and long-lead items, submissions and approvals of shop drawings, construction activities, all work activities to be performed by the Contractor and its Subcontractors, the beginning and time duration thereof, and the dates of all milestones, substantial and final completion of the various elements of the Work, including punch list and close-out. Reports shall be in booklets, indexed and separated as categorized below. Each activity listed on the Schedule shall include, as a minimum, the following:

- a. The activity description;
- b. The trade (A/E, Owner, GC, Electrical, Plumbing, HVAC);
- c. The duration in calendar days;
- d. The Early Start date;
- e. The Late Start Date;
- f. The Early Finish date;
- g. The Late Finish date;
- h. The Total Float

6.3.5 The Contractor agrees that no time extension will be granted for time lost due to normal seasonal weather conditions. In order to qualify for consideration for a time extension due to adverse weather conditions, it must be shown by clear and convincing evidence that the weather conditions during a given quarterly period (summer, fall, winter, spring) were more severe than the previous five-year (5) average for the Project geographical area, and that these weather conditions critically impacted the final Project completion date by delaying the performance of work. If abnormal weather losses can be shown to have impacted the Project completion date, a non-compensable time extension will be considered for that portion of the proven weather-related delays, which exceeded normal weather losses that should have been anticipated for the quarterly period in question.

6.3.6 Immediately upon approval by DPMC, the Contractor shall prepare and distribute four copies of the progress schedule to the DPMC plus two copies to the Architect/Engineer. Each monthly updated coordinated schedule shall be signed and dated by the Contractor.

6.3.7 The Contractor shall furnish sufficient labor and construction plant and equipment to ensure the execution of the Work in accordance with the approved progress schedule. If any updated completion time or date for any activity does not conform to the durations or milestones shown in the approved progress schedule, the sequence of activities and/or the time for performance of activities shall be updated on the progress schedule to be approved by the DPMC and cured by the Contractor by any means, including performing concurrent operations, additional manpower, additional shifts, and overtime. No additional charges to the State will be allowed the Contractor for overtime, additional manpower, equipment, additional shifts, etc. (except as may be provided elsewhere in the Contract), if such expediting procedures or measures are necessary to meet the Contract completion date.

6.3.8 The progress schedule shall show:

- a. Recommended Changes in activity sequencing;
- b. Changes in activity duration for activities not started or partially completed, where agreed upon;
- c. The effect on the network of the modifications (activity duration, Predecessors and Successors);
- d. Changes for the purposes of regaining lost time or improving progress, and;
- e. Changes to milestones, due dates, and the overall Contract completion date, which have been agreed upon by the DPMC's project manager since the last revision of the progress schedule.

6.3.9 The progress schedule shall accurately reflect the manner in which the Contractor intends to proceed with the Project and shall immediately incorporate and reflect the impact of all delays and change orders. All changes made to the schedule shall be subject to approval by the DPMC.

6.3.10 The DPMC will not authorize or approve any claims for additional payment or extension of time for completion of the Work, or any other concession because of any alleged misinterpretation or misunderstanding on the Contractor's part of the Project schedule, the Contractor's failure to attend the pre-bid conference, because of any failure on the Contractor's part to become fully acquainted with all conditions relating to the Project schedule and the manner in which it will be used on the Project, or because of any other failure by the Contractor to properly participate in the development of a progress schedule or to perform the Contract in accordance with the progress schedule.

ARTICLE 7 - TIME OF COMPLETION

7.1 CONTRACT DURATION/NOTICE TO PROCEED

7.1.1 Contract duration shall commence on the effective date set forth on the written Notice to Proceed. The Notice to Proceed will be issued by the DPMC after the DPMC's receipt and acceptance of properly executed Contract Documents, including performance and payment bonds, proof of insurance and permit technical information submitted by the Contractor and/or Subcontractors. The Contractor shall not be entitled to delay, disruption, acceleration or any other claims arising from a deferred issuance of the Notice to Proceed.

7.1.2 The Contractor shall perform no work at the Contract Site prior to the issuance of the Notice to Proceed.

7.2 SUBSTANTIAL COMPLETION

7.2.1 At the request of the Contractor, the Architect/Engineer or the DPMC, the Contractor and the DPMC representative may make a joint inspection of the Work for the purpose of determining if the Work is substantially completed in accordance with the definition provided in Article 1. If DPMC, in its sole discretion, finds that the Work is substantially complete, then the DPMC will issue a written Notice of Substantial Completion for Beneficial Use. Such Notice shall in no way relieve the Contractor of any contractual obligation(s) or relieve the Contractor from responsibility to promptly complete all remaining Contract Work including, but not limited to, punch list items.

7.2.2 The standard guarantee period for equipment, workmanship and materials shall commence on the date DPMC issues the Notification of Substantial Completion for Beneficial Use, or from the time of completion and acceptance of equipment, work or materials in question, whichever is later.

7.2.3 In the event that the Project is completed in phases or stages, and/or in the event that the DPMC takes possession of any part of the Work pursuant to Section 7.4 of these General Conditions, no part of the Project shall be deemed substantially complete for purposes of the New Jersey Statute of Repose, N.J.S.A. 2A:14-1.1, prior to the issuance of a formal Notice of Substantial Completion for Beneficial Use for the all of the Work.

7.3 FINAL COMPLETION

7.3.1 Final completion of the Contract shall occur when:

- a. The DPMC and the Architect/Engineer have determined that the punch list has been completed;
- b. The Contractor has complied with the Contract Document's closeout requirements;
- c. The Contractor has submitted all Contract deliverables as required by the Contract Documents including but not limited to the following: "as-built"

documents, operating and maintenance manuals, attic stock, parts lists, repair source lists, training and certificates; and

d. The Contractor has submitted all warranties, guarantees and/or maintenance bonds required under the Contract.

7.4 PARTIAL OCCUPANCY FOR USE

7.4.1 Use and possession prior to completion: The DPMC shall have the right to take possession or use of any completed or partially completed part of the Project. Said possession or use shall not be deemed acceptance of the Work performed on the Project.

7.4.2 Prior to such possession or use, the DPMC shall furnish the Contractor with an itemized list of Work remaining to be performed or corrected on such portions of the Project that are to be possessed or used by the State. Failure by the DPMC to list any item of work shall not be deemed an acceptance of any Work under the Contract.

7.4.3 The Contractor shall not be entitled to recovery of money damages for any delays, disruptions or inefficiencies caused by such partial occupancy.

7.5 DELAY, DISRUPTION AND INTERFERENCE

7.5.1 Delay - Time Extension. If the Contractor's work is delayed, disrupted or interfered with by act, neglect or default of any party, including the State, the Architect/Engineer, or by strikes, lockouts, fire, unusual delay by common carriers, natural disasters, or by any cause for which the Contractor is not responsible; then for all such delays and suspensions, the Contractor shall be allowed one (1) calendar day addition to the time herein stated for each and every calendar day of such delay so caused in the completion of the Work as specified above, the same to be determined by the DPMC. No such extension shall be granted for any delay unless, within ten (10) calendar days after the beginning of such delay, a written request for additional time shall be filed with the DPMC.

7.5.2 Contractor's Damages for Delay, Disruption or Interference

The Contractor shall not be entitled to recovery of money damages from the DPMC caused by delay, disruption or interference with the Contractor's Work except as expressly provided under section 7.5.2 of these General Conditions paragraph. The Contractor expressly agrees that the Contractor's remedy for delay, disruption or interference shall be limited to an extension of time only and that there shall be no recovery of money damages by the Contractor for any delay, disruption or interference with the Contractor's work attributable to any cause whatsoever (other than the State's negligence, bad faith, active interference or other tortuous conduct). The Contractor expressly agrees that it shall not be entitled to recover damages due to delay, disruption or interference caused by any of the following:

- a. Delayed execution of the contract or any of the causes referenced in paragraph 7.5.2;
- b. Any act or omission by any party other than the State, including, but not limited to, the Architect-Engineer, any other Contractor or Subcontractor, any

CPM or other consultant retained by the State, any construction manager retained by the State, any agency or instrumentality of the federal government or of any local governmental entity or any utility (e.g., gas, electric, telephone, cable);

- c. Any act or omission of any agency or instrumentality of the State, other than the DPMC, including, without limitation, the Department of Environmental Protection and the Department of Community Affairs;
- d. Weather;
- e. Subsurface conditions of any type including, without limitation rock and underground utilities, whether or not such conditions were reasonably ascertainable to the Contractor at the time of bidding;
- f. Use of all or any portion the Project premises prior to completion of the Work to the extent that such use is permitted under the terms of the Contract;
- g. Delay in obtaining any permit or approval;
- h. Delay caused by the issuance of any court order, injunction or restraining order;
- i. Any delay which does not entitle the Contractor to an extension of the Contract Completion Time under Section 6.2.8 of these General Conditions; or
- j. Delay attributable to any other cause, other than a cause for which the State is legally restricted from enforcing a contractual “no damage for delay” clause under N.J.S.A. 2A:58B-3 or any other provision of law restricting or barring the enforcement of such clauses.

In interpreting this provision, the negligence or other wrongful conduct of others, including, without limitation, the Architect/Engineer, the CPM consultant, any construction management firm and any other firm or person retained by the State shall not be imputed to the State. Further, to the extent that the Contractor is entitled to recover monetary damages for delay under this Contract, such recovery shall be limited to actual direct costs incurred on account of the delay, and shall not include profit or other markup on such costs, home office overhead calculated under the Eichleay formula or any other kind of consequential or indirect cost or damage, including but not limited to any alleged cost or damage under the total cost method, the modified total cost method, or productivity factors (costs for inefficiency based on industry productivity factors such as those provided by the Mechanical Contractors Association of America (MCAA) Factors Affecting Labor Productivity).

7.5.3 In the event of the failure of the Contractor to complete its work within the time stated in its Contract, the Contractor shall be liable to the State in the sum as set forth as liquidated damages in the Contract, for each and every calendar day that the Contractor fails to attain contract completion of the work. This sum shall be treated as liquidated damages to compensate for the loss to the State of the use of premises in a completed state of construction, alteration or repair, and for added administrative and inspection costs to the State on account of the delay; provided, however, that the said liquidated damages shall be in addition to other compensatory or consequential losses or damages

that the State may incur by reason of such delay, such as, but not limited to, added costs of the Project and the cost of furnishing temporary services, if any. Any such sums for which the Contractor is liable may be deducted by the State from any moneys due or to become due to the Contractor.

7.5.4 It is hereby understood and mutually agreed by and between the Contractor and the State that the start date in the Notice to Proceed, the dates of all required intermediate milestones, and the times for substantial and final completion, as specified in the Contract Documents, are essential conditions of this Contract.

7.5.5 The Contractor agrees that said work shall be executed diligently, at such rate of progress as will ensure full completion of the Work within the time specified. It is expressly understood and agreed, by and between the Contractor and the State, that the time for the completion of the Work herein is a reasonable time, taking into consideration the average climactic range and usual industry conditions prevailing in this locality. If the said Contractor shall neglect, fail or refuse to complete the Work within the time herein specified, or any proper extension thereof granted by the DPMC, then the Contractor does hereby agree, as a part of the consideration for the awarding of its Contract, to pay the State the amount specified in section 7.5.3 above, as liquidated damages for loss of use of the Project as hereinafter set forth, for each and every calendar day that the Contractor may have exceeded the stipulated date in the Contract for substantially completing the Work.

7.5.6 It is further agreed that time is of the essence of each and every portion of this Contract and of the specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the Contract an additional time is allowed for the completion of any Work, the new time limit fixed by such extension shall similarly be of the essence.

ARTICLE 8 - CLOSE-OUT

8.1 CLOSE-OUT PROCEDURES/FINAL PAYMENT

As part of the final completion procedures described in Article 7 and the requirements for payment as described in Article 9, the Contractor must complete all of the Close-out procedures as follows:

- a. Submit the “as-built” record documents as described in Article 4;
- b. Submit all operating and maintenance manuals, parts lists, repair source parts, and certificates as defined in 8.2 below;
- c. Provide the necessary training for operating systems and equipment as defined in 8.3 below; and
- d. Submit all guarantees as defined in 8.4 below.

8.2 OPERATIONS, EQUIPMENT AND MAINTENANCE MANUALS

8.2.1 The Contractor shall provide six (6) copies of all operating, equipment and maintenance manuals, and applicable warranties, as identified and described in the Contract Documents. The operating, equipment and maintenance manuals and warranties, including contact personnel, addresses and telephone numbers, must include a complete description of all systems and equipment and the method of operating and maintaining the equipment. These manuals must be submitted to the Architect/Engineer for review and approval at the earliest date possible following substantial completion, but in all cases prior to final acceptance. Included within the manuals shall be a list of names, addresses and telephone numbers of all the Subcontractors involved in the installations and of firms capable of performing services for each mechanical item.

8.2.2 As a pre-condition to the Final acceptance of a facility for beneficial use, the Contractor shall provide a "throw-away" copy of operations and maintenance manuals to allow the Using Agency's staff to operate the equipment prior to receiving the hard bound copies required by this Contract.

8.3 TRAINING

The Contractor shall provide formal instruction for DPMC-designated personnel, addressing the operation and maintenance of the facilities and all installed equipment for each operating system or major item of equipment or as otherwise specified. The operations and maintenance manuals shall be used as training materials. Unless otherwise accepted by the DPMC, training course format shall be split equally between classroom instruction and field exercise. All classroom instruction may be videotaped by the DPMC. Classroom instruction may be supported by professionally made videotapes. If used, a copy of each professional video that was utilized shall be provided to the DPMC at no cost for future training and reference.

8.4 GUARANTEE

8.4.1 The issuance of a final certificate for payment and/or partial or complete occupancy of the premises shall not be deemed an acceptance of Work not completed in accordance with the Contract Documents. The issuance of a final certificate for payment and/or partial or complete occupancy of the premises shall not relieve the Contractor or its surety of liability with respect to any express or implied warranties or responsibility for faulty materials or workmanship.

8.4.2 The Contractor shall guarantee and warrant, in writing, the Work performed and all materials furnished under this Contract against defects in materials and/or workmanship. The Contractor shall be responsible for the value or repair of any damage to other Work or to the building premises resulting from the performance of the Contract.

8.4.3 The Contractor is responsible for the above-stated obligations for a period of one (1) year from the date established in 7.2.2 above. All guarantees, including bonds and registrations, required by the Contract Documents shall be in writing and delivered to the DPMC with submission of the invoice for final payment.

8.4.4 The Contractor shall, at its own expense and without cost to the State, promptly after receipt of written notice thereof, make good any defects in materials or workmanship which may develop during stipulated guarantee periods, as well as any damage to other Work caused by such defects or by repairs. Any other defects in materials or workmanship not discovered during the guarantee period shall be repaired and/or replaced at the Contractor's expense, and such shall be completed within a reasonable time after written notice is given to the Contractor.

8.4.5 Pursuant to the Contract Documents, certain permanent equipment, including elevators and HVAC systems, will have to be activated during construction of the Project to support construction operations. Despite any early activation during the construction of the Project, any and all equipment warranties must extend for the time periods required in the Contract Documents, starting at the date set forth in paragraph 7.2.2.

8.4.5 It is expressly acknowledged and agreed that the express and implied warranties and guarantees to which the State is entitled as well as all warranty and guarantee bonds issued by any surety, shall be in addition to and not in lieu of the State's right to seek recourse against the Contractor and the Contractor's surety for defective work.

ARTICLE 9 - PAYMENTS

9.1 INVOICES

9.1.1 Requests for payment under the Contract for materials delivered or services rendered require the proper completion and submittal of specific forms including, but not limited to, the following:

- a. DPMC Form 11/AR50-1 - DPMC Invoice;
- b. DPMC Form 11-2 - Monthly Estimate for Payment to Contractor;
- c. DPMC Form 11-2a - Certification of Prime Contractor;
- d. DPMC Form 11-2b – Certification of Subcontractor;
- e. Copies of Subcontractor(s) invoices;
- d. DPMC Form 11-3 - Prime Contractors Summary of Stored Materials;
- e. DPMC Form 11-3A - Agreement and Bill of Sale Certification for Stored Materials;
- f. Consent of Surety forms;
- g. Certified Payroll Records;
- h. Updated project schedule
- i. Any other information or documentation required by other provisions of the Contract documents.

9.1.3 The Contractor shall submit the completed request for payment on a monthly basis for all properly completed billable work to the DPMC Project representative and at the address identified at the pre-construction conference.

9.1.4 One (1) original and one (1) copy of the request for payment packets shall be prepared and submitted unless otherwise specified.

9.1.2 No request for payment shall be deemed to be formally submitted and received for payment until all dollar amounts and completion percentages for each line item in the invoice has been determined and agreed upon by the State and the Contractor.

9.1.5 For the purpose of the State's Prompt Payment Act (N.J.S.A. 2A:30A-1 et seq.):

- a. A proper invoice will be deemed to have been received by the owner when it is received by the person or entity designated by the State to review and sign the invoice on the State's behalf at the address designated in the pre-construction conference for receipt of invoices. Receipt of an invoice by such person or entity shall commence the running of the 20-day period for formal approval and certification as provided under N.J.S.A. 2A:30A-2(a);
- b. The "billing date", as the term is used in N.J.S.A. 2A:30A-2, shall be the earlier of the date upon which an invoice for payment is approved for payment or twenty (20) days after the invoice is received, unless within such 20-day period

the invoice is found to be incomplete or otherwise unacceptable and returned to the contractor, with a written explanation of deficiencies;

c. In the event that an invoice is found to be deficient and returned to the contractor, the “billing date” shall be calculated from the date that a corrected invoice is received.

d. Payment shall be considered to have been made on the date on which a check for such payment is dated;

e. Payment terms (e.g., “net 20”) offered by the contractor shall not govern the State’s obligation to make payment;

f. The following periods of time will not be included in the calculation of the due date of any contractor invoice:

(1) Any time elapsed between receipt of an improper invoice and its return to the contractor, not to exceed twenty (20) calendar days; or

(2) Any time elapsed between the State’s return of an improper invoice to the contractor and the State’s receipt of a corrected invoice.

9.1.6 The provisions of this Article 9 shall not govern the State’s payment obligations nor shall they supersede or modify any other contractual provision allowing the withholding of monies from the contractor to the extent that the contractor has not performed in accordance with the provisions of the contract. Nor shall this Article 9 govern the State’s payment obligations nor supersede or modify any other contractual provision governing contractor claims for additional compensation beyond the base contract price and approved change orders.

9.2 INTEREST

9.2.1 Interest shall be payable on amounts due the contractor if not paid within thirty (30) calendar days after the billing date specified in the above subparagraph 9.1.5(b), as provided under the State’s Prompt Payment of Contractors and Subcontractors Act (N.J.S.A. 2A:30A-01, et seq.) Interest on amounts due shall be payable to the contractor for the period beginning on the day after the required payment date and ending on the date on which the check for payment is drawn.

9.2.2 Interest may be paid by separate payment to the contractor, but shall be paid within thirty (30) calendar days of payment of the principal amount of the approved invoice.

9.2.3 Nothing in this Article 9 shall be construed as entitling the Contractor to payment of interest on any sum withheld by the State for any reason permitted under the contract or applicable law, or on any claim for additional compensation, over and above sums due under the base contract or approved change orders.

9.3 SCHEDULE OF VALUES AND FINAL PAYMENT

9.3.1 Unless otherwise directed, the Contractor shall furnish a schedule of amounts for Contract payments (Unit Schedule Breakdown,) of the total Contract price, showing the amount included therein for each principal category of the Work and for each Contractor

and Subcontractor, in such detail as requested, to provide a basis for determining progress payments. The schedule, as approved, shall be used only as a basis for the Contractor's estimates for progress payments, and approval by the DPMC does not constitute acceptance of the allocability and allowability of costs to a specific element of Work. The Contractor is cautioned that no payment requests shall be approved until the Unit Schedule Breakdown has been approved in writing by the DPMC.

9.3.2 The State will make progress payments monthly as the Work proceeds based upon the Unit Schedule Breakdown.

9.3.2 All material and Work paid pursuant to progress payments shall thereupon become the sole property of the State. This provision shall not be construed as relieving the Contractor from the sole responsibility for the protection of all material and Work upon which payments have been made for the restoration of any damaged work, or as waiving the right of the State to require the fulfillment of all of the terms and conditions of the Contract.

9.3.3 Following completion and acceptance of all work, the amount due the Contractor under this Contract shall be paid only upon satisfactory completion, by the Contractor, of all Contract close-out requirements, completion of a State audit on all Contract values and payments, and after the Contractor has furnished the State with a release of claims against the State, arising by virtue of this Contract, other than claims in stated amounts as may be specifically excepted by the Contractor from the release.

9.3.4 If for any reason the Contractor refuses final payment, the Project may be closed out by the State by the processing of a Final Contract Acceptance certification. The lack of such certificate shall not toll the limitations period applicable to Contractor claims against the State.

9.3.5 In addition to other warranties required by provisions of the Contract and specifications, the Contractor warrants that title to all Work, materials and equipment covered by an application for payment will pass to the State free and clear of all liens, claims, security interests or encumbrances, either upon incorporation into the construction or upon receipt of payment to the Contractor, whichever occurs first. This provision shall not be construed as relieving the Contractor from sole responsibility for the care and protection of materials and work upon which payments have been made, or for the restoration of any damaged work, or as a waiver by the State of its rights to require fulfillment of all terms of the Contract.

9.3.6 By recommending approval of any invoice, the Architect/Engineer shall not be deemed to represent that it has made exhaustive or continuous on-Site inspections to check the quality or quantity of the Work, or that it has reviewed the construction means, methods, techniques, sequences or procedures, or that it has made any examination to ascertain how and for what purpose the Contractor has used the moneys previously paid. The payment of an invoice does not constitute an acceptance of the Work. The State reserves the right to further inspect the Work and to withhold retainage and any additional funds required to pay for any corrective action for non-conforming work.

9.3.7 If any corporation licensed to do business in New Jersey shall be or become delinquent in the payment of taxes, assessments or fees due the State, unless under an

active appeal process or any final judgment in the State's favor against the Contractor, the DPMC may, in accordance with N.J.S.A. 54:49-19 or other applicable law withhold moneys due the said corporation for the purpose of assuring the payment to the State of such taxes, assessments, fees or judgment.

9.4 CERTIFICATION OF PAYMENTS TO SUBCONTRACTOR

Pursuant to N.J.S.A. 52:32-40, 41 and N.J.S.A. 2A:44-148; the Contractor shall submit a Certification of Prime Contractors form and a Certification of Subcontractor form for each Subcontractor identified in the Unit Schedule Breakdown, as part of the submission for each invoiced progress payment.

9.5 STORED MATERIALS

9.5.1 Unless specifically allowed in the Contract Documents, all materials and equipment must be delivered and installed or stored on the Site prior to payment for such material or equipment.

9.5.2 The DPMC may at its discretion allow payment for equipment stored off Site provided that the following has occurred:

- a. The DPMC has approved the Contractor's written request;
- b. The equipment has been properly stored in an approved location;
- c. The Contractor has established the Owner's title to the specific equipment;
- d. The Contractor has provided sufficient proof of insurance for the materials, equipment and the storage facility;
- e. The Contractor has submitted a release of liens on said stored equipment;
- f. The Contractor has submitted a statement agreeing to assume all costs for storage of material and equipment off Site, including, if required by the DPMC, the cost of storing such material and equipment in a bonded warehouse; and
- g. The Contractor furnishes the "Prime Contractor's Summary of Stored Materials" and "Agreement and Bill of Sale Certification for Stored Materials," forms respectively.

9.6 ALLOWANCES

9.6.1 The Contractor shall include in its bid all allowances as may be set forth in the Contract Documents. The Contractor shall purchase the "allowed materials" as directed by the DPMC on the basis of the lowest acceptable quote from at least three competitive offers or as a negotiated cost subject to DPMC approval. If the actual cost of the "allowed materials" is more or less than the stipulated allowance, the Contract price may be adjusted accordingly. The adjustment in Contract price shall be made on the basis of the actual purchase cost without additional charges for overhead, profit, bond premium or any other incidental expenses. The cost of installation of the "allowed materials," unless

otherwise specified, is to be included as the responsibility of the Contractor in whose Contract the allowance is included, and the Contractor installing such "allowed materials" shall not be entitled to additional payment for such installation.

9.6.2 Unless otherwise provided in the Contract Documents:

- a. These allowances shall cover the Contractor's true costs, including credit for any trade discount, of the materials and equipment required by the allowance, delivered at the Site, including all applicable taxes;
- b. The Contractor's costs for unloading and handling, labor, installation costs, overhead, profit and other expenses reasonably required in connection with such allowance items shall be included in the Contract sum and not as part of the allowances.

9.7 RETAINAGE

9.7.1 In making progress payments for Contract work completed, the State will retain ten percent (10%) of the approved invoice amount until final acceptance and completion of all work covered by the Contract.

9.7.2 The Contractor may, after 50% (fifty percent) of the Contract work is in place, and if the Work is proceeding on schedule, apply for a reduction in the amount retained by the State for the duration of the Contract. Such application must be in writing and accompanied by documentation granting formal consent of surety to the reduction in retainage request. If the DPMC determines that the Contractor's performance has been satisfactory and that the reduction is warranted and appropriate, the State may, with the next progress payment, release any portion of the accumulated retainage in excess of five percent (5%) of the Work in place and retain an amount equal to five percent (5%) of the Work in place for the duration of the Contract. If progress of the Work is not maintained in accordance with the approved schedule, the DPMC may elect to re-institute retainage of ten percent (10%) of the Work in place for the duration of the Contract.

9.7.3 Withholding Payment for Non-Delivery of Data:

- a. If technical data such as "as-built" drawings, reports, spare parts lists, repair parts lists, or instruction books (including additional and maintenance manuals), or any part thereof, are not delivered within the time specified by this Contract or are deficient upon delivery, the DPMC has the discretion to withhold from each invoice a percentage (in addition to any other retainage required by the Contract) of the Contract price in accordance with the following table:

When total contract price is:	Percentage to be withheld is:
Less than \$250,000.	10%
\$250,000.01 through \$1,000,000	5.0%
Over \$1,000,000	2.0%

- b. The withholding of any sums pursuant to this article shall not be construed as, or constitute in any manner, a waiver by the State of the Contractor's obligation to furnish the data required under this Contract. In the event the

Contractor fails to furnish these items, the State shall have those rights and remedies provided by law and pursuant to this Contract, in addition to, and not in lieu of, the sums withheld in accordance with this article.

9.8 MISCELLANEOUS

9.8.1 Disputes regarding nonpayment of a Contractor's invoice under this Article 9 may be submitted to non-binding Alternative Dispute Resolution (ADR) upon mutual agreement of the State and the Contractor. In such event, the State and the Contractor shall share equally the fees and expenses of the selected mediator, arbitrator, umpire or other ADR neutral. Provided, however, that nothing herein shall be construed, in whole or in part, as a waiver, release or modification of the provisions of the New Jersey Contractual Act, N.J.S.A. 59:13-1, et seq., which governs claims against the DPMC.

9.8.2 A Contractor not paid sums due under an approved invoice within thirty (30) days of the billing date may suspend performance without penalty for breach of contract, but only after providing the State with seven (7) days written notice of non-payment, and only in the event that the State fails to furnish the Contractor, within that seven-day period, a written statement of the amount withheld and the reasons for the withholding. Nothing herein shall be construed to excuse the Contractor's nonperformance, or to limit the State's rights and remedies relating to such non-performance, with regard to any monies withheld from the Contractor upon the proper notice provided under this Article 9, or with regard to any Contractor claim disputed by the DPMC.

ARTICLE 10 - CHANGES IN THE WORK

10.1 CHANGES IN THE WORK

10.1.1 The DPMC may at any time, issue a written Change Order which shall direct a change in the Work within the general scope of the Contract, including, but not limited to, changes:

- a. In the plans and/or specifications;
- b. In the method or manner of performance of the Work;
- c. In the State-furnished facilities, equipment, materials, services, or site; or directing acceleration in the performance of the Work; and/or
- d. In the time for the completion of the Work.

10.1.2 Change Orders

10.1.2.1 The Contractor agrees to prepare and submit, within ten (10) calendar days of encountering any conditions it considers a change, or upon receiving official notice of a proposed change or written direction to proceed with a change, a current DPMC form entitled "Contractor Change Order Request," to the DPMC. The Contractor shall submit an original of the form. Failure to submit a timely form may be grounds for rejection of the request for Change Order, at the DPMC's discretion.

10.1.2.2 All requests for Contract time extensions must be submitted in accordance with the requirements set forth in Articles 6 and 7, accompanied by copies of the current approved progress schedule and copies of a proposed progress schedule detailing the incorporation of the changed work and the effects of such incorporation on progress. Failure to provide all required information shall be grounds for rejection of the request.

10.1.2.3 DPMC will only consider a contract duration extension Change Order request arising from changes in the Work, if that change is proven by the Contractor to have caused a delay in the completion of the Project. When the Contract duration is increased as a result of a change, the resulting change in Contract amount will include the costs of extended performance, computed in accordance with the terms of this Section, and no further consideration of such costs arising from the specific modification will be given.

10.1.2.4 Every Change Order request submitted by the Contractor shall furnish a price breakdown, which shall cover all work involved in the change whether such work was deleted, added or changed and shall be in sufficient detail to permit an analysis of all material, labor, equipment, subcontract, overhead costs and profit. Any amount proposed for subcontracts shall be supported by an equally detailed breakdown. In addition, if the request includes a time extension, a justification (see section 10.1.4.) shall also be furnished. The request, together with the price breakdown and time extension justification, shall be furnished by the date specified by the DPMC.

10.1.2.5 The following rates shall apply in computing overhead (indirect costs) and profit for Change Orders that do not exceed \$25,000. The percentages shall be applicable for deleted work as well as additional work. When a change consists of both added and

deleted work, the applicable percentages shall be applied to the net cost or credit. In any event, the percentages shall not exceed the following:

- a. Overhead will be the sum of:
 - (1) fifteen percent (15%) of direct labor costs. NOTE: For the purpose of this article, the term "direct labor" shall include all foremen (identified by name and not included in the Project as the full-time superintendent or full time foreman as required elsewhere in the contract documents), equipment operators and skilled, semi-skilled and common laborers directly assigned to the specified operation. The term "direct labor costs" shall consist of the Contract or actual payroll rate of wage per hour and fringe benefits paid for each and every hour that such employees are actually engaged in the performance of the Work.
 - (2) fifteen percent (15%) of direct material costs. NOTE: For the purpose of this article, the term "direct material costs" shall consist of the actual costs of the materials including applicable tax and transportation charges.
- b. For rented equipment, an hourly rental rate will be used which will be determined based upon the monthly rental rates in the current edition of the Rental Rate Blue Book for Construction Equipment (Rental Book) and dividing it by 176. An allowance will be made for operating costs for each and every hour the equipment is actually operating in accordance with the rates listed in the Rental Book. The Contractor will be allowed only 65% (sixty-five percent) of the rental rate on Contractor-owned equipment.
- c. Bond premiums and payroll taxes, if applicable, will be allowed at actual cost. The Contractor shall submit from the surety to DPMC a letter for the bond premiums.
- d. The Contractor's profit on Subcontractor's work will be six percent (6%) of the Subcontractor's costs. Subcontractor indirect costs will be computed in the same manner as for the Contractor. The Contractor agrees to incorporate this article in each of its subcontracts. NOTE: When more than one tier of Subcontractor exists, for the purpose of markups, they shall be treated as one Subcontractor.
- e. A profit of six percent (6%), where profit is allowable by the terms of the applicable Contract provision, shall be added to the Contractor's total cost. Indirect costs shall not be duplicated in direct costs.

10.1.2.6 For Change Orders in excess of \$25,000 the maximum allowable percentages of 15% overhead and 6% profit applies unless negotiated lower based upon the nature, extent and complexity of the Work involved.

10.1.2.7 The DPMC, in order to avoid delays in the progress of work or when in the best interests of the State, has the discretion to direct the Contractor, in writing, to proceed with work claimed by the Contractor to be extra work, and/or to accelerate its work without a prior agreement on entitlement or costs. Such direction shall be in the form of a Letter of Direction. The Contractor may submit a claim for evaluation by

DPMC, for costs or for time on account of such work and/or acceleration on the form entitled "Contractor Change Order Request," completed in sufficient detail and in accordance with this article within ten (10) calendar days after receipt of the Letter of Direction. Nothing in this article shall excuse the Contractor from proceeding with the Work identified in the Letter of Direction and all other Contract Work. Issuance of a Letter of Direction under this article shall not be intended nor construed as an admission or acknowledgment by the State that the Contractor is entitled to additional compensation and/or time on account of such Work and/or acceleration.

10.2 ACCELERATION

The DPMC may order and direct the Contractor to accelerate its Work at any location(s) by increasing its forces, working overtime and/or working on Saturdays, Sundays, and holidays. If acceleration is required by the DPMC, and not due to any delays on the part of the Contractor, the Contractor will be reimbursed for additional costs.

ARTICLE 11 - CLAIMS AND DISPUTES

11.1 CONTRACTOR CLAIMS

11.1.1 Any claims made by a Contractor against the DPMC for damages, extra costs or any other claim made pursuant to the contract are governed by and subject to the New Jersey Contractual Liability Act, N.J.S.A. 59:13-1 et seq., as well as all the provisions in this Contract.

11.1.2 Upon presentation by the Contractor of a request in writing, the DPMC may review any decision or determination of the State or the Architect/Engineer as to any claim, dispute or any other matter in question relating to the execution or progress of the Work or the interpretation of the Contract Documents. Consistent with the intent of this Contract, the DPMC may schedule a conference for the purpose of settling or resolving such claims, disputes or other matters. Where such a conference is conducted, the Contractor and/or the Architect/Engineer shall be afforded the opportunity to be heard on the matter in question. Following review of the Contractor's request, the DPMC and the Contractor may settle or resolve the disputed matter, provided however that any such negotiations, conferences, settlement or resolution shall be subject to all requirements imposed by law, including where applicable, the New Jersey Contractual Liability Act (N.J.S.A. 59:13-1 et seq.). The DPMC's participation in any effort to negotiate, settle or resolve any such claim or dispute with the Contractor shall not operate to toll or extend the time limitations for notice or suit under the New Jersey Contractual Liability Act.

11.2 MUTUAL RIGHTS AND RESPONSIBILITIES OF ALL CONTRACTORS AND THE ARCHITECT/ENGINEER

11.2.1 Any Contractor or the Architect/Engineer which by its own acts, errors or omissions, damages or unnecessarily delays the Work or otherwise causes damage to the State, any other Contractor or the Architect/Engineer, shall be directly responsible to the aggrieved party or parties, for all costs and expenses incurred due to any such delays and/or damages whether by settlement, compromise or arbitration or judgment.

11.2.2 Any Contractor damaged by the actions of another Contractor or Architect/Engineer shall have a direct right to recovery against the party causing such damages, but shall not have a right to recover such damages against the State.

11.2.3 In addition, the party responsible for causing such damages agrees to defend, indemnify and save harmless the State from all such claims and damages. Nothing contained in this paragraph shall be construed to relieve the responsible party from any liability or damage sustained on account of such acts, errors or omissions.

11.2.4 The State shall not be held vicariously liable to any Contractor for any damages or extra costs caused by any acts or omissions by another party including but not limited to actions of the Architect/Engineer as specified in the above paragraph. The Contractor's exclusive remedy shall be against the party directly responsible for causing such damages or extra costs.

ARTICLE 12 - TERMINATION/SUSPENSION

12.1 SUSPENSION OF THE WORK / STOP WORK

12.1.1 If the Contractor fails to correct defective work or persistently fails to carry out the Work in accordance with the Contract Documents, or if the DPMC determines that it is in the best interest of the Project to do so, the DPMC may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated and the DPMC provides written notice to the Contractor that the stopped Work may resume.

12.1.2 The DPMC shall have the right to defer the beginning or to suspend the whole or any part of the Work herein contracted to be done whenever, in the opinion of the DPMC, it may be necessary or expedient for the State to do so.

12.2 TERMINATION FOR CAUSE

12.2.1 If the Contractor persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials so as to avoid or eliminate delays in the orderly progress of the Work in accordance with the approved schedule; or if the Contractor fails to make prompt payment to any Subcontractor or for materials or labor; or persistently disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction; or if the Contractor is guilty of a material breach of a provision of the Contract Documents or otherwise fails to carry out the Work in accordance with the Contract Documents, then the DPMC may, without prejudice to any other right or remedy, and after giving the Contractor and its surety three (3) working days written Notice to forthwith address such breach and default with diligence and promptness, terminate the employment of the Contractor by the issuance of a written Notice to that effect to the Contractor and its surety, should the Contractor fail to comply with the demands of the original above mentioned Three Day Notice.

12.2.2 Upon such termination, the DPMC may take possession of the Site and of all the materials, equipment, and tools on the Site and of any materials stored off Site paid for by DPMC, and may finish the Work by whatever method the DPMC may deem expedient. In such case, the Contractor shall not be entitled to receive any further payment until the Work is finished.

12.2.3 In the event of termination for default, the surety shall either complete the principal's work or finance the completion of the Work. The surety shall not have the right to do nothing. In the event of the surety's breach of its obligations to the State, the surety shall be subject to all available damages under the law, including but not limited to debarment and the penalties imposed by New Jersey's Consumer Fraud Act.

12.2.4 Within seven (7) calendar days following receipt of Notice of Termination by the surety, the surety shall submit in writing its intention to satisfy its bond obligation to the State as obligee, and to explain its plan to complete the Work, tender a completing Contractor or finance the completion of the Work.

12.2.5 If the surety elects to take over the Work and complete same or to tender a completing Contractor, it must furnish notice of its intent to do so in writing over the

signature of an authorized representative and such notice shall be served upon the DPMC within seven (7) calendar days after service upon the surety of the Notice of Termination. This document shall identify the Contractor to perform this work.

12.2.6 If the surety elects to satisfy its bond obligation by financing the completion of the Work, in lieu of taking over same, the surety and State shall enter into an agreement, within thirty (30) days of the termination Notice, setting forth the details of the payments to be made by the surety. All current obligations for labor and materials incurred and outstanding by the defaulting Contractor on this Project shall be paid by the surety without delay, subject to allowance of reasonable time to verify such claims by the surety.

12.2.7 If the surety fails to satisfy its bond obligations within the time frames established above, the DPMC may undertake the completion of the Project in any manner deemed appropriate. In that circumstance, the surety shall not be relieved of any of its payment and performance bond obligations.

12.2.8 If the unpaid balance of the Contract sum exceeds the cost of finishing the Work (including but not limited to liquidated damages for delays and all other remaining damages sustained by the State originating from such breach of Contract), such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor and its surety shall be obligated to pay the difference to the DPMC promptly upon receipt of billing from the State, and this obligation shall survive the termination of the Contract.

12.3 OWNER'S RIGHT TO COMPLETE THE WORK

12.3.1 Alternatively, should the Contractor fail or refuse to correct its breach and default after receiving the required notice as provided under Section 12.2 hereof, the DPMC, in lieu of terminating the Contractor's employment, may provide for the correction and completion of all remaining Work by other means, and deduct all costs associated with such correction and completion from any undisbursed balance of funds (including earned retainage) remaining under the Contract. Such deduction may be documented by issuance of one or more deductive change orders. DPMC's correction or completion of Work under this paragraph shall not operate to waive, release or diminish the liability of the Contractor and its surety to the State for any breach or default by the Contractor.

12.4 TERMINATION FOR CONVENIENCE

12.4.1 The DPMC may, at any time, terminate the Contract in whole or in any part for the DPMC's convenience and without cause when the DPMC in its sole discretion views termination to be in the public interest.

12.4.2 Upon receipt of an order of Termination for Convenience, the Contractor shall not proceed with any item of work which is not specified in the Order of Termination. The Contractor shall complete all items of work specified in the termination order. Such work shall include punch list items and all work necessary to ensure the safety of the public, to properly secure existing work already constructed or partially constructed and to secure the Project Site. This work so ordered shall be performed in accordance with the Contract Documents, and may include items of work not in the original Contract. The Work performed shall be considered substantially complete upon completion and

acceptance of all items of work specified in the Order, except punch list items. After completion of the punch list items and all documents required by the Contract, the Contract shall terminate upon issuance of a Final Certificate and payment. The DPMC reserves the right to declare in default a Contractor who fails to carry out the conditions set forth in an Order of Termination for Convenience.

12.4.3 When the DPMC orders termination of the Contract for Convenience, all completed items of work as of that date will be paid for at the Contract prices.

12.4.3.1 Payment for partially completed work will be paid for at agreed prices.

12.4.3.2 Payment for new items, if any, will be made either at agreed prices or in accordance with Article 10.

12.4.3.3 Materials obtained by the Contractor for the Work but which have not been incorporated therein may, at the option of the State, be purchased from the Contractor at actual cost delivered to a prescribed location, or otherwise disposed of as mutually agreed.

12.4.4 Within sixty (60) days of the effective termination date, the Contractor shall submit claims for additional costs actually incurred, not covered above or elsewhere in the Contract. Such claims may include reasonable mobilization costs, overhead expenses attributable to the Work performed, Subcontractor costs not otherwise paid for, actual idle labor costs if Work is stopped in advance of the termination date. The DPMC will not compensate the Contractor for costs prohibited under provisions of the Contract and/or anticipated profits on work not performed.

12.4.5 If the DPMC terminates the Contractor for cause as provided under Article 12.2 of the General Conditions, and if a court of law subsequently determines such termination for cause to have been undertaken without lawful justification, then such termination shall be deemed a termination for convenience governed by this Article 12.4. In that event, recovery by the Contractor and/or the Contractor's surety shall be limited to those costs which are recoverable following a termination for convenience under this Article 12.4.

ARTICLE 13 – OTHER REQUIREMENTS

13.1 PREVAILING WAGE

13.1.1 The Contractor shall comply with the New Jersey Prevailing Wage Act Laws of 1963, Chapter 150, (N.J.S.A. 34:11-56.25 et seq.) and all amendments thereto, and this act is hereby made a part of every Contract entered into on behalf of the State of New Jersey through the DPMC, except those Contracts which are not within the contemplation of the Act. Provisions of the Act include the following stipulations and requirements:

a. All workers employed in the performance of every Contract in which the Contract sum is in excess of \$2,000 and to which the DPMC is a party shall be paid not less than the prevailing wage rate as designated by the Commissioner, Division of Labor or his or her duly authorized representative.

(1) The Contractor performing public work for the DPMC and which is subject to the provisions of the Prevailing Wage Act, shall post the prevailing wage rates for each craft and classification involved as determined by the Commissioner, Division of Labor. This posting shall include the effective date of any changes thereof, and shall be displayed in prominent and easily accessible places at the Site of the Work or at such place or places as are used by the Contractor/Subcontractor to pay workers' wages.

(2) At the time of the bid due date, the Bidder and any Subcontractors identified by the Bidder must be registered in accordance with “The Public Works Contractor Registration Act” (N.J.S.A. 34:11-56.48 et seq.) All questions regarding registration shall be addressed to:

Contractor Registration Unit
New Jersey Department of Labor
Division of Wage & Hour Compliance
P O Box 389
Trenton NJ 08625-0389
Telephone: 609-292-9464
FAX: 609-633-8591

b. In the event it is found that any worker, employed by any Contractor covered by any Contract in excess of \$2,000 for any public work to which the DPMC is a party, has been paid a rate of wages less than the prevailing wage required by such Contract, DPMC may terminate the Contractor's right to proceed with the Work, or such part of the Work as to which there has been failure to pay required wages, and may otherwise execute the Work to completion.

c. In the event that any Subcontractor retained by a Contractor on any Contract in excess of \$2,000 for any public work to which the DPMC is a party, has been paid a rate of wages less than the prevailing wage required by such Contract, DPMC may terminate the Contractor's right to proceed with the Work, or such part of the Work as to which there has been failure to pay required wages, and may

otherwise execute the Work to completion or may require that the Contractor immediately substitute a new Subcontractor at the costs set forth in the Contract.

d. Nothing contained in the Prevailing Wage Act shall prohibit the payment of more than the prevailing wage rate to any worker employed on a Project.

e. The Contractor shall, as a condition of subcontract with any tier Subcontractor, require compliance with this section as a condition of Subcontract.

f. The State may audit the Contractor's conformance with the Prevailing Wage Act. If the result of such audit determines that the Contractor has not complied with the Prevailing Wage Act then such Contractor shall be responsible for the cost of this audit.

13.2 PATENTS

13.2.1 The Contractor shall hold and save the State and its officers, agents, servants, and employees harmless from liability of any nature or kind, including cost and expenses for or on account of any patented or non-patented design, devise, invention, process, article or appliance manufactured or used in the performance of the Contract, including its use by the State, unless otherwise specifically stipulated in the Contract Documents.

13.2.2 License and/or royalty fees for the use design, devise, invention, process, article or appliance which is authorized by the State must be reasonable, and paid to the holder of the patent or his or her authorized licensee directly by the State and not by or through the Contractor.

13.2.3 If the Contractor uses any design, devise, invention, process, article or appliance covered by letters, patent or copyright, it shall provide for such use by suitable agreement with the State of such patented or copyrighted design, device or material. It is mutually agreed and understood that, without exception, the Contract prices shall include all royalties or costs arising from the use of such design, devise, invention, process, article or appliance in any way involved in the Work.

13.2.4 The Contractor and/or its surety shall indemnify and save harmless the State from any and all claims for infringement by reason of the use of such patented or copyrighted devise, invention, process, article or appliance, or any trademark or copyright in connection with Work performed under this Contract, and shall defend and indemnify the State for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during the execution of the Work or after the completion of the Work. This section shall survive the termination of the Contract.

13.3 RIGHT TO AUDIT

13.3.1 The State reserves the right to audit the records of the Contractor in connection with all matters related to its Contract. The Contractor agrees to maintain its records in accordance with "Generally Accepted Accounting Principles," for a period of not less than five (5) years after receipt of final payment. All charges must be supported by appropriate documentation, including, but not limited to canceled checks. All records

shall be made available to the New Jersey Office of the State Comptroller or other State audit agency upon request and at no cost to the State.

13.3.2 The Contractor shall maintain all documentation related to products, transactions or services under this contract for a period of five years from the date of final payment. Such records shall be made available to the New Jersey Office of the State Comptroller or other State audit agency upon request and at no cost to the State.

13.3.2 The Contractor shall develop, maintain and make available to the DPMC on request such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, Change Orders, all original estimates, takeoffs and other bidding documents, all Subcontractor and supplier Contracts and changes, all records showing all costs and liabilities incurred or to be incurred in connection with the Project (including all Subcontractor and supplier costs), all payment records and all records showing all costs incurred in labor and personnel of any kind, records and other data as the State may request concerning work performed or to be performed under this Contract.

13.3.3 The Contractor acknowledges and agrees that no claim for payment which is premised to any degree upon actual costs of the Contractor shall be recognized or payable by the State except and to the extent that such actual costs are substantiated by records required to be maintained under these provisions.

13.3.4 The Contractor acknowledges and agrees that its obligation to establish, maintain and make available records and the State's right to audit as delineated herein shall extend to actual costs incurred by Subcontractors in performing work required under the Contract Documents. The Contractor shall require in each subcontract that the Subcontractor establish, maintain and make available to the State all records as defined and delineated herein, relating to all work performed under the Subcontractor including work performed by a sub-Subcontractor.

13.4 INSURANCE

13.4.1 Insurance To Be Carried By The Contractor:

The Contractor shall obtain and maintain, at its expense and for the duration of the contract, minimum insurance coverage set forth below. By requiring such minimum insurance, the State of New Jersey shall not be deemed or construed to have assessed the risk that may be applicable to the Contractor under this contract. The Contractor shall assess its own risks and if it deems appropriate and/or prudent, maintain higher limits and/or broader coverage. The Contractor is not relieved of any liability or other obligations assumed or pursuant to the Contract by reason of its failure to obtain or maintain insurance in sufficient amounts, duration or types.

a Commercial General Liability:

(1) Commercial General Liability (CGL)-ISO occurrence form CG001 or a substitute form providing a minimum coverage of \$2,000,000 per occurrence for bodily injury liability and \$2,000,000 per occurrence for property damage liability and shall cover liability arising from:

- Premises/Operations

- Independent Contractors
 - Products/Completed Operations
 - Personal and Advertising Injury
 - Liability assumed under an insured contract (including defense cost assumed)
- (2) The State of New Jersey shall be included as an additional insured under the CGL using ISO additional insured endorsement CG 20 10 and CG 20 37 or a substitute providing equivalent coverage, which endorsement shall include coverage for the State of New Jersey arising out of the completed operations of the contractor, and which coverage shall be maintained in effect for the benefit of the State of New Jersey for a period of three (3) years following the completion of the work specified in section 7.3 of this contract. Additional Insured coverage as required in this subparagraph shall apply as primary insurance with respect to any other insurance or self-insurance programs afforded to the State of New Jersey.
- (3) The CGL general aggregate shall apply separately to this project using ISO CG 2503 form – designated construction projects(s) General Aggregate Limit.
- (4) There shall be no endorsement or modification of the CGL limiting the scope of coverage for liability arising from explosion, collapse or underground property damage.
- (5) If not included in the policy form the CGL policy must be endorsed with a separation of insureds (severability of interests) endorsement.
- (6) CGL policy must provide or be endorsed (ISO form CG 24 04) to provide for waiver of subrogation.

b Business Automobile Liability:

- (1) Contractor and subcontractors shall maintain business auto liability insurance and such insurance shall cover liability arising out of any auto (including owned, hired and non-owned autos).
- (2) The limits of liability shall be not less than \$1,000,000 per occurrence for both bodily injury and property damage liability.
- (3) Business Automobile coverage shall be written on ISO form CA 00 01 or a substitute form providing equivalent liability coverage. If necessary, the policy shall be endorsed to provide contractual liability coverage equivalent to that provided in the 1990 and later additions of CA 00 01.
- (4) If required by law, the business auto policy shall be endorsed to provide pollution liability coverage equivalent to that provided under the ISO pollution liability broadened coverage for covered autos form

CA 99 48 and the Motor Carrier Act endorsement (MCS 90) shall be attached.

- (5) Waiver of Subrogation -- Contractor waives all rights against the State of New Jersey for recovery of damages to the extent these damages are covered by the business auto liability insurance obtained by Contractor pursuant to Paragraph 2.0 of this Agreement.
- c Workers Compensation: Workers Compensation Insurance applicable to the laws of the State of New Jersey and other State or Federal jurisdiction is required to protect the employees of the Contractor or any Subcontractor who will be engaged in the performance of this Contract. This insurance shall include employers' liability protection with a limit of liability not less than \$500,000.
- d Umbrella Liability: Contractor must maintain an Umbrella Liability Policy excess of the Commercial General Liability, Automobile Liability and Employer Liability coverage.
 - (1) The coverages of the umbrella policy must be as broad as the primary policies covered by this policy and include a "drop-down" provision if the primary coverage becomes impaired or exhausted.

13.4.2 Insurance To Be Carried By The State of New Jersey:

- a Builders Risk Insurance: Unless otherwise provided in this agreement the State of New Jersey shall provide and maintain, in a company or companies lawfully authorized to do business in the jurisdiction which this project is located, Builders Risk Insurance in the amount of the initial contract amount as well as subsequent modifications for the entire project at the site on a replacement cost basis.
 - (1) The Builders Risk coverage shall be on an "All Risk of direct physical loss or damage" or equivalent policy form and include theft, earthquake, flood, temporary structures, demolition and increased cost of construction, architects fees and expenses.

Also the insurance must include coverage for Equipment Breakdown Coverage (a.k.a. Boiler & Machinery) which shall cover insured Equipment during installation and testing. The Builders Risk insurance shall include the interest of the State of New Jersey, the general Contractor, subcontractors and sub-tier contractors in the project.
 - (2) The Builders Risk Policy shall cover all materials equipment and supplies, assemblies and furnishings intended for specific installation in the project while located at the site. The policy will cover portions of the work off site and portions of the work in transit subject to the policy sub-limits for these coverages.
 - (3) Waivers of Subrogation -- The State of New Jersey and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees and (2) the

Architect/Engineer, Architect/Engineer's Consultants, and any of their subcontractors, Sub-subcontractors, agents and employees for damages caused by fire or other causes of loss to the extent covered by the Builders Risk insurance or any other property insurance applicable to the work.

- (4) The Builders Risk policy will provide for a waiver of subrogation against all interested parties covered by the policy but only to the extent the loss is covered by the policy.
- (5) The above insurance shall apply only to the work described in this contract, and shall not apply to alterations, repairs, maintenance and installations of systems, equipment and other items of work which do not result in creating additional habitable space. This insurance shall not protect against damage or loss to any of the Contractor's or Subcontractor's tools, equipment, scaffolding, staging towers or forms and Contractor's materials stored on Site which are not part of the construction Project,. It is understood that the Contractor will, at its own expense, carry all insurance which may be required to provide the necessary protection against such loss or damage herein described which shall contain a waiver of any right of subrogation against the State of New Jersey.
- (6) Deductible Provisions -- The insurance protection described herein may contain a deductible clause. The State of New Jersey agrees to bear the cost of all deductibles of the Builders Risk Policy.
- (7) Loss Reporting and Loss Adjustment – The Contractor will receive a Loss Reporting Form whenever Builders' Risk Insurance is written. This form includes appropriate loss reporting instructions. In the event of loss, the Contractor shall immediately notify the State of New Jersey, DPMC, in writing, and take any other appropriate steps as may be required under the standard builders' risk insurance policy in effect. Upon the occurrence of any loss or damage prior to the acceptance of the building by the State, the Contractor shall, at the State's option, replace and repair the damaged work as originally provided in the drawings and specifications at no additional compensation to that provided in the original Contract.
- (8) Status Trustee for Loss Adjustment -- All losses will be adjusted with, and payable to, the State of New Jersey, as trustee for the insured as their interests may appear. The Contractor shall be named jointly with the State in all policies of insurance, all of which shall be open to inspection by the State.
- (9) This provision shall not relieve the Contractor from its obligation to complete, according to plans and specifications, the Project covered by the Contract, and the Contractor and its surety shall be obligated to full performance of the Contractor's undertaking.

13.5 ASSIGNMENT OF ANTITRUST CLAIMS

13.5.1 The Contractor recognizes that in actual economic practice, overcharges resulting from antitrust violations are in fact usually borne by the ultimate purchaser. Therefore, and as consideration for executing this Contract, the Contractor, acting herein by and through its duly authorized agent, hereby conveys, sells, assigns, and transfers to the State of New Jersey, for itself and on behalf of its political subdivisions, instrumentalities, and public agencies, all right, title and interest to all claims and causes of action it may now or hereafter acquire under the antitrust laws of the United States or the State of New Jersey, relating to the particular goods or services purchased or acquired by the State of New Jersey or any of its political subdivisions or public agencies pursuant to this Contract.

13.5.2 In connection with this assignment, the following are the express obligations of the Contractor:

- a. The Contractor will take no action which will in any way diminish the value of the rights conveyed or assigned hereunder.
- b. The Contractor will advise the Attorney General of New Jersey and DPMC:
 - (1) in advance of its intention to commence any action on its own behalf regarding any such claim or cause(s) of action; and/or
 - (2) immediately upon becoming aware of the fact that an action has been commenced on its behalf by some other person(s) of the tendency of such action.
- c. The Contractor will notify the defendants in any antitrust suit of the fact of the within assignment at the earliest practicable opportunity after the Contractor has initiated an action on its own behalf or becomes aware that such an action has been filed on its behalf by another person. A copy of such Notice will be sent to the Attorney General of New Jersey and the DPMC.

13.5.3 It is understood and agreed that in the event any payment under any such claim or cause of action is made to the Contractor, it shall promptly pay over to the State of New Jersey the allotted share thereof, if any, assigned to the State hereunder.

END, GENERAL CONDITIONS

LIST OF DRAWINGS

SALT STORAGE STRUCTURE
 NJDOT Freehold Maintenance Facility
 Monmouth County, N.J.
 DPMC PROJECT #T0564-02

DRAWING NUMBER	TITLE SHEET
<u>GENERAL:</u>	
G-001	TITLE SHEET
<u>CIVIL:</u>	
C-101	EXISTING CONDITIONS PLAN
C-102	DEMOLITIONS PLAN
C-103	SITE LAYOUT AND DIMENSIONING PLAN
C-104	GRADING, DRAINAGE AND UTILITY PLAN
C-105	SOIL EROSION AND SEDIMENT CONTROL PLAN
C-106	SITE LIGHTING PLAN
C-107	ENVIRONMENTAL PLAN
C-108	WETLAND PERMIT PLAN
C-109	ENVIRONMENTAL NOTES
C-110	CONSTRUCTION DETAILS SHEET 1
C-111	CONSTRUCTION DETAILS SHEET 2
C-112	CONSTRUCTION DETAILS SHEET 3
C-113	CONSTRUCTION DETAILS SHEET 4
<u>ARCHITECTURAL:</u>	
	<u>SALT STORAGE BUILDING</u>
G-002	CODE ANALYSIS AND EGRESS PLAN
A1-101	PLAN
A1-102	ELEVATIONS
A1-103	SECTION AND STOCKPILE CALCULATIONS
A1-104	DETAILS
	<u>COVERED MATERIAL STORAGE BINS</u>
G-003	CODE ANALYSIS AND EGRESS PLAN
A2-101	PLAN AND ELEVATIONS
A2-102	SECTIONS AND DETAILS
<u>STRUCTURAL DRAWINGS:</u>	
	<u>SALT STORAGE BUILDING</u>
B1-S101	FOUNDATION PLAN, SECTIONS
B1-S102	CaCl TANKS & EQUIPMENT PAD AND SECTION
B1-S201	SECTIONS

B1-S301 B1-S401	TYPICAL DETAILS AND GENERAL NOTES GENERAL NOTES
	<u>COVERED MATERIAL STORAGE BINS</u>
B1-S101 B1-S102 B2-S201 B2-S301	FOUNDATION PLAN, SECTIONS ROOF FRAMING PLAN AND SECTIONS ELEVATIONS AND TYPICAL DETAILS GENERAL NOTES
<u>ELECTRICAL DRAWINGS:</u>	
E1-001 E1-050 E1-100 E1-101 E2-100	GENERAL NOTES AND SYMBOL LIST SITE DEMOLITION PLAN SITE PLAN SALT STORAGE BUILDING PLAN MATERIAL STORAGE BUILDING PLAN

PART II – TECHNICAL SPECIFICATIONS

DPMC # T0564-02

DIVISION 1

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and Instructions to Bidders and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

- 1. Work covered by the Contract Documents.
- 2. Type of the Contract.
- 3. Construction duration.
- 4. Work under other contracts.
- 5. Owner-furnished products.
- 6. Use of premises.
- 7. Owner's occupancy requirements.
- 8. Work restrictions.
- 9. Specification formats and conventions.

- B. Related Sections include the following:

- 1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Salt Storage Structure – NJDOT Freehold Maintenance Facility, DPMC Project No. T0564-02.

- 1. Project Location: Rt 79 and Daniels Way, Freehold, NJ.

- B. Owner: State of New Jersey Department of Transportation, 1035 Parkway Avenue, PO Box 600, Ewing, NJ 08618.

- 1. Owner's Representative: Mr. Christopher Sagliocco, Project Manager, State of New Jersey Department of Transportation, 1035 Parkway Avenue, PO Box 600, Ewing, NJ 08618.

Salt Storage Structure
NJDOT Freehold Maintenance Facility

SUMMARY

011000-1

2. State of NJ, Department of Property Management & Construction Representative: Ed Hedger, Project Manager, State of New Jersey Department of Treasury, Division of Property Management and Construction, 20 W. State Street, 3rd Floor, Trenton, NJ 08625.
- C. Architect: NV5 – Architecture PC, 7 Campus Drive, Suite 300, Parsippany, NJ 07054.
- D. Description of Work: The scope of this project includes, but is not limited to:
 1. Construction of a New Salt Storage Structure, consisting of the following, but not limited to:
 - a. New Salt Storage Building – 10,000-ton capacity
 - b. New Material Storage Building
 - c. Site Improvements
 - d. Lighting and Electric improvements

1.4 TYPE OF CONTRACT

- A. Project will be constructed under a single prime contract.

1.5 CONTRACT DURATION

- A. Construction Duration:
 1. All specified work shall be completed within **180** calendar days of the issuance of a Notice to proceed by the State.

1.6 WORK UNDER OTHER CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.

1.7 USE OF PREMISES

- A. General: Contractor shall have use of premises for construction operations as indicated on Drawings by the Contract limits.
 1. Contractor shall coordinate with the maintenance yard staff on a daily basis to allow continued operation of the facility.
- B. Use of Site: Limit use of premises to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 1. Limits: Limit site disturbance, including earthwork and clearing of vegetation, to designated work Area

2. Owner Occupancy: The facilities will be used during construction; therefore the Contractor must maintain full vehicular and pedestrian access at all times. The Contractor must provide adequate signage and/or traffic control to allow maintenance staff to park and access facilities.
 - a. Coordinate and cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain access ways, unless otherwise indicated.
 - 1) Provide not less than 72 hours' notice to Owner of activities that may affect Owner's operations.
3. Driveways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.8 WORK RESTRICTIONS

- A. Contractor cannot work at the site during winter operations, which occur from October 1st through April 30th.
 1. In the event that construction is not completed by October 1st, Contractor access to the site may be limited.
- B. On-Site Work Hours: as required by local ordinance.
- C. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor air intakes.

1.9 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 50-division format and CSI/CSC's "MasterFormat" numbering system.
 1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
 2. Division 01: Sections in Division 01 as well as provisions in the Instructions to Bidders and General Conditions, govern the execution of the Work of all Sections in the Specifications.

- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
- C. Related Documents: The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019 as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for work included in this contract. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

DPMC #T0564-02

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for unit prices.
- B. Related Sections include the following:
 - 1. Instructions to Bidders and General Conditions for procedures for submitting and handling Change Orders.
 - 2. Division 01 Section "Quality Requirements" for general testing and inspecting requirements.

1.3 DEFINITIONS

- A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

A. Unit Price No. 1:

1. Description: For any affected area beyond that shown on drawings, provide 2” pavement milling.
2. Unit of Measurement: Square Yard

B. Unit Price No. 2:

1. Description: For any affected areas beyond that shown on drawings, furnish and install Dense Graded Aggregate Base Course – variable thickness, price to include all required testing.
2. Unit of Measurement: Cubic Yard

C. Unit Price No. 3:

1. Description: Furnish and install HMA 12.5 M-64 Surface Course (2” thick), price to include all required testing.
2. Unit of Measurement: Ton

D. Unit Price No. 4:

1. Description: Furnish and install HMA 25 M-64 Base Course (variable thickness), price to include all required testing.
2. Unit of Measurement: Ton

END OF SECTION 012200

DPMC # T0564-02

DIVISION 1

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and Instructions to Bidders and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Coordination Drawings.
 - 2. Administrative and supervisory personnel.
 - 3. Project meetings.
 - 4. Requests for Interpretation (RFIs).
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.
- C. Related Sections include the following:
 - 1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
 - 2. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.4 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

- B. Coordination: Each trade contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's Construction Schedule.
 2. Preparation of the Schedule of Values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.
 9. Project closeout activities.

1.5 SUBMITTALS

- A. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

- B. Shop Drawings and other submittals shall be submitted to Architect as set forth in the General conditions & instructions to bidders.

1.6 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.
 - 1. Include special personnel required for coordination of operations with other contractors.

1.7 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within 5 days of the meeting.

- B. Preconstruction Conference: DPMC will schedule a preconstruction conference before the start of construction, but no later than 15 days after execution of the Agreement. Conference will be held at Project site or another convenient location. The meeting will be conducted to review responsibilities and personnel assignments.
 - 1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Discuss items of significance that could affect progress, including but not limited to the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for RFIs.
 - g. Procedures for testing and inspecting.
 - h. Procedures for processing Applications for Payment.
 - i. Distribution of the Contract Documents.
 - j. Submittal procedures.
 - k. Preparation of Record Documents.
 - l. Use of the premises and existing building.
 - m. Work restrictions.
 - n. Owner's occupancy requirements.

- o. Responsibility for temporary facilities and controls.
 - p. Construction waste management and recycling.
 - q. Parking availability.
 - r. Office, work, and storage areas.
 - s. Equipment deliveries and priorities.
 - t. First aid.
 - u. Security.
 - v. Progress cleaning.
 - w. Working hours.
3. Minutes: Architect will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Owner and Architect of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. The Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility problems.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written recommendations.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
 - 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Architect will conduct progress meetings at biweekly intervals. Meeting dates will be coordinated with preparation of payment requests.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) RFIs.
 - 16) Status of proposal requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.
 - 19) Pending claims and disputes.
 - 20) Documentation of information for payment requests.
 3. Minutes: Architect will record and distribute the meeting minutes to each party present and to parties who should have been present.

- a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.8 REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
 1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
 1. Project name.
 2. Date.
 3. Name of Contractor.
 4. Name of Architect.
 5. RFI number, numbered sequentially.
 6. Specification Section number and title and related paragraphs, as appropriate.
 7. Drawing number and detail references, as appropriate.
 8. Field dimensions and conditions, as appropriate.
 9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 10. Contractor's signature.
 11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
 - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. Hard-Copy RFIs: DPMC RFI Form.
 1. Identify each page of attachments with the RFI number and sequential page number.
- D. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.
 1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- E. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
 1. The following RFIs will be returned without action:

- a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or RFIs with numerous errors.
2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to the Instructions to Bidders and General Conditions.
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 7 days of receipt of the RFI response.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within 7 days if Contractor disagrees with response.
- G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log at each progress meeting. Use CSI Log Form 13.2B or other equivalent. Software log with not less than the following information:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were dropped and not submitted.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

DPMC # T0564-02

DIVISION 1

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and Instructions to Bidders and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.

- 1. All testing required by code or specification are procured and paid for by the Contractor. Costs to be included in bid. Testing agency must be pre-qualified for same by DPMC.

- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

- 1. Specific quality-assurance and control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

- C. Related Sections include the following:

- 1. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
 - 2. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.
- D. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.
- E. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- F. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- G. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- H. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- I. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- J. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- K. Experienced: When used with an entity, "experienced" means having successfully completed projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of DPMC Classification.
- B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Description of test and inspection.
 - 3. Identification of applicable standards.
 - 4. Identification of test and inspection methods.
 - 5. Number of tests and inspections required.
 - 6. Time schedule or time span for tests and inspections.
 - 7. Entity responsible for performing tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.
- C. Reports: Prepare and submit certified written reports that include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and reinspecting.

- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
 - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

- J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect 7 days in advance of dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow 7 days for initial review and each re-review of each mockup.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Demolish and remove mockups when directed, unless otherwise indicated.

- K. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Sections in Divisions 02 through 49.

1.7 QUALITY CONTROL

- A. Tests and inspections are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 1. Where services are indicated, engage a qualified testing agency to perform these quality-control services.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated, submit a certified written report, in duplicate, of each quality-control service.
 4. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- B. **Manufacturer's Field Services:** Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- C. **Retesting/Reinspecting:** Provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D. **Testing Agency Responsibilities:** Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- E. **Associated Services:** Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- F. **Coordination:** Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- G. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for the Notice to Proceed.
1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.8 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Contractor, and as follows:
- B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Architect.
 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

DPMC # T0564-02

DIVISION 1

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and Instructions to Bidders and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Sections include the following:
 - 1. Division 01 Section "Summary" for limitations on utility interruptions and other work restrictions.
 - 2. General Conditions "Shop drawings and Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
 - 3. Division 31 Section "Earthmoving" for disposal of ground water at Project site.
 - 4. Division 31 Section "Asphalt Paving" for construction and maintenance of asphalt paving for temporary roads and paved areas.

1.3 DEFINITIONS

- A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 USE CHARGES

- A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, Commissioning Authority, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Pay sewer service use charges for sewer usage by all entities for construction operations.

- C. Water Service: Provide temporary connections and extensions of services, as required for construction operations.
- D. Electric Power Service: Provide temporary connections and extensions of services, as required for construction operations.

1.5 SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.6 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.7 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts.
- B. Portable Chain-Link Fencing: Minimum 2-inch, 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top and bottom rails. Provide concrete bases for supporting posts.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

- B. DPMC/Contractor Common-Use Field Office: If deemed required by contractor Single trailer of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly.
 - 1. All UCC permits associated with field offices to be obtained and paid for by General Contractor.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - 1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company and Owner for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
- C. Water Service: Install temporary water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

- E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Install electric power service overhead, unless otherwise indicated.
 - 2. Connect temporary service to Owner's existing power source, as directed by Owner.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 - 2. Install lighting for Project identification sign.
- I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install 1 telephone line(s) for each field office.
 - 1. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Architect's office.
 - e. Engineers' offices.
 - f. Owner's office.
 - g. Principal subcontractors' field and home offices.
 - 2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
- J. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail, in common-use facilities.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.

2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 1. Maintain access for fire-fighting equipment and access to fire hydrants.
 - C. Parking: Contractor to provide designated areas of parking for construction personnel in locations to minimize damage to existing conditions to remain.
 - D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
 2. Remove snow and ice as required to minimize accumulations.
 - E. Waste Disposal Facilities: Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."
 - F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements found in the General Conditions and Instructions to Bidders.
 - G. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 1. Comply with work restrictions specified in Division 01 Section "Summary."
- B. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- C. Tree and Plant Protection: Comply with requirements specified in Division 01 Section "Temporary Tree and Plant Protection."
- D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

- E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.
- F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.
- G. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- J. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 015000

DPMC #T0564-02

DIVISION 1

SECTION 015639 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and Instructions to Bidders and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the protection and trimming of existing trees that interfere with, or are affected by, execution of the Work, whether temporary or permanent construction.
- B. Related Sections include the following:
 - 1. Division 01 Section "Summary" for limits placed on Contractor's use of the site.
 - 2. Division 31 Section "Site Clearing" for removal limits of trees, shrubs, and other plantings affected by new construction.
 - 3. Division 31 Section "Earth Moving" for building and utility trench excavation, backfilling, compacting and grading requirements, and soil materials.

1.3 DEFINITIONS

- A. Tree Protection Zone: Area surrounding individual trees or groups of trees to remain during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Tree Pruning Schedule: Written schedule from arborist detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
- C. Qualification Data: For tree service firm and arborist.

- D. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.
- E. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

1.5 QUALITY ASSURANCE

- A. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed tree protection and trimming work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of tree protection and trimming.
- B. Arborist Qualifications: An arborist certified by ISA or licensed in the jurisdiction where Project is located.
- C. Tree Pruning Standard: Comply with ANSI A300 (Part 1), "Tree, Shrub, and Other Woody Plant Maintenance--Standard Practices (Pruning)."
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
 - 1. Before tree protection and trimming operations begin, meet with representatives of authorities having jurisdiction, Owner, Architect, consultants, and other concerned entities to review tree protection and trimming procedures and responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Drainage Fill: Selected crushed stone, or crushed or uncrushed gravel, washed, ASTM D 448, Size 24, with 90 to 100 percent passing a 2-1/2-inch sieve and not more than 10 percent passing a 3/4-inch sieve.
- B. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches 1 inch in diameter; and free of weeds, roots, and toxic and other nonsoil materials.
 - 1. Obtain topsoil only from well-drained sites where topsoil is 4 inches deep or more; do not obtain from bogs or marshes.
- C. Filter Fabric: Manufacturer's standard, nonwoven, pervious, geotextile fabric of polypropylene, nylon, or polyester fibers.
- D. Organic Mulch: Shredded hardwood, free of deleterious materials.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Temporary Fencing: Install temporary fencing around tree protection zones to protect remaining trees and vegetation from construction damage. Maintain temporary fence and remove when construction is complete.
 - 1. Install chain-link fence according to ASTM F 567 and manufacturer's written instructions.
- B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
- C. Mulch areas inside tree protection zones and other areas indicated.
 - 1. Apply 3-inch average thickness of organic mulch. Do not place mulch within 6 inches of tree trunks.
- D. Do not store construction materials, debris, or excavated material inside tree protection zones. Do not permit vehicles or foot traffic within tree protection zones; prevent soil compaction over root systems.
- E. Maintain tree protection zones free of weeds and trash.
- F. Do not allow fires within tree protection zones.

3.2 EXCAVATION

- A. Install shoring or other protective support systems to minimize sloping or benching of excavations.
- B. Do not excavate within tree protection zones, unless otherwise indicated.
- C. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots.
 - 1. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction.
 - 2. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

- D. Where utility trenches are required within tree protection zones, tunnel under or around roots by drilling, auger boring, pipe jacking, or digging by hand.
 - 1. Root Pruning: Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots with sharp pruning instruments; do not break or chop.

3.3 REGRADING

- A. Grade Lowering: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist, unless otherwise indicated.
 - 1. Root Pruning: Prune tree roots exposed during grade lowering. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots with sharp pruning instruments; do not break or chop.
- B. Minor Fill: Where existing grade is 6 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.
- C. Moderate Fill: Where existing grade is more than 6 inches but less than 12 inches below elevation of finish grade, place drainage fill, filter fabric, and topsoil on existing grade as follows:
 - 1. Carefully place drainage fill against tree trunk approximately 2 inches above elevation of finish grade and extend not less than 18 inches from tree trunk on all sides. For balance of area within drip-line perimeter, place drainage fill up to 6 inches below elevation of grade.
 - 2. Place filter fabric with edges overlapping 6 inches minimum.
 - 3. Place fill layer of topsoil to finish grade. Do not compact drainage fill or topsoil. Hand grade to required finish elevations.

3.4 TREE PRUNING

- A. Prune trees to remain that are affected by temporary and permanent construction.
- B. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
- C. Pruning Standards: Prune trees according to ANSI A300 Part 1 as follows:
 - 1. Type of Pruning: Cleaning.
 - 2. Specialty Pruning: Restoration.
- D. Cut branches with sharp pruning instruments; do not break or chop.
- E. Chip removed tree branches and dispose of off-site.

3.5 TREE REPAIR AND REPLACEMENT

- A. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
- B. Remove and replace trees indicated to remain that die or are damaged during construction operations that arborist determines are incapable of restoring to normal growth pattern.
 - 1. Provide new trees of same size and species as those being replaced; plant and maintain as specified in Division 32 Section "Plants."
 - 2. Provide new trees of 6-inch caliper size and of a species selected by Architect when damaged trees more than 6 inches in caliper size, measured 12 inches above grade, are required to be replaced. Plant and maintain new trees as specified in Division 22 Section "Plants."
- C. Aerate surface soil, compacted during construction, 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch diameter holes a minimum of 12 inches deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand.

3.6 DISPOSAL OF WASTE MATERIALS

- A. Burning is not permitted.
- B. Disposal: Remove excess excavated material and displaced trees from Owner's property.

END OF SECTION 015639

DIVISION 1

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and Instructions to Bidders and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Facilities and Controls" for environmental-protection measures during construction.
 - 2. Division 31 Section "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction. Construction waste includes packaging.
- B. Disposal: Removal off-site construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- C. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- D. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- E. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE GOALS

- A. General Salvage/Recycle Goals: Owner's goal is to salvage and/or recycle as much nonhazardous construction waste as possible including, as applicable, the following materials:
 - 1. Construction Waste:
 - a. Site-clearing waste.
 - b. Concrete.
 - c. Lumber.
 - d. Wood sheet materials.
 - e. Metals.
 - f. Piping.
 - g. Electrical conduit.
 - h. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.
 - 4) Plastic sheet and film.
 - 5) Polystyrene packaging.
 - 6) Wood crates.
 - 7) Plastic pails.

1.5 SUBMITTALS (not used)

1.6 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.2 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes: Chip brush, branches, and trees at landfill facility.

C. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

3.3 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 017419

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DIVISION 1

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and Instructions to Bidders and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Warranties.
 - 3. Final cleaning.
- B. Related Sections include the following:
 - 1. General and Supplementary General Conditions and Instructions to Bidders for requirements for Applications for Payment for Substantial and Final Completion.
 - 2. General and Supplementary General Conditions and Instructions to Bidders for Progress Cleaning of Project Site.
 - 3. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 4. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 5. General Conditions and Instruction to Bidders for requirements for instructing Owner's personnel.
 - 6. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Instruction to Bidders and General Conditions, Article 9 "Payment."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy

of the list shall state that each item has been completed or otherwise resolved for acceptance.

3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit 4 copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.

1. Organize list of spaces in sequential order, starting with exterior areas first.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
 - a. Project name.
 - b. Building Name.
 - c. Date.
 - d. Name of Architect.
 - e. Name of Contractor.
 - f. Page number.

1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - d. Remove snow and ice to provide safe access to building.
 - e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces.

- f. Remove debris and surface dust from limited access spaces, including roofs.
 - g. Remove labels that are not permanent.
 - h. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - i. Leave Project clean and ready for use.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

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DIVISION 1

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Instructions to Bidders and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

- 1. Operation and maintenance documentation directory.
- 2. Emergency manuals.
- 3. Maintenance manuals for the care and maintenance of products, materials, and finishes, systems and equipment.

- B. Related Sections include the following:

- 1. General Conditions and Instruction to Bidders for submitting copies of submittals for operation and maintenance manuals.
- 2. General Conditions and Instruction to Bidders for submitting operation and maintenance manuals.
- 3. General Conditions and Instruction to Bidders and Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
- 4. Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

- A. Initial Submittal: Submit a draft copy of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory.

Architect will return 1 copy of draft and mark whether general scope and content of manual are acceptable.

- B. Final Submittal: Submit 6 copies of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
 - 1. Correct or modify each manual to comply with Architect's comments. Submit 6 copies of each corrected manual within 15 days of receipt of Architect's comments.

1.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
 - 1. List of documents.
 - 2. List of systems.
 - 3. List of equipment.
 - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name, address, and telephone number of Contractor.
 6. Name and address of Architect.
 7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
 4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.

- b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 PRODUCT MAINTENANCE MANUAL

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to operation, and maintenance manuals.

- B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original Project Record Documents as part of operation and maintenance manuals.
 - 2. Comply with requirements of newly prepared Record Drawings in General Conditions and Division 01 Section "Project Record Documents."
- E. Comply with General Conditions and Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

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DIVISION 1

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Instructions to Bidders and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
- B. Related Sections include the following:
 - 1. General Conditions, Instruction to Bidders and Division 01 Section "Closeout Procedures" for general closeout procedures.
 - 2. General Conditions, Instruction to Bidders and Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Divisions 02 through 49 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit 2 set(s) of marked-up Record Prints.
 - 2. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal: Submit 2 sets of marked-up Record Prints. Architect will initial and date each plot and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return prints for organizing into sets, printing, binding, and final submittal.
 - b. Final Submittal: Submit 1 set of marked-up Record Prints.
- B. Record Specifications: Submit 2 copies of Project's Specifications, including addenda and contract modifications.

- C. Record Product Data: Submit 2 copies of each Product Data submittal.
 - 1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
 - 1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Changes made by Change Order or Construction Change Directive.
 - d. Changes made following Architect's written orders.
 - e. Details not on the original Contract Drawings.
 - f. Field records for variable and concealed conditions.
 - g. Record information on the Work that is shown only schematically.
 - 3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 - 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 - 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 - 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Drawings: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect.
- C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing Record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
 2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared Record Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- D. Format: Identify and date each Record Drawing; include the designation "As-Built" in a prominent location.
1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "As-Built."
 - d. Name of Architect.
 - e. Name of Contractor.
- E. Contractor shall comply with DPMC General Conditions Section 4.8..

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Contractor shall comply with DPMC instructions to Bidders and General Conditions Section 4.8 for this work.
- B. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- C. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 017839

DPMC #T0564-02

DIVISION 1

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training videotapes.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for requirements for pre-instruction conferences.
 - 2. Divisions 02 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 SUBMITTALS

- A. Instruction Program: Submit 3 copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. At completion of training, submit 2 complete training manual(s) for Owner's use.
- B. Qualification Data: For instructor.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Photographer Qualifications: A professional photographer who is experienced photographing construction projects.
- D. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 3. Review required content of instruction.
 - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
 - 1. Emergency Generators

- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project Record Documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
 4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
 5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.

- c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
 7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
 8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
 2. Owner will furnish an instructor to describe Owner's operational philosophy.
 3. Owner will furnish Contractor with names and positions of participants.

- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner, through Architect, with at least 7 days' advance notice.
- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a written performance-based test.
- E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEOTAPES

- A. General: Engage a qualified commercial photographer to record demonstration and training videotapes. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Videotape Format: Provide high-quality VHS color videotape in full-size cassettes.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
- D. Narration: Describe scenes on videotape by audio narration by microphone while videotape is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.
- E. Transcript: Provide a typewritten transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

END OF SECTION 017900

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DIVISION 3

SECTION 030505 – UNDERSLAB VAPOR BARRIER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes but is not limited to, the following:
 - 1. Sheet vapor barrier under concrete slabs on grade.
- B. Related Sections:
 - 1. Section 032000 – Concrete Reinforcing.
 - 2. Section 033000 – Cast-in-Place Concrete.

1.3 REFERENCE STANDARDS

- A. ASTM E1643 – Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs; 2011.
- B. ASTM E1745 – Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.
- C. ASTM F1249 – Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.

1.4 SUBMITTALS

- A. See Section 01300 – Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers’ data on manufactured products.
- C. Samples: Submit samples of underslab vapor barrier to be used.\
- D. Manufacturer’s Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

PART 2 - PRODUCTS

2.1 VAPOR RETARDERS

- A. Vapor Barrier below slab on grade must have the following qualities:
 - 1. Permeance: ASTM F 1249 0.012 perms or lower
 - 2. Water Vapor Barrier: ASTM E 1745 Meets Class A (Plastics)

- B. Acceptable Plastic Vapor Barrier Manufacturers:
1. Stego Wrap (15 mil) Vapor Barrier by Stego Industries LLC.
 2. Moistop Ultra A by Fortifiber Corporation.
 3. Vapor Block 15 by Raven Industries Inc.
 4. Griffolyn Type-105 by Reef Industries, Inc.
 5. Or approved equal.
- C. Accessories:
1. Seam Tape
 - a. Tape must have the following qualities:
 - 1) Water Vapor Transmission Rate ASTM E 1249, 0.3 perms or lower
 - b. Seam Tape:
 - 1) Include manufacturer's recommended adhesive or pressure-sensitive tape.
 - 2) Similar to Stego Tape by Stego Industries LLC, San Juan Capistrano, CA (877) 464-7834 www.stegoindustries.com or approved equal.
 2. Vapor Proofing Mastic:
 - a. Mastic must have the following qualities:
 - 1) Water Vapor Transmission Rate ASTM E 1249, 0.3 perms or lower
 - b. Mastic:
 - 1) Similar to Stego Mastic by Stego Industries LLC, San Juan Capistrano, CA (877) 464-7834 www.stegoindustries.com or approved equal.
 3. Pipe Boots:
 - a. Construct pipe boots from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer's instructions.
- D. Preparation:
1. Ensure that subsoil is approved by geotechnical firm.
 2. Level and tamp or roll aggregate, sand or tamped earth base.
- E. Installation:
1. Install Vapor Barrier/Retarder:
 - a. Installation shall be in accordance with manufacturer's instructions.
 - b. Lap Vapor Barrier/Retarder over thru wall flashing, footings, or seal to foundation walls based on details and conditions encountered. Comply with manufacturer's warranty requirements.
 - c. Overlap joints 6 inches and seal based on manufacturer's requirements.
 - d. Seal all penetrations (including pipes) per manufacturer's instructions.
 - e. No penetration of the Vapor Barrier/Retarder is allowed except for reinforcing steel and permanent utilities.
 - f. Repair damaged areas by using patches provided by Vapor Barrier/Retarder manufacturer.
- F. Vapor-Retarder Fasteners: Utilize product approved by vapor barrier manufacturer for fastening and seaming the system. Comply with manufacturer's installation requirements.
- G. Single-Component Non-sag Sealant: Utilize product approved by vapor barrier manufacturer for the system to seal around perimeter edges and terminations of dissimilar materials. Comply with manufacturer's installation requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions (by Installer/Applicator): Examine conditions under which products of this section are to be installed in coordination with Installer of materials and components specified in this Section and notify the General Contractor in writing, with copies to the Owner's Representative and Architect, of any conditions detrimental to proper and timely installation. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
- B. When Installer confirms conditions are acceptable to ensure proper and timely installation of the proposed products and confirms requirements for applicable warranty or guarantee can be satisfied; submit to General Contractor written confirmation, with copies to the Owner's Representative and Architect, from applicable Installer. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to Installer.
 - 1. Verify that work of other trades which will be covered by vapor barrier/retarder is complete, approved, and tested.
- C. Clean substrates of substances harmful to vapor barriers, including removal of projections, which might puncture vapor barriers.
- D. Verify that substrate, adjacent materials are dry and that substrates are ready to receive vapor barrier/retarder and adhesive.
- E. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.2 INSTALLATION

- A. Vapor Barrier General: Coordinate installation of Vapor Barrier with other installers of material and components. Extend vapor barrier to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor barrier to cover miscellaneous voids in substrates. Seam all joints in dissimilar materials before installation of vapor barrier with approved seam tape product.
 - 1. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor barriers with approved tape or sealant to create an airtight seal between penetrating objects and vapor barrier.
 - 2. Repair tears or punctures in vapor barriers immediately before concealment by other work. Cover with vapor barrier tape or sealant.

3.3 PROTECTION

- A. Protect installed vapor barrier from harmful exposure and physical abuse until coverage by permanent concealing work. Advise Contractor of exposure hazards, including possible sources of deterioration and fire hazard.
- B. Dispose of all materials legally and in accordance with local jurisdiction requirements.
- C. Comply with recycling program and waste management procedures.
- D. Remove trash and construction debris from vapor barrier/retarder surface prior to installation of reinforcement and concrete for slab.
- E. Dispose of all waste legally and in accordance with local jurisdiction requirements.
- F. Comply with waste management and recycling program requirements.

END OF SECTION

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DIVISION 3

SECTION 032000 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel reinforcement bars.
 - 2. Welded-wire reinforcement.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Each type of steel reinforcement.
 - 2. Epoxy repair coating.
 - 3. Bar supports.
 - 4. Mechanical splice couplers.
- B. Shop Drawings: Comply with ACI SP-066:
 - 1. Include placing drawings that detail fabrication, bending, and placement.
 - 2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
- C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.
 - 1. Location of construction joints is subject to approval of the Architect.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

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1. Reinforcement To Be Welded: Welding procedure specification in accordance with AWS D1.4/D1.4M
- B. Material Certificates: For each of the following, signed by manufacturers:
 1. Epoxy-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."
 2. Dual-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."
- C. Material Test Reports: For the following, from a qualified testing agency:
 1. Steel Reinforcement:
 - a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.
 2. Mechanical splice couplers.
- D. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.
- B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4/D 1.4M.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage and to avoid damaging coatings on steel reinforcement.
 1. Store reinforcement to avoid contact with earth.
 2. Do not allow epoxy-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615/A615M, Grade 60 (Grade 420), deformed.
- B. Low-Alloy Steel Reinforcing Bars: ASTM A706/A706M, deformed.
- C. Epoxy-Coated Reinforcing Bars:
 1. Steel Bars: ASTM A615/A615M, Grade 60 (Grade 420), deformed bars.

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- 2. Epoxy Coating: ASTM A775/A775M with less than 2 percent damaged coating in each 12-inch (305-mm) bar length.
- D. Steel Bar Mats: ASTM A184/A184M, fabricated from ASTM A615/A615M, Grade 60 (Grade 420), deformed bars, assembled with clips.
- E. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.
- F. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, flat sheet.
- G. Galvanized-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from galvanized-steel wire into flat sheets.
- H. Epoxy-Coated Welded-Wire Reinforcement: ASTM A884/A884M, Class A coated, Type 1, plain steel.

2.2 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A615/A615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.
- B. Epoxy-Coated Joint Dowel Bars: ASTM A615/A615M, Grade 60 (Grade 420), plain-steel bars, ASTM A775/A775M epoxy coated.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
 - 1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
 - b. For epoxy-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.
- D. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch (1.2908 mm) in diameter.
 - 1. Finish: Plain ASTM A884/A884M, Class A, Type 1, epoxy coated, with less than 2 percent damaged coating in each 12-inch (305-mm) wire length.
- E. Stainless Steel Tie Wire: ASTM A1022/A1022M, not less than 0.0508 inch (1.2908 mm) in diameter.
- F. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A775/A775M.

2.3 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protection of In-Place Conditions:
 - 1. Do not cut or puncture vapor retarder.
 - 2. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
- B. Accurately position, support, and secure reinforcement against displacement.
 - 1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
 - 2. Do not tack weld crossing reinforcing bars.
- C. Preserve clearance between bars of not less than 1 inch (25 mm), not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- D. Provide concrete coverage in accordance with ACI 318 (ACI 318M).
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings.
 - 1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, or 24 inches (610 mm), whichever is greater.
 - 2. Stagger splices in accordance with ACI 318 (ACI 318M).
 - 3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.
 - 4. Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.
- G. Install welded-wire reinforcement in longest practicable lengths.
 - 1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."
 - a. For reinforcement less than W4.0 or D4.0, continuous support spacing shall not exceed 12 inches (305 mm).

2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches (50 mm) for plain wire and 8 inches (200 mm) for deformed wire.
 3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
 4. Lace overlaps with wire.
- H. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating in accordance with ASTM D3963/D3963M.

3.3 JOINTS

- A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
1. Place joints perpendicular to main reinforcement.
 2. Continue reinforcement across construction joints unless otherwise indicated.
 3. Do not continue reinforcement through sides of strip placements of floors and slabs.
- B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.4 INSTALLATION TOLERANCES

- A. Comply with ACI 117 (ACI 117M).

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor, at their own expense, will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Contractor, at their own expense, will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
1. Steel-reinforcement placement.
 2. Steel-reinforcement mechanical splice couplers.
 3. Steel-reinforcement welding.

END OF SECTION 032000

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DIVISION 3

SECTION 033000 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.4 ACTION SUBMITTALS

- A. Product Data: For each of the following.

- 1. Portland cement.
- 2. Fly ash.
- 3. Slag cement.
- 4. Blended hydraulic cement.
- 5. Silica fume.
- 6. Performance-based hydraulic cement
- 7. Aggregates.
- 8. Admixtures:
 - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
- 9. Curing materials.

10. Joint fillers.
11. Repair materials.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Slump limit.
6. Air content.
7. Nominal maximum aggregate size.
8. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
9. Include manufacturer's certification that permeability-reducing admixture is compatible with mix design.
10. Include certification that dosage rate for permeability-reducing admixture matches dosage rate used in performance compliance test.
11. Intended placement method.
12. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - a. Location of construction joints is subject to approval of the Architect.

D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
3. Testing agency: Include copies of applicable ACI certificates.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Floor and slab treatments.
5. Bonding agents.
6. Adhesives.
7. Semirigid joint filler.
8. Joint-filler strips.
9. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Silica fume.
6. Performance-based hydraulic cement.
7. Aggregates.
8. Admixtures:

- a. Permeability-Reducing Admixture: Include independent test reports, indicating compliance with specified requirements, including dosage rate used in test.

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

E. Research Reports:

1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For sheet vapor retarder/termite barrier, showing compliance with ICC AC380.

F. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician with experience installing and finishing concrete, incorporating permeability-reducing admixtures.

1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

- C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.
 - 1. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
- D. Field Quality Control Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301 (ACI 301M).

1.8 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 306.1 and as follows.
 - 1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 2. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
 - 3. Do not use frozen materials or materials containing ice or snow.
 - 4. Do not place concrete in contact with surfaces less than 35 deg F (1.7 deg C), other than reinforcing steel.
 - 5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M), and as follows:
 - 1. Maintain concrete temperature at time of discharge to not exceed 95 deg F (35 deg C).
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 (ACI 301M) unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I, Type II, Type III, gray.
2. Fly Ash: ASTM C618, Class F.
3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
4. Silica Fume: ASTM C1240 amorphous silica.

C. Normal-Weight Aggregates: ASTM C33/C33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Alkali-Silica Reaction: Comply with one of the following:

- a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
- b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
- c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. (2.37 kg/cu. m) for moderately reactive aggregate or 3 lb./cu. yd. (1.78 kg/cu. m) for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301 (ACI 301M).

2. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.

3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C260/C260M.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
7. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) BASF Corporation.
 - 2) Cortec Corporation.
 - 3) GCP Applied Technologies Inc.
 - 4) Sika Corporation.
 - 5) Or Approved Equal.

F. Water and Water Used to Make Ice: ASTM C94/C94M, potable.

2.3 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. BASF Corporation.
 - b. Bon Tool Co.
 - c. Brickform; a division of Solomon Colors.
 - d. ChemMasters, Inc.
 - e. Dayton Superior.
 - f. Euclid Chemical Company (The); an RPM company.
 - g. Kaufman Products, Inc.
 - h. Lambert Corporation.
 - i. Laticrete International, Inc.
 - j. Metalcrete Industries.
 - k. Nox-Crete Products Group.
 - l. Sika Corporation.
 - m. SpecChem, LLC.
 - n. TK Products.
 - o. Vexcon Chemicals Inc.
 - p. W.R. Meadows, Inc.
 - q. Or Approved Equal.

- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
 - 1. Color:
 - a. Ambient Temperature Below 50 deg F (10 deg C): Black.
 - b. Ambient Temperature between 50 deg F (10 deg C) and 85 deg F (29 deg C): Any color.
 - c. Ambient Temperature Above 85 deg F (29 deg C): White.
- D. Water: Potable or complying with ASTM C1602/C1602M.
- E. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Anti-Hydro International, Inc.
 - b. ChemMasters, Inc.
 - c. Dayton Superior.
 - d. Euclid Chemical Company (The); an RPM company.
 - e. Kaufman Products, Inc.
 - f. Lambert Corporation.
 - g. Laticrete International, Inc.
 - h. Nox-Crete Products Group.
 - i. SpecChem, LLC.
 - j. TK Products.
 - k. Vexcon Chemicals Inc.
 - l. W.R. Meadows, Inc.
 - m. Or Approved Equal.

2.4 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

2.5 REPAIR MATERIALS

- A. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested in accordance with ASTM C109/C109M.

2.6 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301 (ACI 301M).
 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 1. Fly Ash or Other Pozzolans: 25 percent by mass.
 2. Slag Cement: 50 percent by mass.
 3. Silica Fume: 10 percent by mass.
 4. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
 5. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
 1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, concrete for parking structure slabs, and concrete with a w/cm below 0.50.
 4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
 5. Use permeability-reducing admixture in concrete mixtures where indicated.

2.7 CONCRETE MIXTURES

- A. Class A: Normal-weight concrete used for footings.
 1. Exposure Class: ACI 318 (ACI 318M) C1.
 2. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
 3. Maximum w/cm: 0.45.

4. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm) before adding high-range water-reducing admixture or plasticizing admixture at Project site.
5. Air Content:
 - a. Exposure Class F1: 5.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch (19-mm) nominal maximum aggregate size.
6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

B. Class B: Normal-weight concrete used for foundation walls.

1. Exposure Class: ACI 318 (ACI 318M) C1.
2. Minimum Compressive Strength: 5,000 psi (34.5 MPa) at 28 days.
3. Maximum w/cm: 0.40.
4. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm) before adding high-range water-reducing admixture or plasticizing admixture at Project site.
5. Air Content:
 - a. Exposure Class F3: 6.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch (19-mm) nominal maximum aggregate size.
6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

C. Class C: Normal-weight concrete used for interior slabs-on-ground.

1. Exposure Class: ACI 318 (ACI 318M) C1.
2. Minimum Compressive Strength: 5000 psi (34.5 MPa) at 28 days.
3. Maximum w/cm: 0.40.
4. Minimum Cementitious Materials Content: 470 lb/cu. yd. (279 kg/cu. m).
5. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm) before adding high-range water-reducing admixture or plasticizing admixture at Project site.
6. Air Content:
 - a. Exposure Class F3: 6.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch (19-mm) nominal maximum aggregate size.
7. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Class J: Normal-weight concrete used for exterior retaining walls.

1. Exposure Class: ACI 318 (ACI 318M) C1.
2. Minimum Compressive Strength: 5000 psi (34.5 MPa) at 28 days.
3. Maximum w/cm: 0.40.
4. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm) before adding high-range water-reducing admixture or plasticizing admixture at Project site.
5. Air Content:

- a. Exposure Class F3: 6.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch (19-mm) nominal maximum aggregate size.
- 6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M and ASTM C1116/C1116M, and furnish batch ticket information.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
 - 1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
 - 2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:
 - 1. Daily access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
 - 4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.
 - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.

3.4 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
 - 1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
 - 2. Place joints perpendicular to main reinforcement.
 - a. Continue reinforcement across construction joints unless otherwise indicated.
 - b. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
 - 4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 6. Space vertical joints in walls at a maximum of 40 feet. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 7. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 8. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
 - 2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
 - 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

- E. Doweled Joints:
 - 1. Install dowel bars and support assemblies at joints where indicated on Drawings.
 - 2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.
- F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

3.5 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
 - 1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
 - 2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M), but not to exceed the amount indicated on the concrete delivery ticket.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
 - 1. If a section cannot be placed continuously, provide construction joints as indicated.
 - 2. Deposit concrete to avoid segregation.
 - 3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301 (ACI 301M).
 - a. Do not use vibrators to transport concrete inside forms.
 - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer.
 - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.

- d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Do not place concrete floors and slabs in a checkerboard sequence.
 2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 3. Maintain reinforcement in position on chairs during concrete placement.
 4. Screed slab surfaces with a straightedge and strike off to correct elevations.
 5. Level concrete, cut high areas, and fill low areas.
 6. Slope surfaces uniformly to drains where required.
 7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
 8. Do not further disturb slab surfaces before starting finishing operations.

3.6 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 (ACI 301M) Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
 - a. Patch voids larger than 1-1/2 inches (38 mm) wide or 1/2 inch (13 mm) deep.
 - b. Remove projections larger than 1 inch (25 mm).
 - c. Tie holes do not require patching.
 - d. Surface Tolerance: ACI 117 (ACI 117M) Class D.
 - e. Apply to concrete surfaces not exposed to public view.

B. Rubbed Finish: Apply the following to as cast surface finishes where indicated on Drawings:

1. Smooth-Rubbed Finish:

- a. Perform no later than one day after form removal.
- b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
- c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.

2. Grout-Cleaned Rubbed Finish:

- a. Clean concrete surfaces after contiguous surfaces are completed and accessible.
- b. Do not clean concrete surfaces as Work progresses.
- c. Mix 1 part portland cement to 1-1/2 parts fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.

- d. Wet concrete surfaces.
 - e. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap, and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish:
- a. Mix 1 part portland cement to 1 part fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint.
 - b. Mix 1 part portland cement and 1 part fine sand with sufficient water to produce a mixture of stiff grout. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
 - c. Wet concrete surfaces.
 - d. Compress grout into voids by grinding surface.
 - e. In a swirling motion, finish surface with a cork float.
4. Scrubbed Finish: After concrete has achieved a compressive strength of from 1000 to 1500 psi (6.9 to 10.3 MPa), apply scrubbed finish.
- a. Wet concrete surfaces thoroughly and scrub with stiff fiber or wire brushes, using water freely, until top mortar surface is removed and aggregate is uniformly exposed.
 - b. Rinse scrubbed surfaces with clean water.
 - c. Maintain continuity of finish on each surface or area of Work.

C. Related Unformed Surfaces:

- 1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
- 2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.7 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish:

- 1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
- 2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch (6 mm) in one direction.
- 3. Apply scratch finish to surfaces indicated.

C. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighthen until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces indicated.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155 (ASTM E1155M), for a randomly trafficked floor surface:

a. Slabs on Ground:

- 1) Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch (6 mm).
- 2) Specified overall values of flatness, F_F 25; and of levelness, F_L 20; with minimum local values of flatness, F_F 17; and of levelness, F_L 15.
- 3) Specified overall values of flatness, F_F 35; and of levelness, F_L 25; with minimum local values of flatness, F_F 24; and of levelness, F_L 17.
- 4) Specified overall values of flatness, F_F 45; and of levelness, F_L 35; with minimum local values of flatness, F_F 30; and of levelness, F_L 24.
- 5) Specified Overall Value (SOV): F_F 50 and F_L 25 with minimum local value (MLV): F_F 40 and F_L 17.
- 6) Specified Overall Value (SOV): F_F 25 and F_L 20 with minimum local value (MLV): F_F 17 and F_L 15.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

3.8 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.

3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

3.9 CONCRETE CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
 1. Comply with ACI 301 (ACI 301M) and ACI 306.1 for cold weather protection during curing.
 2. Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M) for hot-weather protection during curing.
 3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h (1 kg/sq. m x h), calculated in accordance with ACI 305.1, before and during finishing operations.
- B. Curing Formed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:
 1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
 2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
 3. If forms remain during curing period, moist cure after loosening forms.
 4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
 - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
 - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
 - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
 - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
 - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
 - 2) Maintain continuity of coating and repair damage during curing period.
- C. Curing Unformed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:
 1. Begin curing immediately after finishing concrete.
 2. Interior Concrete Floors:
 - a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

- a) Lap edges and ends of absorptive cover not less than 12-inches (300-mm).
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
 - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive.
 - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - b) Cure for not less than seven days.
 - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
- b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12 inches (300 mm).
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
 - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive.
 - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - b) Cure for not less than seven days.
 - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
- c. Floors to Receive Curing Compound:

- 1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
- 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
- 3) Maintain continuity of coating, and repair damage during curing period.
- 4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

d. Floors to Receive Curing and Sealing Compound:

- 1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
- 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
- 3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.10 TOLERANCES

- A. Conform to ACI 117 (ACI 117M).

3.11 JOINT FILLING

- A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.
1. Defer joint filling until concrete has aged at least one month
 2. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints.
- D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.12 CONCRETE SURFACE REPAIRS

- A. Defective Concrete:
1. Repair and patch defective areas when approved by Architect.
 2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete.
 - a. Limit cut depth to 3/4 inch (19 mm).
 - b. Make edges of cuts perpendicular to concrete surface.
 - c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
 - d. Fill and compact with patching mortar before bonding agent has dried.
 - e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
 - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
 - b. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.
 - a. Correct low and high areas.
 - b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.
 - a. Finish repaired areas to blend into adjacent concrete.
5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.
 - a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - b. Feather edges to match adjacent floor elevations.
6. Correct other low areas scheduled to remain exposed with repair topping.

- a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations.
 - b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
7. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete.
- a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around.
 - b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
 - c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
 - d. Place, compact, and finish to blend with adjacent finished concrete.
 - e. Cure in same manner as adjacent concrete.
8. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar.
- a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
 - b. Dampen cleaned concrete surfaces and apply bonding agent.
 - c. Place patching mortar before bonding agent has dried.
 - d. Compact patching mortar and finish to match adjacent concrete.
 - e. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.13 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor, at their own expense, will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
- B. Testing Agency: Contractor, at their own expense, will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
 - 1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
 - 2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
 - 3. Testing agency shall report results of tests and inspections, in writing, to Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

- a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
 - 1) Project name.
 - 2) Name of testing agency.
 - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
 - 4) Name of concrete manufacturer.
 - 5) Date and time of inspection, sampling, and field testing.
 - 6) Date and time of concrete placement.
 - 7) Location in Work of concrete represented by samples.
 - 8) Date and time sample was obtained.
 - 9) Truck and batch ticket numbers.
 - 10) Design compressive strength at 28 days.
 - 11) Concrete mixture designation, proportions, and materials.
 - 12) Field test results.
 - 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
 - 14) Type of fracture and compressive break strengths at seven days and 28 days.
- C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.
- D. Inspections:
 1. Headed bolts and studs.
 2. Verification of use of required design mixture.
 3. Concrete placement, including conveying and depositing.
 4. Curing procedures and maintenance of curing temperature.
 5. Verification of concrete strength before removal of shores and forms from beams and slabs.
 6. Batch Plant Inspections: On a random basis, as determined by Architect.
- E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:
 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C143/C143M:

- a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - b. Perform additional tests when concrete consistency appears to change.
3. Slump Flow: ASTM C1611/C1611M:
- a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - b. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete;
- a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C1064/C1064M:
- a. One test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
6. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.
- a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C31/C31M:
- a. Cast and laboratory cure two sets of two 6-inch (150 mm) by 12-inch (300 mm) or 4-inch (100 mm) by 8-inch (200 mm) cylinder specimens for each composite sample.
 - b. Cast, initial cure, and field cure two sets of two standard cylinder specimens for each composite sample.
8. Compressive-Strength Tests: ASTM C39/C39M.
- a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.
 - b. Test one set of two field-cured specimens at seven days and one set of two specimens at 28 days.
 - c. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa) if specified compressive strength is 5000 psi (34.5 MPa), or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi (34.5 MPa).

11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 12. Additional Tests:
 - a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
 - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
 - 1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 (ACI 301M), section 1.6.6.3.
 13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 (ASTM E1155M) within 48 hours of completion of floor finishing and promptly report test results to Architect.

3.14 PROTECTION

- A. Protect concrete surfaces as follows:
1. Protect from petroleum stains.
 2. Diaper hydraulic equipment used over concrete surfaces.
 3. Prohibit vehicles from interior concrete slabs.
 4. Prohibit use of pipe-cutting machinery over concrete surfaces.
 5. Prohibit placement of steel items on concrete surfaces.
 6. Prohibit use of acids or acidic detergents over concrete surfaces.
 7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
 8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 033000

DPMC # TO564-02

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Structural steel.
 - 2. Prefabricated building trusses.
 - 3. Grout.

1.3 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 - 3. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pre-tensioned and slip-critical, high-strength bolted connections.
 - 4. Identify members and connections of the Seismic-Load-Resisting System.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:
 - 1. Power source (constant current or constant voltage).
 - 2. Electrode manufacturer and trade name, for demand critical welds.
- D. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Structural calculations and shop drawings for the building, in accordance with ICC Chapter 16, shall be submitted to the New Jersey State, Office of Construction Services, for review and approval, prior to the building's erection. They shall display the raised seal and signature of an Engineer licensed in the State of New Jersey.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, fabricator, shop-painting applicators, professional engineer, testing agency.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural steel, including chemical and physical properties.
- E. Product Test Reports: For the following:
 - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 2. Direct-tension indicators.
 - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 - 4. Shop primers.
 - 5. Nonshrink grout.
- F. Source quality-control reports.
- G. Field quality-control and special inspection reports.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that must follow all AISC Standards.
- B. Installer Qualifications: A qualified installer who must follow all AISC Standards.
- C. Shop-Painting Applicators: Must follow AISC's Sophisticated Paint or to SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- E. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 341 and AISC 341s1.
 - 3. AISC 360.
 - 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided Contractor's testing and inspecting agency observes repackaging and seals containers.
 - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 3125/F 3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering

analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC 360.
2. Use Load and Resistance Factor Design; data are given at factored-load level.

B. Moment Connections: Type PR, partially restrained.

C. Construction: Moment frame, Braced frame, Shear wall system.

2.2 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M , Grade 50.

B. Channels, Angles-Shapes: ASTM A 36/A 36M.

C. Plate and Bar: ASTM A 36/A 36M.

D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.

E. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: Grade A325 (Grade A325M), Type 1, heavy-hex steel structural bolts.

B. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.

1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
4. Finish: Plain.

C. Threaded Rods: ASTM A 36/A 36M.

1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
2. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened ASTM A 36/A 36M carbon steel.
3. Finish: Plain.

D. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

E. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

F. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.4 PRIMER

- A. Primer: Comply with Section 099111 "High Performance Coatings".
- B. Primer: SSPC-Paint 25, Type I, zinc oxide, alkyd, linseed oil primer.
- C. Primer: SSPC-Paint 25 BCS, Type I, zinc oxide, alkyd, linseed oil primer.
- D. Primer: SSPC-Paint 23, latex primer.
- E. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- F. Galvanizing Repair Paint: MPI#19.

2.5 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
 - 1. Fabricate beams with rolling camber up.
 - 2. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 - 3. Mark and match-mark materials for field assembly.
 - 4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning."
- F. Welded Door Frames: Build up welded door frames attached to structural-steel frame. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches (250 mm) o.c. unless otherwise indicated.

- G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.7 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.8 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
 - 2. Surfaces to be field welded.
 - 3. Surfaces of high-strength bolted, slip-critical connections.
 - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 - 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

- D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
 - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
 - 2. Galvanize lintels and welded door frames attached to structural-steel frame and located in exterior walls.

2.10 SOURCE QUALITY CONTROL

- A. Testing Agency: Contractor at their own expense will engage a qualified testing agency to perform shop tests and inspections.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1. Liquid Penetrant Inspection: ASTM E 165.
 - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3. Ultrasonic Inspection: ASTM E 164.
 - 4. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.
- E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 - 1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
 - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Baseplates Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor, at their own expense, will engage a qualified special inspector to perform the following special inspections:
1. Verify structural-steel materials and inspect steel frame joint details.
 2. Verify weld materials and inspect welds.
 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Contractor, at their own expense, will engage a qualified testing agency to perform tests and inspections.
- C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

- a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- E. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
- 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Painting: Cleaning and touchup painting are specified in Section 099111 "High Performance Coatings".

END OF SECTION 051200

DPMC #T0564-02

DIVISION 7

SECTION 071900 - WATER REPELLENT CONCRETE SEALER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. A clear, low VOC, deep penetrating water repellent sealer for concrete. Install on concrete walls and floor slabs of new salt storage building and material storage building.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, installation instructions, and tested physical and performance properties of waterproofing.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Safety Data Sheets (SDS) for all materials to be used.
- C. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that is approved or licensed by waterproofing manufacturer for installation of waterproofing required for this Project.
- A. Source Limitations: Obtain waterproofing materials from single source from single manufacturer.

Salt Storage Structure
NJDOT Freehold Maintenance Facility

WATER REPELLENT CONCRETE SEALER

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver liquid materials to Project site in original containers with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, shelf life, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer.
- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- D. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F above dew point.
 - 1. Do not apply waterproofing in snow, rain, fog or mist, or when such weather conditions are imminent during application and curing period.
- B. Maintain adequate ventilation during application and curing of waterproofing materials.

1.8 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which waterproofing manufacturer agree to repair or replace waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- B. Special Installer's Warranty: Specified form signed by Installer, covering Work of this Section, for warranty period of two years.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Single-Component, Fluid Applied impregnating Water repellent sealer: Comply with manufacturer's written physical requirements.
 - 1. Products: Subject to compliance with requirements, provide the following:

- a. Met-Con 3000 by Rhomar Industries Inc.
- b. Marflex Waterproofing Products
- c. Ghostshield 8500 by KreteTek, Industries, Inc.
- d. CreteDefender P2
- e. Or Approved Equal

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 - 1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
 - 2. Verify that substrate is visibly dry and free of moisture. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean and prepare substrate according to manufacturer's written recommendations. Provide clean, dust and contaminant free, substrate for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage or overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.

3.3 JOINT AND CRACK TREATMENT

- A. Prepare, treat, rout, and fill joints and cracks in substrate according to waterproofing manufacturer's written instructions. Remove dust and dirt from joints and cracks before coating surfaces.

3.4 WATERPROOFING APPLICATION

- A. Apply waterproofing according to manufacturer's written instructions.

- B. Unreinforced Waterproofing Applications: Mix materials and apply waterproofing by spray, roller, notched squeegee, trowel, or other application method suitable to slope of substrate.
 - 1. Apply two or more coats of waterproofing sealer.

3.5 CURING, PROTECTION, AND CLEANING

- A. Cure waterproofing according to manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.
- B. Remove any masking materials after installation. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 071900

DPMC #T0564-02

DIVISION 7

SECTION 074113 – METAL ROOF PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Exposed fastener metal roof panels

1.2 RELATED REQUIREMENTS

- A. Division 05 Section "Structural Steel Framing"
- B. Division 07 Section "Metal Wall Panels" for factory-formed metal wall panels.
- C. Division 07 Section "Joint Sealants" for field-applied joint sealants.

1.3 DEFINITIONS

- A. Metal Roof Panel System: Metal roof panels with exposed fastener attachment, supplemental framing members required for complete metal framing attachment system, and accessories necessary for a complete watertight installation.

1.4 REFERENCES

- A. American Architectural Manufacturer's Association (AAMA):
 - 1. AAMA 620 - Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Aluminum Substrates.
 - 2. AAMA 621 - Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
- B. American Iron and Steel Institute (AISI):
 - 1. Specification for the Design of Cold-Formed Steel Structural Members.
- C. American Society of Civil Engineers (ASCE):
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- D. ASTM International (ASTM):
 - 1. ASTM A 653/ A 653M - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

2. ASTM A 666 – Standard Specification for Annealed or Cold Worked Austenitic Stainless Steel Sheet, Strip, Plate and flat bar.
 3. ASTM A 755/A 755M - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
 4. ASTM A 792/A 792M – Specification for Steel Sheet, 55 percent Aluminum-Zinc Alloy Coated by the Hot Dip Process.
 5. ASTM B 209 - Specification for Aluminum and Aluminum Alloy Sheet and Plate.
 6. ASTM C 920 - Specification for Elastomeric Joint Sealants.
 7. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
 8. ASTM D 4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
 9. ASTM E 84 - Test Methods for Surface Burning Characteristics of Building Materials.
 10. ASTM E 119 - Test Methods for Fire Tests of Building Construction and Materials.
 11. ASTM E 283 - Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences across the Specimen.
 12. ASTM E 331 - Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 13. ASTM E 1980 - Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
- E. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):
1. Architectural Sheet Metal Manual.
- F. Underwriters Laboratories, Inc. (UL):
1. UL 580 – Tests for Uplift Resistance of Roof Assemblies.
 2. UL Fire Resistance Directory.
 3. UL Roofing Materials Directory.
 4. ISO 14025 Environmental labels and declarations – Type III environmental declaration – Principles and procedures.

1.5 PERFORMANCE REQUIREMENTS

- A. General: Provide metal roof panel system meeting performance requirements as determined by application of specified tests by a qualified testing agency on manufacturer's standard assemblies.
- B. Air Infiltration: Maximum 0.06 cfm/sq. ft. per ASTM E 283 at a static-air-pressure difference of 6.24 lb. /sq. ft. using minimum 10-by-10 foot test panel that includes side joints.
- C. Water Penetration, Static Pressure: No uncontrolled water penetration per ASTM E 331 at a minimum static differential pressure of 15 lb. /sq. ft. using minimum 10-by-10 foot test panel that includes side joints.

- D. Wind Uplift Resistance: UL 580 wind uplift rating UL 90 and uplift design pressures indicated on Drawings.
- E. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction.

1.6 QUALITY ASSURANCE

- A. Manufacturer/Source: Provide metal roof panels and panel accessories from a single manufacturer.
- B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum 5 years experience in manufacture of similar products in successful use in similar applications.
 - 1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Product data, including certified independent test data indicating compliance with requirements.
 - b. Samples of each component.
 - c. Sample submittal from similar project.
 - d. Project references: Minimum of 5 installations not less than 5 years old, with Owner and Architect contact information.
 - e. Sample warranty.
 - 2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.
 - 3. Approved manufacturers must meet separate requirements of Submittals Article.
- C. Installer Qualifications: Experienced Installer with minimum of 5 years experience with successfully completed projects of a similar nature and scope.
 - 1. Fire Resistance Ratings: Provide metal roof panel system tested as part of a roof assembly listed in UL Fire Resistance Directory.

1.7 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Prior to erection of metal roof panels , conduct preinstallation meeting at site attended by Owner, Architect, manufacturer's technical representative, inspection agency and related trade contractors.
 - 1. Coordinate building framing in relation to metal roof panels.
 - 2. Coordinate openings and penetrations of metal roof panels.
 - 3. Coordinate work of Division 07 Sections "Roof Specialties" and "Roof Accessories" and roof openings and penetrations and manufacturer's accessories with installation of metal roof panels.

1.8 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets, for specified products.
 - 1. Include data indicating compliance with performance requirements.
- B. Shop Drawings: Show layouts of metal roof panels. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot of edge conditions, joints, fastener and sealant placement, flashings, penetrations, and special details. Make distinctions between factory and field assembled work.
 - 1. Include data indicating compliance with performance requirements.
 - 2. Indicate points of supporting structure that must coordinate with metal roof panel system installation.
 - 3. Include data indicating compliance with requirements of local authorities having jurisdiction.
- C. Samples for Initial Selection: For each product specified including sealants and gaskets. Provide representative color charts of manufacturer's full range of colors.
- D. Samples for Verification: Provide 12-inch long section of metal roof panel showing finishes, vertical joint return, and anchoring details. Provide 12-inch long pieces of trim.

1.9 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Indicating compliance of products with requirements, from a qualified independent testing agency, when requested by Architect.
- B. Qualification Information: For Installer firm and Installer's field supervisor.
- C. Manufacturer's warranty: Submit sample warranty.

1.10 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Protect products of metal roof panels during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage. Protect panels and trim bundles during shipping with water resistant paper. Protect painted surfaces with a strippable protective covering before shipping.
 - 1. Deliver, unload, store, and erect metal roof panels and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.

2. Store in accordance with Manufacturer's written instruction. Provide wood collars for stacking and handling in the field.

1.12 WARRANTY

- A. Special Manufacturer's Warranty: On Manufacturer's standard form, in which Manufacturer agrees to repair or replace components of metal roof panel installation that fail in materials and workmanship within two years from date of Substantial Completion.
- B. Special Panel Finish Warranty: On Manufacturer's standard form, in which Manufacturer agrees to repair or replace metal roof panels that display evidence of deterioration of factory-applied finish within 20 years from date of Substantial Completion, including:
 1. Color fading in excess of 5 Hunter units per ASTM D 2244.
 2. Chalking in excess of No. 8 rating per ASTM D 4214.
 3. Failure of adhesion, peeling, checking, or cracking.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

Exposed Fastener, Metal Roof Panels: Structural metal roof panel consisting of roll formed metal sheets forming structural ribbed shapes, installed by overlapping edges of adjacent panels.

- A. Metal Roof Panels over uninsulated framed structural supports: Single-skin exposed fastener metal roof panels installed as an exterior roof over steel framing.

2.2 MANUFACTURERS

- A. Basis of Design: **CENTRIA, Profile Series Exposed Fastener Metal Roof Panels.** Provide basis of design product, or comparable product approved by Architect prior to bid.
 1. CENTRIA Architectural Systems; Moon Township, PA 15108-2944. Tel: (800)759-7474. Tel: (412)299-8000. Fax: (412)299-8317. Email: info@CENTRIA.com. Web: www.CENTRIA.com.
 2. Metal Span
 3. MBCI
 4. Or approved equal

2.3 PANEL MATERIALS

- A. Metallic-Coated Steel Face Sheet: Coil-coated, ASTM A 755/A 755M.
 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 structural steel quality.

2. Aluminum-zinc Alloy-coated (Galvalume) Steel Sheet: ASTM A 792/A 792 M, Class AZ50 Grade 50 structural steel quality.
3. Face Sheet: Minimum 0.020 inch/20 gage nominal uncoated thickness.
4. Surface: Non-Directional Embossed.

2.4 EXPOSED FASTENER METAL ROOF PANELS

- A. Metal Roof Panels, General: Factory-formed, Exposed fastener panels with interconnecting side joints, fastened to supports with exposed fasteners, with field-applied sealants in side laps as required to meet performance requirements.
- B. Ribbed profile
 1. Basis of Design Product: CENTRIA, BR5-36.
 2. Panel Coverage: 36 inches
 3. Panel Height: 1.50 inches
 4. Rib Spacing: 5 at 7.20 inches o.c.
- C. Exposed Coil-Coated Finish System:
 1. Fluoropolymer Two-Coat System: 0.2 mil primer with 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 620.
 - a. Basis of Design: CENTRIA Fluorofinish.
 2. Interior Finish System: Manufacturer's standard, Match exterior panel finish system
- D. Color:
 1. Panel Coverage: 24 inches
 2. Panel Height: 3 inches
 3. Stiffening Beads: Two.
- E. Exposed Coil-Coated Finish System:
 1. Fluoropolymer Two-Coat System: 0.2-mil primer with 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 621.
 - a. Basis of Design: CENTRIA Fluorofinish.
- F. Color:
 1. Interior Exposed Surface: As selected by Architect from manufacturer's standard colors
 2. Concealed Surface: Manufacturer's standard primer color.

2.5 METAL ROOF PANEL ACCESSORIES

- A. Provide complete metal roof panel assembly incorporating trim, copings, fasciae, soffits, downspouts, insulation spacers, closures, and miscellaneous flashings. Provide required fasteners, gaskets, closure strips, and sealants. Fabricate and install accessories in accordance with SMACNA Manual.
 - 1. Flashing and Trim: Match material, thickness, and finish of metal roof panels.
- B. Panel Fasteners: Self-tapping screws, bolts, nuts, and other acceptable fasteners recommended by roof panel manufacturer. Provide corrosion-resistant fasteners with heads matching color of metal panels by means of factory-applied coating.
 - 1. Exposed Screws: Manufacturer's recommended stainless steel screws with bonded neoprene and stainless steel washers, coated to match panel color.
 - 2. Concealed Screws: Manufacturer's recommended corrosion resistant carbon steel with corrosion resistant coating.
- C. Panel Sealants:
 - 1. Field Applied Unexposed Sealant: Side Laps, end laps, and flashing details: Gun grade, nonskinning, butyl elastomer or polymeric non-skinning butyl tape.
 - 2. Exposed Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; as recommended by metal roof panel manufacturer colored to match panel color.
- D. Closures:
 - 1. Metal: Matching metal roof panel material, thickness, and finish, precut to match panel profile.
 - 2. Foam: Precut to match panel profile.

2.6 SECONDARY METAL FRAMING

- A. Miscellaneous Framing Components, General: Cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G90
 - 1. Hat Channels: 0.0598 inch/16 ga. minimum – nominal thickness.
 - 2. Sill Channels: 0.0598 inch/16 ga. minimum – nominal thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine metal roof panel installation substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal roof panels.

- B. Roof Substrate: Confirm that wall substrate is within tolerances acceptable to metal roof panel system manufacturer.
 - 1. Maximum deviations acceptable:
 - a. 1/4 inch in 20 feet out of plane
 - b. 1/2 inch over entire roof
- C. Framing: Inspect framing that will support metal roof panel system to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable framing members at recommended spacing to match installation requirements of metal roof panels.
- D. Advise G.C., in writing, of out-of-tolerance work and other deficient conditions prior to proceeding with metal wall panel system installation.
- E. Correct out of tolerance work and other deficient conditions prior to proceeding with panel installation.

3.2 INSTALLATION

- A. General: Install metal roof panel system in accordance with approved shop drawings and manufacturer's recommendations. Install metal roof panels in orientation, sizes, and locations indicated. Install metal roof panels in one piece lengths from the ridge to eave unless otherwise indicated on approved shop drawings. Anchor panels and other components securely in place. Provide for thermal and structural movement.
- B. Attach panels to metal framing using recommended screws, fasteners, sealants, and adhesives indicated on approved shop drawings.
 - 1. Fasten metal roof panels to supports with exposed fasteners at location, spacing recommended by manufacturer, and with fasteners recommended by manufacturer. Anchor to supports with self-tapping fasteners approved by manufacturer.
 - 2. Provide weatherproof escutcheons for pipe and conduit penetrating roof.
 - 3. Dissimilar Materials: Where elements of metal roof panels installation will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.

3.3 ACCESSORY INSTALLATION

- A. General: Install metal roof panel accessories with positive anchorage to building and weather tight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install related flashings and sheet metal trim.
 - 2. Install components required for a complete metal roof panel assembly, including trim, copings, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 - 3. Comply with performance requirements, requirements of authorities having jurisdiction, and manufacturer's written installation instructions.

4. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.4 CLEANING AND PROTECTION

- A. Remove temporary protective films when directed by Architect. Remove metal filings and residue. Clean finished surfaces as recommended by metal roof panel manufacturer.
- B. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Architect.

END OF SECTION 074113

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DIVISION 7

SECTION 074213.13 – METAL WALL PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Exposed fastener metal wall panels, as part of the assembly described in Section 2.1.

1.2 RELATED REQUIREMENTS

- A. Division 07 Section "Joint Sealants" for field-applied joint sealants.

1.3 REFERENCES

- A. American Architectural Manufacturer's Association (AAMA):

- 1. AAMA 620 - Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Aluminum Substrates.
- 2. AAMA 621 - Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.

- B. American Society of Civil Engineers (ASCE):

- 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

- C. ASTM International (ASTM):

- 1. ASTM A 653/A 653M - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- 2. ASTM A 666 – Standard specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- 3. ASTM A 755/A 755M - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
- 4. ASTM A 792/A 792M – Standard specification for Steel Sheets, 55% Aluminum – Zinc Alloy. Coated by hot-dip process.
- 5. ASTM B 209 - Specification for Aluminum and Aluminum Alloy Sheet and Plate.
- 6. ASTM C 754 - Specification for Installation of Steel Framing Members to Receive Screw Attached Gypsum Panel Products.
- 7. ASTM C 920 - Specification for Elastomeric Joint Sealants.
- 8. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.

9. ASTM E 283 - Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences across the Specimen.
10. ASTM E 331 - Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

D. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):

1. Architectural Sheet Metal Manual.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide metal wall panel assemblies meeting performance requirements as determined by application of specified tests by a qualified testing agency on manufacturer's standard assemblies.
- B. Air Infiltration: When installed over Insulated Composite Backup Panels or Metal Liner Panels, maximum 0.06 cfm/sq. ft. per ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft. using minimum 10-by-10 foot test panel that includes side joints.
- C. Water Penetration, Static Pressure: When installed over Insulated Composite Backup Panels or Metal Liner Panels, no uncontrolled water penetration per ASTM E 331 at a minimum static differential pressure of 6.24 lbf/sq. ft. using minimum 10-by-10 foot test panel that includes side joints.
- D. Maximum allowable deflection limitation.
 1. Single Skin Panels Less than 1-inch in Depth: Limited to L/90 deflection of panel perimeter normal to plane of wall.
 2. Single Skin Panels greater than 1-inch in Depth: Limited to L/120 deflection of panel perimeter normal to plane of wall.
 3. All Exposed Fastener Series panels specified with Liner Panels: Limited to L/180 deflection of panel perimeter normal to plane of wall.
- E. Secondary Metal Framing: Design secondary metal framing for metal wall panel assembly according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."
- F. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction.

1.5 QUALITY ASSURANCE

- A. Manufacturer/Source: Provide metal wall panel and panel accessories from a single manufacturer.
- B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum 10 years experience in manufacture of similar products in successful use in similar applications.

1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Product data, including certified independent test data indicating compliance with requirements.
 - b. Samples of each component.
 - c. Project references: Minimum of 5 installations not less than 5 years old, with Owner and Architect contact information.
 - d. Sample warranty.
 2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.
 3. Approved manufacturers must meet separate requirements of Submittals Article.
- C. Wall Systems Installer Qualifications: Experienced Installer with minimum of 5 years experience with successfully completed projects of a similar nature and scope.

1.6 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct preinstallation meeting at site attended by Owner, Architect, manufacturer's representative, and other trade contractors.
1. Coordinate building framing in relation to metal wall panel assembly.
 2. Coordinate installation of building air and water barrier behind metal wall panel assembly.
 3. Coordinate window, door and louver, and other openings and penetrations of metal wall panel assembly.

1.7 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets, for specified products.
1. Include data indicating compliance with performance requirements.
- B. Shop Drawings: Provide shop drawings prepared by manufacturer or manufacturer's authorized Installer. Include full elevations showing openings and penetrations. Include details of each condition of installation and attachment. Provide details at a minimum scale 1-1/2-inch per foot (1:8) of all required trim and extrusions needed for a complete installation.
1. Indicate points of supporting structure that must coordinate with metal wall panel assembly installation.
- C. Samples for Initial Selection: For each product specified. Provide representative color charts of manufacturer's full range of colors.
- D. Samples for Verification: Provide 12-inch section of panel(s) showing finishes. Provide 12-inch long pieces of trim pieces and other exposed components.

1.8 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Indicating compliance of products with requirements, from a qualified independent testing agency.
- B. Qualification Information: For Installer firm.
- C. Manufacturer's warranty: Submit sample warranty.

1.9 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Protect metal wall panel products during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage.
 - 1. Deliver, unload, store, and erect metal wall panel products and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.

1.11 WARRANTY

- A. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials and workmanship within two years from date of Substantial Completion.
- B. Special Panel Finish Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal wall panels that display evidence of deterioration of finish within 20 years from the date of substantial completion.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Metal Wall Panels over Uninsulated Framed Wall System: Single-skin exposed fastener metal wall panels applied as exterior barrier cladding over wall framing specified in Division 5. Metal wall panel installation specified in this Section may include secondary metal subgirt framing for panel attachment.

2.2 MANUFACTURERS

- A. Basis of Design: CENTRIA, Exposed Fastener Series Metal Wall Panels. Provide basis of design product, or comparable product approved by Architect prior to bid.

1. CENTRIA Architectural Systems; Moon Township, PA 15108-2944. Tel: (800)759-7474. Tel: (412)299-8000. Fax: (412)299-8317. Email: info@CENTRIA.com. Web: www.CENTRIA.com.
2. Metal Span
3. MBCI
4. Or approved equal

2.3 METAL WALL PANEL MATERIALS

A. Metallic-Coated Steel Face Sheet: Coil-coated, ASTM A 755/A 755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Class Z275), structural steel.
2. Aluminum-zinc alloy-coated (Galvalume) Steel Sheet: ASTM A 792/A 792 M, Class AZ50 Grade 50 (Class AZM150, Grade 275), structural steel quality.
3. Face Sheet: Minimum 18 gage
4. Surface: Non-Directional Embossed.

2.4 EXPOSED FASTENER PROFILE METAL WALL PANELS

A. Metal Wall Panels, General: Factory-formed, Exposed fastener panels with interconnecting side joints, fastened to supports with exposed fasteners, with field-applied sealants in side laps when required to meet performance requirements.

B. Ribbed profile with lap joint

1. Basis of Design Product: CENTRIA, BR5-36.
2. Panel Coverage: 36 inches
3. Panel Height: 1.50 inches
4. Rib Spacing: 5 at 7.20 inches o.c.

A. Exposed Coil-Coated Finish System:

1. Fluoropolymer Two-Coat System: 0.2 mil primer with 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 620, 621.
 - a. Basis of Design: CENTRIA Fluorofinish.

2.5 METAL WALL PANEL ACCESSORIES

A. Metal Wall Panel Accessories, General: Provide complete metal wall panel assembly incorporating trim, copings, fasciae, parapet caps, soffits, sills, inside and outside corners, and miscellaneous flashings. Fabricate accessories in accordance with SMACNA Manual. Provide

manufacturer's factory-formed clips, shims, flashings, gaskets, lap strips, closure strips, and caps for a complete installation as required for the following:

1. Single-skin application over metal framing [and secondary framing] with liner panels.
 2. Single-skin application over insulated, sheathed frame wall with air and water resistant barrier.
 3. Single-skin application over furred masonry backup with air and water resistant barrier.
 4. Multi-component wall system, consisting of metal wall panel application over insulated core metal wall panel backup system.
- B. Extruded Trim: Manufacturer's complementary aluminum extrusions for head, jamb, sill, base, flush, reveal, inside and outside corner, end wall, and expansion joint details. Finish to match metal wall panels.
1. Basis of Design: CENTRIA, Microline Extrusions.
 2. Metal Span
 3. MBCI
 4. Or approved equal
- C. Mitered Corners: Structurally-bonded horizontal interior and exterior trimless corners matching metal wall panel material, profile, and factory-applied finish, fabricated and finished by metal wall panel manufacturer.
1. Welded, riveted, fastened, or field- fabricated corners do not meet the requirements of this specification.
 2. Basis of Design: CENTRIA, MicroSeam Corners.
 3. Metal Span
 4. MBCI
 5. Or approved equal
- D. Formed Flashing and Trim: Match material, thickness, and color of metal wall panel face sheets.
- E. Sealants: Type recommended by metal wall panel manufacturer for application, meeting requirements of Division 07 Section "Joint Sealants."
- F. Flashing Tape: 4-inch wide self-adhering butyl flashing tape.
- G. Fasteners: Self-tapping screws, bolts, nuts, and other acceptable fasteners recommended by panel manufacturer. All exposed fasteners must be stainless steel with heads matching color of metal wall panels by means of factory-applied coating.
1. Air Performance: Not exceeding 0.10-inch wg static pressure drop at 600-fpm free area velocity.
- H. Base Metal and Finish:
1. Match metal wall panel base metal and finish.

2.6 SECONDARY METAL FRAMING

- A. Miscellaneous Framing Components, General: Cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G90
 - 1. Hat Channels: 0.06 inch/16 ga. minimum – nominal thickness.
 - 2. Sill Channels: 0.06 inch/16 ga. minimum – nominal thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine metal wall panel substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal wall panels.
- B. Wall Substrate: Confirm that wall substrate is within tolerances acceptable to metal wall panel system manufacturer.
 - 1. Maximum deviations acceptable:
 - a. 1/4-inch in 20 feet vertically or horizontally from face plane of framing.
 - b. 1/2-inch across building elevation.
 - c. 1/8-inch in 5 feet
- C. Framing: Inspect framing that will support metal wall panels to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable framing members at recommended spacing to match installation requirements of metal wall panels.
- D. Openings: Verify that windows, doors, louvers and other penetrations match layout on shop drawings.
- E. Air/Moisture Barriers: Confirm that work has been completed, inspected, and tested as required.
- F. Advise G.C, in writing, of out-of-tolerance work and other deficient conditions prior to proceeding with metal wall panel system installation.
- G. Correct out of tolerance work and other deficient conditions prior to panel installation.

3.2 SECONDARY FRAMING INSTALLATION

- A. Secondary Metal Framing: Install secondary metal framing components to tolerances indicated, as shown on approved shop drawings. Install secondary metal framing and other metal panel supports per ASTM C 1007 and metal wall panel manufacturer's recommendations.

3.3 METAL WALL PANEL INSTALLATION

- A. General: Install metal wall panels in accordance with approved shop drawings and manufacturer's recommendations. Install metal wall panels in orientation, sizes, and locations indicated. Anchor metal wall panels and other components securely in place.
- B. Attach panels to metal framing using recommended screws, fasteners, sealants, and adhesives indicated on approved shop drawings.
 - 1. Fasteners for Steel Wall Panels: Stainless-steel for exterior locations and locations exposed to moisture; carbon steel for interior use only.
 - 2. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
 - 3. Dissimilar Materials: Where elements of metal wall panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.
- C. Joint Sealers: Install joint sealants where indicated on approved shop drawings.

3.4 ACCESSORY INSTALLATION

- A. General: Install metal wall panel accessories with positive anchorage to building. Coordinate installation with flashings and other components.
 - 1. Install related flashings and sheet metal trim per requirements of Division 07 Section "Sheet Metal Flashing and Trim."
 - 2. Install components required for a complete metal wall panel assembly, including trim, copings, corners, lap strips, flashings, sealants, fillers, closure strips, and similar items.
 - 3. Comply with performance requirements and manufacturer's written installation instructions.
 - 4. Set units true to line and level as indicated.

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a service representative authorized by metal wall panel manufacturer to inspect completed installation. Submit written report.
- B. Correct deficiencies noted in manufacturer's report.

3.6 CLEANING AND PROTECTION

- A. Remove temporary protective films. Clean finished surfaces as recommended by metal wall panel manufacturer. Clear weep holes and drainage channels of obstructions, dirt, and sealant. Maintain in a clean condition during construction.
- B. Replace damaged panels and accessories that cannot be repaired by finish touch-up or minor repair.

END OF SECTION 074213.13

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DIVISION 7

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Instructions to Bidders and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Latex joint sealants.

1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers eight samples of materials that will contact or affect joint sealants. Use manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

1.4 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples: For each kind and color of joint sealant required.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.
- D. Product test reports.
- E. Warranties.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five (5) years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Twenty (20) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- B. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

2.2 LATEX JOINT SEALANTS

- A. Latex Joint Sealant LS-1: Acrylic latex or Siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide manufacturer's name Tremco Inc; Tremflex 834 or comparable product by one of the following:
 - a. BASF Building Systems.
 - b. Bostik, Inc.

- c. Pecora Corporation.
- d. Or approved equal.

2.3 JOINT SEALANT BACKING

- A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.4 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove laitance and form-release agents from concrete.
 - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
- F. Acoustical Sealant Installation: Comply with ASTM C 919 and with manufacturer's written recommendations.
- G. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.3 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed and cured sealant joints as follows:

- a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
 - b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.
2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
- B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

END OF SECTION 079200

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DIVISION 8

SECTION 083350 – OVERHEAD ROLLER CURTAIN

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes, but is not limited to, the following:
 - 1. Overhead roller curtain and associated mechanical parts and controls for automatic operation.
 - 2. Electrical connections and mounting products.
- B. Related Requirements:
 - 1. Division 03 - Concrete.
 - 2. Division 05 – Structural Steel Framing.
 - 3. Division 07 - Joint Sealants.
 - 4. Division 09 – High Performance Coatings.
 - 5. Division 13- Frame Supported Membrane Structure.
 - 6. Division 26 - Electrical Sections.

1.3 SUBMITTALS

- A. Product Data General: Submit manufacturer's product literature, technical specifications, application instructions, product storage and handling requirements, and similar data for each product specified below as required to demonstrate compliance with specified requirements and provide complete application information.
 - 1. Product Data: Provide information for each type and size of overhead roller curtain and accessory.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: Provide for Main Body and Edge Trim Fabric for each color and texture specified.
- D. Maintenance data.
- E. Warranties: Sample of special warranties.
- F. Contract Closeout Submittals: Comply with the applicable sections noted in Division 1, including but limited to the following:
 - 1. Requirements of 017700 Closeout Procedures;
 - 2. Submission of maintenance instructions described in 017823 Operation and Maintenance Data;
 - 3. Record documents as described in 017839 Project Record Documents;

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of curtain specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Manufacturer's authorized representative with minimum of five years documented experience, who is trained and approved for both installation and maintenance of units required for this Project.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Standards: Fabricate product to comply with ANSI standards unless otherwise indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

1.6 PRODUCT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.7 WARRANTY

- A. Special Warranty: Provide warranty form in which manufacturer agrees to repair or replace all components of roller curtain system including motor; that fail in materials or workmanship within specified warranty period.
 - 1. Two (2) years from date of Substantial Completion.
- B. Special Finish Warranty: Provide warranty which manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes and delamination within specified warranty period.
 - 1. Warranty Period: Two (2) years from date of Substantial

PART 2 – PRODUCTS

2.1 MANUFACTURER

- A. As a basis of design, documents and specifications have been based on “Block ‘n’ Roll” system or approved equal.
 - 1. P.O. Box 204, Glen Ridge, NJ 07028. Contact: Julie Anne Milic, Director of Sales. 2. TEL: 973-736-1107; FAX: 973-766-1576
 - 2. Email: blocknroll2000@aol.com
 - 3. www.blocknroll.com
- B. Gateway Industrial
- C. Paylon Industrial
- D. Or approved equal

2.2 CURTAIN ASSEMBLY

- A. Manufacturer overhead roller curtain with the following products to create a final assembly and system as described.
- B. Roller Tube/Axel: Extruded aluminum/mill finish, outside diameter: 4”, wall thickness: .100”.

- C. Hood: 3/16" aluminum, with same thickness end plates welded to the main hood body.
 - 1. Provide Stainless Steel 3/8" and 5/8" Lag Bolts.
- D. Motor: "Superwinch" Single output 12 Volt DC power drive unit; 90:1 gear ratio; Torque 1125 in/lb; 1.1HP; 25-30 amps. Coordinate placement of motor (Left or Right) with installation requirements. Indicate placement of motor on shop drawing submittal.
- E. Electrical: 50 amp circuit breaker supplied mounted on quick disconnect cables; manual operating box. Mount remotely and coordinate location in the field with Owner and Architect.
- F. Trickle charge: 1.5 amp; fully automatic- turns on/off as needed; charges in 2 to 12 hrs.
 - 1. Provide a 12 Volt Automotive Battery with an Aluminum Battery Box.
- G. Fabric (Main Body):
 - 1. Open weave vinyl coated polyester/13 oz. per sq. yd., high tensile/tear strength, moisture resistant/quick drying, withstands temperatures well below 0°, shade factor/60%.
 - a. Provide NJ Specifications for Fabric (Main Body) – Solid 10 oz. vinyl with four (4) 2' x 3' window/vent openings to allow the product/building to breathe and prevent from billowing in winds.
 - 2. All seams are heat-welded.
 - 3. Axle attachment: 1/4" polypropylene rope, sewn into tarp, slides into groove in axle tube.
 - 4. Bottom: 12" to 15" is solid 18 oz. vinyl with pocket sewn for weight bar.
- H. Fabric (Edge Trim): All edges are double with 2" webbing and hemmed edge.
- I. Weight Bar: 1" solid galvanized tube epoxy coated to weight down the curtain. Provided by contractor if the product cannot be provided by the manufacturer.
- J. Weight Bars (Connecting Hardware): "Steel "S" Hold Down brackets.
- K. Webbing/Ratchets: 2 – 2" wide black polypropylene webbing with hooks; (appropriate lengths are provided to keep door from billowing in high wind areas); ratchet-self-locking manual operation to keep webbing taut. Provide hook anchors.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions (by Installer/Applicator): Examine conditions under which products of this section are to be installed in coordination with Installer of materials and components specified in this Section and notify the General Contractor in writing, with copies to the Owner's Representative and Architect, of any conditions detrimental to proper and timely installation. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
- B. When Installer confirms conditions are acceptable to ensure proper and timely installation of the proposed products and confirms requirements for applicable warranty or guarantee can be satisfied; submit to General Contractor written confirmation, with copies to the Owner's Representative and Architect, from applicable Installer. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to Installer.

3.2 INSTALLATION

- A. Install curtain system and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Tracks: Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and curtain system equipment.
- C. Adjust hardware and moving parts to function smoothly so that curtain system can operate easily, free of warp, twist, or distortion.
- D. Adjust curtain system to provide closed tight fit around entire perimeter.

3.3 DEMONSTRATION

- A. Engage an authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain curtain system.

3.4 CLEANING

- A. Clean curtain system, frame and housing. Remove debris from space and repair or replace all damaged items.
- B. Remove labels and visible markings.
- C. Comply with waste management and recycling program requirements.
- D. Dispose of all waste legally and in compliance with local jurisdiction requirements.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

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DIVISION 9

SECTION 099111 – HIGH PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes, but is not limited to the following:

1. High performance coatings.
2. Special preparation of surfaces.
3. Paint metal fabrications exposed to weather or imbedded in concrete or masonry.
4. Paint all surfaces specifically included to receive special coating system. Includes, but is not limited to:
 - a. Exterior Structural steel beams, brackets, columns, and other surfaces required to be coated on exterior of building and interior of building that is not part of a conditioned space.
 - b. Exterior metal fabrications not pre-finished. Includes steel bollards, exposed structural steel members, etc.
 - c. All exterior surfaces specifically included to receive painted finish (high-performance coating system).
 - d. Exposed exterior mechanical equipment and ductwork painting.
 - e. Exposed steel pipe guards and steel column corner guards in project areas.
5. Exclusions: In addition to material obviously not requiring special coating systems such as stainless steel, plastic laminate, glass, flooring, tile, etc. Do not finish:
 - a. Surfaces indicated by finish schedule to remain unfinished.
 - b. Factory finished surfaces indicated to be factory finished.
 - c. Aluminum with anodized or baked-on finish.
 - d. Electrical devices, fixtures, and trim except as noted herein.
 - e. Equipment such as mechanical, and electrical.
 - f. Concealed ducts and piping.

- B. Related Sections:

1. Division 03 - Cast-in-Place Concrete.
2. Division 05- Structural Steel Framing.
3. Mechanical and Electrical: Exterior equipment, supports and hangers for Mechanical and Electrical equipment.

1.3 REFERENCES

- A. Reference Standards comply with following:

1. ASTM D 16 - Standard Terminology for Paint, Coatings, Materials, and Applications; current edition.
2. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; current edition.
3. ASTM C 3359 - Standard Test Methods for Measuring Adhesion by Tape Test; current edition.
4. FS TT-C-535 - Coating, Epoxy, Two Component, for Interior Use on Metal, Wood, Wallboard,

- Painted Surfaces, Concrete and Masonry; Federal Specifications and Standards; current edition.
5. FS TT-C-542 - Coating, Polyurethane, Oil-Free, Moisture Curing; Federal Specifications and Standards; current edition.
 6. FS TT-C-555 - Coating, Textured (For Interior and Exterior Masonry Surfaces); Federal Specifications and Standards; Revision B, 1973; current edition.
 7. FS TT-E-496 - Enamel: Heat-Resisting (400 degrees F.), Black; Federal Specifications and Standards; current edition.
 8. FS TT-P-28 - Paint, Aluminum, Heat Resisting (1200 degrees F.); Federal Specifications and Standards; current edition.
 9. GSA CID A-A-3120 - Paint: for Swimming Pools; Federal Specifications and Standards; current edition.
 10. GSA CID A-A-3054 - Paint: Heat Resisting (204 deg C); Federal Specifications and Standards; current edition.
 11. SSPC (PM2) - Steel Structures Painting Manual, Vol. 2, Systems and Specifications; current edition.
 12. SSPC-SP 1 - Solvent Cleaning; 1982 (Part of Steel Structures Painting Manual, Vol. Two).
 13. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings; current edition.
 14. SSPC-SP 3 - Power Tool Cleaning; Society for Protective Coatings; current edition.
 15. SSPC-SP 5 - White Metal Blast Cleaning; Society for Protective Coatings; current edition.
 16. SSPC-SP 6 - Commercial Blast Cleaning; Society for Protective Coatings; current edition.
 17. SSPC-SP 7 - Brush-Off Blast Cleaning; Society for Protective Coatings; current edition.
 18. SSPC-SP 10 - Near-White Blast Cleaning; Society for Protective Coatings; current edition.
 19. SSPC-SP 11 - Power Tool Cleaning to Bare Metal; Society for Protective Coatings; current edition.
 20. SSPC-Paint 16 - Coal Tar Epoxy-Polyamide Black (or Dark Red) Paint; Society for Protective Coatings; current edition.
 21. SSPC-Paint 17 - Chlorinated Rubber Inhibitive Primer; Society for Protective Coatings; current edition.
 22. SSPC-Paint 18 - Chlorinated Rubber Intermediate Coat Paint; Society for Protective Coatings; current edition.
 23. SSPC-Paint 19 - Chlorinated Rubber Topcoat Paint; Society for Protective Coatings; current edition.

1.4 PERFORMANCEREQUIREMENTS

- A. Provide coating systems that meet the following minimum performance criteria, unless more stringent criteria are specified:
 1. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0, maximum, when tested in accordance with ASTM E 84.
 2. Lead Content: None

1.5 SYSTEM DESCRIPTION

- A. Design Requirements:
 1. Compatibility and Coordination: Provide coating materials, equipment, and accessories which are compatible with each other and with surfaces to be coated. Insure compatibility of finish coats with prime coats, prime coats with surfaces to be painted, and equipment with materials to be applied.
 2. Review other sections of Project Manual to insure compatibility of prime and finish coats with shop coats or other coatings specified elsewhere.
 3. Notify Prime Contractor and Architect in writing of any anticipated problems using coating systems specified.

1.6 SUBMITTALS

- A. Procedure: Comply with submittal requirements indicated below and as stipulated in 013300 Submittal Procedures.
- B. Product Data General: Submit manufacturer's product literature, technical specifications, application instructions, product storage and handling requirements, and similar data for each product specified below as required to demonstrate compliance with specified requirements and provide complete application information.
 - 1. Product Data: Provide information for each type of high performance coating.
- C. Samples: For each exposed product and for each color and texture specified. Provide swatch control samples for each color as required by Architect.
- D. Maintenance data.
- E. Warranties: Sample of special warranties.
- F. Sustainability/Environmental Submittals: Show evidence including, but not limited to the following.
 - 1. Indoor Environmental Quality - product is VOC compliant in the state and jurisdiction the project is located.
- G. Contract Closeout Submittals: Comply with the applicable sections noted in Division 1, including but limited to the following:
 - 1. Requirements of 017700 Closeout Procedures.
 - 2. Record documents as described in 017839 Project Record Documents;

1.7 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer Qualifications: Minimum ten (10) years of experience in manufacturing quality coatings for commercial applications.
 - 2. Applicator Qualifications: Minimum ten (10) years of experience in applying coating systems similar to those specified for commercial applications, and approved in writing by coating manufacturer. Provide a listing of minimum five (5) completed commercial applications of coating materials similar to specified materials in similar applications.
 - 3. Product Qualifications: All products are to be within the first month; the start of the product "pot life" restrictions of the manufacturer. All products that are not within the "pot life" restrictions will be replaced to meet the restrictions at no cost to the Owner.
- B. Pre-Installation Conference: At least 45 days prior to scheduled start of Painting -conduct Pre- Installation Conference as required by Architect; do not begin Painting prior to this conference.
 - 1. Attendance - Include representatives from at least following organizations:
 - a. General Construction Contractor and High Performance Coating Contractor
 - b. Coating Manufacturer's technical representative
 - c. Owner
 - d. Owner's Project Representative
 - e. Architect
 - 2. Schedule pre-installation conference to occur immediately before or after regularly scheduled Progress Meeting.
 - 3. Verify that all parties clearly understand where materials specified in this section and in Division 09, Painting, are to be used.
 - 4. Review other sections of these specifications in which paint primers are to be provided to ensure compatibility of total coatings system for various substrates. Contractor to provide schedule indicating product information or characteristics of such primer materials to ensure that compatible

- finish coats are used.
- 5. Review any known condition that will affect quality of work and which cannot be put into acceptable condition through preparatory work as included under Preparation.
- 6. Agenda - Include at least following items on conference agenda:
 - a. Review of all systems and materials to be used in Coatings installation.
 - b. Review and coordination of all substrate preparation and related construction.
 - c. Review and modification of Coating System Installer's proposed sequencing of installation.
- C. Regulatory Requirements:
 - 1. VOC Compliance: Provide coating products complying with local jurisdiction (New Jersey) requirements for Volatile Organic Compound (VOC) and Ozone Transport Commission (OTC) regulations.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping: Deliver coating materials in original containers with seals unbroken and labels intact with following information:
 - 1. Manufacturer's Name.
 - 2. Type of Coating Including Contents by Volume for Major Pigment and Vehicle.
 - 3. Brand Name, Lot Number, Brand Code (if any), and Color Designation.
 - 4. Coverage and Drying Time.
 - 5. Surface Preparation.
 - 6. Clean-Up Procedures.
 - 7. Mixing and Reducing Instructions.
- B. Storage and Protection: Store materials in single location. Coordinate storage location with Owner and Owner's representative on site. Inform Architect of agreed upon storage location at regularly scheduled job meeting. Keep storage place neat and clean and restore damage occurring during use. Remove soiled or used rags, waste, and trash from building every night, and take precautions to avoid danger of fire. Maintain minimum 45 Degrees F. to maximum 90 Degrees F. storage temperature, unless otherwise recommended by coating manufacturer.
 - 1. Do not allow coating materials to settle, cake, or thicken in container in manner that inhibits ready dispersion with paddle to smooth consistency.

1.9 PROJECT/SITE CONDITIONS

- A. Existing Conditions:
 - 1. Spaces: Clean before finishing is started. Do not finish spaces where rubbish has accumulated or while rubbish is being removed. Finishing not allowed in dusty spaces.
 - 2. Do not remove rubbish while finish is fresh.
 - 3. Surfaces: Dry and clean.
 - 4. Existing Primed Ferrous Metal Surfaces: Test as described in Part 3 Article, Examination.
- B. Environmental Requirements: Comply with manufacturer's recommendations.
 - 1. Do not install materials when temperature is below 55 degrees F (13 degrees C) or above 90 degrees F (32 degrees C).
 - a. Maintain this temperature range, 24 hours before, during, and 72 hours after installation of coating.
 - 2. Do not apply paint when damp or rainy weather exists, is predicted or anticipated, or when surfaces show evidence of condensation.
 - 3. Exterior painting not allowed while dust is blowing.
 - 4. Lighting: Provide minimum lighting level of 80 ft. candles measured mid-height at substrate surface.
 - 5. Restrict traffic from area where coating is being applied or is curing.

1.10 WARRANTY

- A. Division 01 - Closeout Submittals, for additional warranty requirements.
 - 1. Correct defective Work within a seven (7) year period after Date of Substantial Completion.
 - 2. Warranty: Provide a non-prorated material and labor warranty including coverage for bond to substrate for a (7) year period after Date of Substantial Completion or the date of final payment whichever is later.

1.11 SEQUENCING

- A. Coordinate scheduling of finish coatings application to succeed installation of structural steel, and purlins. Any finished material installed prior to painting shall be properly protected.
- B. Prime and finish coat surfaces of lintels that will be concealed after construction in accordance with specification requirements herein prior to erection.

1.12 MAINTENANCE/ATTIC STOCK PRODUCTS

- A. Provide 1 gallon of each color of each type of coating specified, for Owner's maintenance use.
- B. Label each container with manufacturer's name, product number, color number, and room names and numbers where used.
- C. Provide listing of coatings numbers, and lot numbers for each color selected for Owner's future use.
- D. All products are to be within the first month; the start of the product "pot life" restrictions of the manufacturer. All products that are not within the "pot life" restrictions will be replaced to meet the restrictions at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. As basis of Design, details and specifications have been based on Sherwin Williams (S-W) products listed in Coating Schedule by:
 - 1. Sherwin Williams (S-W) : www.sherwin-williams.com
 - a. Other manufacturer's include:
 - 1) Tnemec Company, Inc., North Kansas City, Missouri: www.tnemec.com.
 - 2) Carboline Company: www.carboline.com.
 - 3) PPG Architectural Finishes, Inc.: www.ppgaf.com.
 - 4) Or approved equal
- B. Single Source Requirement: Provide products for each specified function and coating system by a single manufacturer.

2.2 MATERIALS

- A. Coatings - General: Provide complete multi-coat systems formulated and recommended by manufacturer for the applications indicated, in the thicknesses indicated; number of coats specified does not include primer or filler coat.
 - 1. Lead content: Lead free as required by regulations.
 - 2. Chromium content, as zinc chromate or strontium chromate: None.
 - 3. Maximum volatile organic compound (VOC) content: As required by applicable regulations.

4. Colors: Selected by Architect from manufacturer's standard, and premium, and custom colors.
- B. High Performance Epoxy Coatings: Provide "best quality" grade of materials with identification on containers as such; have not badly settled, caked, or thickened in the container; can be readily dispersed with paddle to smooth consistency; and comply with following performance requirements:
1. Abrasion Resistance: (ASTM D 4060, CS-17 Wheel, 1,000 grams) - Not more than 145 mg. loss after 1,000 cycles.
 2. Chemical Resistance: (FS TT-C-550 C, Paragraph 4.4.6) - No evidence of discoloration, blistering, loss of adhesion or softening with listed solutions.
 3. Humidity: (FS TT-C-550 C, Para. 4.4.7) - No gloss change of more than 5 percent, no color difference greater than 3 MacAdam units, and no cracking, checking or other deterioration.
 4. Scrubbability: (Federal Test Method Std. - No. 141, Method 6142, 10000 cycles) - No coating removed; maximum 15 percent gloss change.
 5. Stain Resistance: (ASTM D 1308) - Unaffected by following stains after 16 hour spot test - blackberry jam, catsup, "Crisco" oil, lime juice, margarine, mustard, salad dressing, 5 percent sodium hydroxide, "Tide" solution, toothpaste, vinegar.
 6. Steam Resistance: (10 hrs steam at 250 Degrees F) - Color change no greater than (3) MacAdam units, no gloss change over 5 percent, no blistering, checking, cracking or other deterioration.
 7. Adhesion: (Cross Cut Tape Test Method 5B, ASTM D 3359) -100 percent retention.
 8. Solids by Volume: 44.0 +/- 2.0 percent (mixed) - Surface Burning Characteristics (ASTM E 84) - 25 or less flame spread; 100 or less smoke development.
- C. Epoxy Coating: Two coats, epoxy, gloss finish.
1. Comply with the performance requirements of FS TT-C-535, Type II.
 2. Product: As recommended by manufacturer for substrate.
 - a. Product: Pro Industrial High Performance Epoxy by S-W
 3. Primers: As recommended by manufacturer for substrate.
 - a. Primer for exterior ferrous metal: Corothane I Galva-Pac Zinc Primer by S-W
 - b. Primer for non-ferrous metal: Macropoxy 646 FC Epoxy by S-W
- D. Urethane Coating: Two coats, two-part, aliphatic high-build acrylic polyurethane moisture-curing polyurethane, semi-gloss finish.
1. Product characteristics:
 - a. Percentage of solids by volume: 58, minimum.
 - b. Dry film thickness, per coat: 2, minimum.
 - c. Comply with the performance requirements specified above for moderate exposure.
 - d. Comply with the performance requirements of FS TT-C-542, Type I.
 - e. Product: As recommended by manufacturer for substrate.
 - 1) Product: Acrolon 218 HS Polyurethane by S-W
 - f. Primers: As recommended by manufacturer for substrate.
 - 1) Primer for concrete: Kem Cati-Coat HS Epoxy Filler/Sealer by S-W
 - 2) Primer for ferrous metal: Corothane I Galva-Pac Zinc Primer by S-W
 - 3) Primer for non-ferrous metal: Macropoxy 646 FC Epoxy by S-W
- E. High-Build Urethane Coating: One coat, two-part, acrylic polyurethane, semi-gloss finish.
1. High-Build Urethane Coating: Two coats, two-part, acrylic polyurethane, gloss finish.
 2. Product characteristics:
 - a. Percentage of solids by volume: 68, minimum.
 - b. Dry film thickness, per coat: 3, minimum.
 - c. Comply with the performance requirements specified above for moderate exposure.
 - d. Comply with the performance requirements of FS TT-C-542, Type I.
 - e. Product: As recommended by manufacturer for substrate.
 - 1) Product: Acrolon 218 HS Polyurethane by S-W
 - f. Primers: As recommended by manufacturer for substrate.
 - 1) Primer for concrete: Kem Cati-Coat HS Epoxy Filler/Sealer by S-W

- 2) Primer for Ferrous metal: Macropoxy 646 FC Epoxy by S-W
 - 3) Primer for non-ferrous metal: Macropoxy 646 FC Epoxy by S-W.
- F. Phosphatizing Cleaner: Bio-degradable, water-reducible phosphoric acid and detergent blend: Clean n' Etch by Great Lakes Laboratories.
 - G. Primers (factory/shop) Macropoxy 646 FC Epoxy or Recoatable Epoxy Primer by S-W.
 - H. Primers: As recommended by coating manufacturer for specific substrate, unless otherwise specified.

2.3 MIXING

- A. Mix and thin materials according to manufacturer's latest printed instructions.
 - 1. Factory Premix Colors: Before delivering coating materials. Factory premix all colors as selected by Architect.
 - 2. Provide colors as selected by Architect from coating manufacturer's full range of colors for each product specified.
- B. Do not use materials beyond manufacturer's recommended shelf life, and do not use mixed materials beyond manufacturer's recommended pot life.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions (by Installer/Applicator): Examine conditions under which products of this section are to be installed in coordination with Installer of materials and components specified in this Section and notify the General Contractor in writing, with copies to the Owner's Representative and Architect, of any conditions detrimental to proper and timely installation. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
- B. Verification of Conditions by Applicator: Prior to beginning special coating application, carefully examine all surfaces to receive coatings for defects and other conditions that cannot be corrected by surface preparation procedures specified below or recommended by coating manufacturer and which would be detrimental to proper and timely completion of coating application. Verify that substrate surfaces are ready to receive work as instructed by the coating manufacturer. Obtain and follow manufacturer's instructions for examination and testing of substrates:
 - 1. Verify that shop-applied primers are compatible substrates.
 - 2. Cementitious Substrates: Do not begin application until substrate has cured 28 days minimum and measured moisture content is not greater than 16 percent.
 - 3. Wood: Do not begin application if substrate has moisture content over 12 percent.
 - 4. Defects and other conditions include, but are not limited to:
 - a. Incompatibility of existing coating materials with new coatings to be applied.
 - b. Deterioration of surfaces, including peeling of existing coating, moisture, scale, dirt, rust or similar conditions.
 - c. Insure compatibility of specified coating with existing finish by applying coating in unobtrusive location approved by Architect.
- C. When Installer confirms conditions are acceptable to ensure proper and timely installation of the proposed products and confirms requirements for applicable warranty or guarantee can be satisfied; submit to General Contractor written confirmation, with copies to the Owner's Representative and Architect, from applicable Installer. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to Installer.

1. Notify General Contractor in writing, with copies to the Owner's Representative and Architect, of any such defects and conditions, and do not proceed with coating applications until unsatisfactory conditions have been corrected in manner acceptable to coating Applicator. Start of coating application indicates Applicator's acceptance of surfaces and conditions within any particular area.

3.2 PREPARATION

A. Protection:

1. Protective Measures: Provide covers or other appropriate protection measures for adjacent surfaces during application of coatings.
2. Fixtures: Remove all hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be coated, or provide surface-applied protection prior to surface preparation and coating application. After completion of coating application, reinstall removed items using workmen skilled in trades involved.

B. Surface Preparation: Clean surfaces of loose foreign matter.

1. Comply with coating manufacturer's surface preparation and surface treatment recommendations.
2. Remove substances that would bleed through finished coatings. If un-removable, seal surface with shellac.
3. Remove and neutralize mildew on surfaces to be painted by scrubbing with a trisodium phosphate type cleaner combined with sodium hypochlorite. Rinse, and allow to dry before painting.
4. Dislodge dirt, rust, plaster, nibs, mortar spatter, and other dry material by scraping or brushing. Remove dust and loose material by brushing, sweeping, vacuuming or blowing with high pressure air. Remove oil, wax and grease by scraping off heavy deposits and cleaning with mineral spirits or hot tri-sodium phosphate solution followed by water rinse. Verify that surfaces to be coated are dry, clean, and free of dust, dirt, oil, wax, grease or other contaminants.
5. Concrete: Allow new concrete and masonry to cure at least 28 days. Scrape and grind fins and protrusions flush with surface. Patch holes and cracks flush with surface. Rake mortar joints clean.
6. Non-Ferrous Metal: SSPC-SP1 Solvent cleaning to remove all contaminants.
7. Ferrous Metal: Remove loose rust, mill scale and other foreign matter by hand (SSPC-SP2) or power tool (SSPC-SP3) cleaning and apply specified coating before rusting occurs.
8. Galvanized Metal/Galvanized Deck: Remove contaminants and protective mill coating by SSPC-SP1 Solvent Cleaning or steam cleaning.
9. Wood to be painted: Remove surface deposits of sap and pitch by scraping and cleaning with mineral spirits. Seal knots and pitch pockets with coating manufacturer's recommended products. Sand rough spots of smooth siding and finish woodwork. After prime coat is dry, fill cracks, holes and scratches with suitable wood filler or spackling compound and when dry, sand flush with surface. Sand lightly between coats.

3.3 PRIMING

A. Apply primer to scheduled surfaces, unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.

1. Wood: Prior to priming patch with filler to produce smooth, even surface.
2. Concrete: Prior to priming, patch with masonry filler to produce smooth surface.
3. Steel: Shop primed with S-W manufacturer's zinc rich primer.

3.4 COATING APPLICATION

A. Surfaces: If surfaces are not in proper condition for painting, repair, rebuild or refinish before proceeding with work. Be responsible for poor work caused by improper surfaces. Application of first coat does not relieve responsibility for base.

1. Do not apply any coats on either damp or wet surfaces.
2. Factory Primed Surfaces: Finish with materials compatible with primer.

- B. Mix paint to proper consistency. Apply coatings in accordance with manufacturer's instructions, to thicknesses specified. Brush out smooth, leaving minimum of brush marks.
 - 1. Apply in uniform thickness coats, without runs, drips, pinholes, brush marks, or variations in color, texture, or finish. Finish edges, crevices, corners, and other changes in dimension with full coating thickness.
 - 2. Allow each coat to dry thoroughly, and in conformance with manufacturer's written time recommendations, before starting application of successive coat.
 - 3. Sand work between coats on wood and metal.
- C. Application:
 - 1. Roller Applied: Where paint or enamel is rolled on, use fine nap roller so nearly flat or orange peel texture is obtained.
 - 2. Back prime all exposed to view wood trim members with one coat of primer. At cut ends of wood trim members provide one coat of primer, after sanding cut surfaces and prior to installation.
- D. Number of coats specified and mil-thickness are minimum values acceptable. No painted area shall be less than values given.
- E. Colors: Finish coat shall be color as selected by Architect. Tint pigmented undercoats to approximately same shade as finish coat, perceptibly increasing depth of shade in successive coats.
- F. Comply with manufacturer's recommended application instructions for coating materials and surfaces indicated. Secure color selections before applying coating. Tint primer and undercoater to different shade than finish coat, however ensure that primer or undercoater are compatible with finish coat.
- G. Apply materials at specified film thickness by method recommended by coating manufacturer. Apply sufficient quantity to insure complete coverage and hide. Provide and apply additional coats until coating film in uniform in finish, color, appearance, and coverage.
 - 1. Apply first coat to porous masonry surfaces, concrete, and dense masonry in manner to completely fill voids and surface irregularities.
 - 2. Allow each coat to dry thoroughly before recoating. Follow coating manufacturers recommended recoat time.
 - 3. Cut edges clean and sharp where coating adjoins other materials or colors.

3.5 ADJUSTING/CLEANING

- A. On a daily basis remove all discarded materials, rubbish, can, and rags.
- B. Touch up and restore finish where damaged. Upon completion of coating application, clean all surfaces spattered with coating materials in accordance with coating manufacturer's recommendations exercising care not to scratch or otherwise damage finished surfaces. Repair or replace all damaged items.
- C. Dispose of waste legally and in accordance with local jurisdiction requirements.
- D. Remove labels and visible markings.
- E. Comply with waste management and recycling program requirements.

3.6 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

3.8 SCHEDULES OF COATINGS

- A. Surface Not Receiving Coating - Unless otherwise specified, do not apply coatings to following surfaces:
1. Exterior veneer or Face Brick
 2. Pre-finished wall panels, partitions, and ceiling tile.
 3. New items with undamaged factory-applied final finish.
 4. Concealed ducts, pipes, and conduit.
- B. High Performance Epoxy Coating Systems – General Use
1. EXTERIOR APPLICATIONS & INTERIOR APPLICATIONS (NOT CONDITIONED):
 - a. Exposed Structural Steel and Exposed Miscellaneous Metal - Exterior Applications:
 - 1) 1st Coat
 - a) S-W Corothane I Galva-Pac Zinc Primer
 - 2) 2nd Coat
 - a) S-W Macropoxy 646 FC Epoxy
 - 3) 3rd Coat
 - a) S-W Acrolon 218 HS Polyurethane
 - b. Galvanized Steel - Exterior Applications:
 - 1) 1st Coat
 - a) S-W Macropoxy 646 FC Epoxy
 - 2) 2nd Coat
 - a) Acrolon 218 HS Polyurethane
 - c. Cast Iron material – Exterior Application:
 - 1) 1st Coat
 - a) S-W Macropoxy 646 FC Epoxy
 - 2) 2nd Coat
 - a) Acrolon 218 HS Polyurethane
 - d. Cast aluminum or stainless Steel lower drainage spouts - not primed (color to be matched as selected by Architect)
 - 1) 1st First Coat
 - a) S-W DTM Wash Primer
 - 2) 2nd Coat
 - a) S-W Acrolon 218 HS Polyurethane (2 coats over the DTM Wash Primer)
 - e. Interior Concrete Wall - 12" salt fill line in the salt holding areas (Safety Yellow color with Black Letters)
 - 1) 1st First Coat
 - a) S-W Kem Cati Coat HS Epoxy Filler/Sealer
 - 2) 2nd Coat
 - a) S-W Acrolon 218 HS Polyurethane (2 coats over the Kem Cati Coat)
 2. Metal Louvers: Paint as specified for zinc ferrous coated or factory primed metals -painted.

END OF SECTION

DPMC # T0564-02

DIVISION 13

SECTION 133121 – FRAME SUPPORTED MEMBRANE STRUCTURE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of Contract, including General and Supplementary Conditions and other Divisions-1 Specification Sections, apply to this Section.

1.2 SUMMARY

This Section specifies the furnishing and installation of a structural frame supported membrane fabric covered roof and wall structure of the type described herein and as shown on the project drawings. Including but not limited to, the following:

- A. Custom tensioned fabric structure
- B. Fabric
- C. Structural steel supporting members
- D. Fittings
- E. Accessories

1.3 REFERENCES AND STANDARDS

- A. The following publications are for the standards listed below but referred to thereafter by basic letter designation only. They form a part of this specification to the extent referenced thereto use latest editions.

1. American Institute of Steel Construction (AISC):

- a. M016 Manual of Steel Construction
- b. S326 Design, Fabrication and Erection of Structural Steel Buildings
- c. S329 Structural Joints Using ASTM A325 or A490

2. American Iron and Steel Institute (AISI):

- a. SG 503 Manual of Steel Construction, Ninth Edition

3. American Society for Testing and Materials (ASTM):

- a. A36 Structural Steel
- b. A123 Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
- c. A307 Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
- d. A325 High-Strength Bolts for Structural Steel Joints
- e. A500 Standard Specifications for Cold Formed Welded and Seamless Carbon

- Steel Structural Tubing in Rounds and Shapes
 - f. A563 Rev Carbon and Alloy Steel Nuts
 - g. A687 High-Strength Non-Headed Steel Bolts and Studs
 - h. E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2014
4. American Society of Civil Engineers (ASCE):
 - a. ASCE 7 Minimum Design Loads for Building and Other Structures
 5. American Welding Society (AWS):
 - a. D1.1 Structural Welding Code – Steel
 6. National Fire Protection Association (NFPA):
 - a. 701 Standard Methods of Fire Tests for Flame Resistant Textiles and Films

1.4 GENERAL REQUIREMENTS

A. Scope:

1. This specification covers the design, manufacture, shipping and handling and erection of a Relocatable, prefabricated tension membrane structure. Approximately 100' x 152'.
2. The structure membrane shall be tensioned over the framework. The structure shall be rectangular in shape. The side and gable walls of the structure shall be vertical. The interior of the structure below the main arch shall be clear and free of any structural members and shall provide unobstructed floor space. One end of the structure will be open, with the opposite end closed utilizing a 20 foot wide by 26 foot tall fabric roll up door.
3. The Frame Supported Membrane Structure shall be a delegated design: THE PRE-ENGINEERED BUILDING MANUFACTURER SHALL SUBMIT STRUCTURAL CALCULATIONS FOR THE BUILDING IN ACCORDANCE WITH ICC CHAPTER 16. CALCULATIONS SHALL BE SUBMITTED TO THE NEW JERSEY STATE, OFFICE OF CONSTRUCTION SERVICES, FOR REVIEW AND APPROVAL, PRIOR TO THE BUILDINGS ERECTION. THE CALCULATIONS SHALL DISPLAY THE RAISED SEAL AND SIGNATURE OF AN ENGINEER LICENSED IN THE STATE OF NEW JERSEY.
4. Building to be installed by awarded bidder on a 15'-0" high concrete wall foundation with a painted fill line at 14'-4".
5. The Frame Supported Structure foundation design is based on the configuration and truss spacing indicated on the drawings. The design ASD load combination reactions at each connection to the foundation wall are:
 - a. Max. gravity = 11.9 kips
 - b. Max. uplift = 15.9 kips

- c. Max. inward lateral = 8.8 kips
- d. Max. outward lateral = 8.2 kips

Any changes to the truss spacing and or design reactions proposed by the contractor that require redesign of the foundation will be the responsibility of the contractor. The contractor will be required to provide signed and sealed drawings and calculations by a structural engineer licensed in the State of NJ for any required foundation redesign. In the event any changes to the foundation design results in additional concrete and/or reinforcing, any and all costs will be the responsibility of the contractor.

- 6. Building prefabrication shall be performed under factory conditions in a plant specifically arranged for this type of work. Contractor shall provide adequate space, equipment, personnel and technical ability to coordinate the assembly and factory prefabrication of all major components of the work and all necessary operation in the packing, shipping and installation procedures. No fabrication shall be done unless the materials have been tested and approved.

1.5 SUBMITTALS

- A. Procedure: Comply with submittal requirements indicated below and as stipulated in 013300 SUBMITTAL PROCEDURES
- B. Product Data: Submit manufacturer's product data, including test reports on fabric showing compliance with specified properties.
- C. Samples: Submit 6 by 6 inch sample of fabric
- D. Shop Drawings: Submit construction drawings including plans, elevations, details, dimensions, support steel sizing, cables, and hardware, clamps/corner plates, fittings, fabric, and fabric layout seams. Include:
 - 1. Exact interface geometry determination and definitions.
 - 2. Coordination between fabric and structural supports
 - 3. Interfaces to foundation supports.
 - 4. Design loads used in structural calculations.
 - 5. Foundation reaction loads.
 - 6. Stamp or seal of design engineer.
 - 7. Construction drawings and structural calculations for the membrane building and for the anchorage of the building, in accordance with ICC Chapter 16, shall be submitted to the New Jersey State, office of Construction Services, for review and approval, prior to the building's erection. The calculations shall display the raised seal and signature of an engineer licensed in the state of New Jersey.
- E. Contract Closeout Submittals: Comply with the applicable sections noted in DIVISION 1, including but limited to the following:
 - 1. Requirements of 017700 CLOSEOUT PROCEDURES.
 - 2. Submission of maintenance instructions described in 017820 OPERATION AND MAINTENANCE DATA;
 - 3. Record documents as described in 017000 PROJECT RECORD DOCUMENTS;

4. Demonstration and training requirements indicated in 018200 DEMONSTRATION AND TRAINING.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firm that is capable of assuming complete responsibility for design, engineering, fabrication, delivery, preparation, installation, adjusting, and cleaning of structure, and:
 1. Having minimum of 5 years of experience in design and fabrication of tensioned fabric structures of similar size and complexity to that specified.
 2. Employing a professional staff and qualified consultants experienced with tensioned fabric structures of similar size and complexity to that specified.
 3. Providing installation directly supervised by a superintendent, directly employed by the contractor, with 5 years of experience in installation of tensioned fabric structures of similar size and complexity to that specified.
- B. Installer Qualifications: Manufacturer or authorized by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Store materials in accordance with manufacturer's instructions, in a clean, dry, well ventilated area, above ground on blocking, and do not allow materials to become wet, stained, or dirty.
- C. Handle materials so as to protect materials, coatings, and finishes during handling and in installation to prevent damage or staining.
 1. Handle fabric in accordance with manufacturer's instructions.
 2. Use care in handling of fabric to avoid damage to fabric material and coating.

1.8 WARRANTY

- A. Provide 5-year installer's maintenance contract per manufacturer's recommended maintenance not limited to maintenance schedule as outlined in section 3.
- B. Provide manufacturer's standard 20 year fabric warranty.
- C. Provide manufacture's standard 50 year truss warranty.
- D. Provide installer's written 2 year workmanship warranty with bond note.

1.9 GENERAL DESIGN REQUIREMENTS:

- A. The membrane shall be tensioned over the framework.
- B. The structure shall be rectangular in shape with 1 enclosed vertical gable end wall incorporating a 20' wide by 26' high fabric roll up door.
- C. Front wall to be left completely open.

- D. Rear end wall to be enclosed with steel framing and fabric and shall include a total of 4 ea 48"x48" louvered vents and framing.
- E. Fabric Termination shall be overlapping style.
- F. The interior of the structure below the main trusses shall be clear span free of any structural support members and shall provide unobstructed floor space.
- G. No exterior purlins, guy ropes or cables shall be used for anchoring the structures.
- H. Building to be engineered to 25 # psf ground snow load and 116 mph Ultimate Wind rating:

1.10 DESIGN REQUIREMENTS-STRUCTURAL FRAME

- A. Purlin Spacing: To provide for structural stability and to provide for installation of accessory items, the main structural trusses shall be laterally braced by tubular purlins at intervals required by the truss design.
- B. Wind and Frame Bracing: The structure shall be appropriately stabilized with wind bracing cable as well as any required secondary node restraint assemblies so as to efficiently transfer wind, snow and seismic induced stresses to the foundation/anchoring system. The end bays of the structure shall be designed to be X – braced early during installation to allow for permanent stability of the frames during installation.
- C. Connecting Joints: Connections between structural elements shall be designed so as to transfer the compressive and tensile forces present in a given joint. A minimum of Grade 5 bolts shall be used at each truss chord joint. Primary axial steel, secondary purlins and end wall frame connections shall be made with a minimum of Grade 5 hex bolts, carriage bolts and self-drilling screws.
- D. Mechanical Equipment Interface: The main structural roof trusses shall allow for installation of electrical and mechanical equipment based on collateral loads. Likewise, the structure shall accept penetrations through the membrane for access doors and mechanical services with minimal modification.
- E. Ancillary Systems: The structure shall be designed such that it can be readily retrofitted with insulation systems and other ancillary systems such as lighting, sprinklers, HVAC, provided collateral load factors are taken into account.
- F. Materials such as metal wall cladding can be added with minimal modification, if required.
- G. All hardware needed to assemble buildings to be supplied by vendor/contractor.

1.11 DESIGN REQUIREMENTS – MEMBRANE CLADDING SYSTEM:

- A. Membrane: The roof membrane shall form a weather tight shell over the structural frame. In order to provide for a good finished appearance and to insure weather tightness, the membrane shall be assembled and tensioned, in a manner to minimize wrinkles in hot and cold temperatures.
- B. The gable wall membrane cladding shall be manufactured and connected to form one piece to the adjacent end wall and roof cladding.

- C. Roof membrane horizontal stretch shall be maintained with horizontal purlins requiring no ongoing maintenance.
- D. Base Tensioning System: The membrane cladding will be provided with a mechanical tensioning system that allows the membrane to be fully tensioned around the structure perimeter. The system will be designed such that the membrane can be tightly and neatly secured over the structural frame and such that the system has remaining range of adjustment.
- E. Membrane Seal at Openings and Base: Manufacturer supplying the structure will provide all materials and methods necessary to fully tension and seal the membrane material around all doors, ventilation and other opening as well as around the structure perimeter below the main tensioning system. This seal shall provide a neat and finished appearance and eliminate any loose membrane cladding that would otherwise be damaged by flapping or abrasion. When a membrane base skirt is required, this shall be supplied and attached at the base perimeter to allow a reasonable seal against air and water intrusion.
- F. The membrane shall not be designed to function as a structural member such that, should any damage to or penetrations of the membrane occur, the integrity of the structural framework shall not be affected.
- G. The Contractor shall provide drawings and calculations acceptable to the architect/Engineer of the Record, meeting the provisions of the applicable State Building Code. The Contractor shall bear all costs for production of drawings and associated structural calculations.
- H. Contractor shall make all revisions and corrections to those documents required for approval and shall resubmit as required to obtain approvals.

1.12 ENGINEERED DESIGN CRITERIA:

- A. The structure shall be designed using methodology as per ASCE 7 standard referenced from the applicable building code. Primary and secondary framing shall comply with current issues of ISC, AISI, NEMA and ASTM specification, as applicable.
- B. Structural members shall be designed using Allowable Stress Design (ASD) or Load Resistance Factored Design (LRFD) for the design loads given below. Wind load factors and coefficients used in design of structural members must be in accordance with the applicable ASCE 7 guidelines.
- C. Snow Loads: The structure shall be designed based upon a minimum ground snow load of 25 pounds per square foot (Psf).
- D. Wind Loads: The structure shall be capable of withstanding an ultimate wind speed from any direction of 116 miles per hour. The design wind pressure shall be based on an exposure category of "B" and appropriate wind load factors and coefficients in accordance with the applicable referenced ASCE 7 guidelines. In no event shall the wind load used in the design of the main wind force resisting system be less than 10 pounds per square foot multiplied by the area of the building or structure projected on a vertical plane that is normal to the wind direction.
- E. Risk Category: II

- F. Importance Factor: 1.0
- G. Rainfall: The structure shall be capable of withstanding the effects of rainfall up to 5 inches per hour for at least 2 hours.
- H. Design Loads: The design shall be based as a minimum on the following design loads. Each member shall be designed to withstand stresses resulting from combinations of design loads that produce maximum percentage of actual to allowable stress in that member as per referenced ASCE 7 standard from applicable building code.
 - D = Dead Load + Collateral Load
 - S = Symmetrical Snow or Live Load (Balanced or Unbalanced)
 - Ws = Wind with internal suction
 - Wp = Wind with internal pressure
 - E = Earthquake

1.13 OPERATION AND USE:

- A. The main structure frame shall be designed to provide a minimum of 50-year operational use period with appropriate inspection and maintenance. Owner's manual to be provided.
- B. The structure shall be capable of being assembled, operated and dismantled in all ambient temperatures between -20 °F and 120 °F.
- C. The structure shall be capable of being erected on concrete and of accepting differential settlement of up to 1 ½% between truss positions.

PART 2 - PRODUCTS

2.0. MATERIALS

- 2.1 The basis of Design: ClearSpan Fabric Structures International, Inc., South Windsor, CT or equal by:
 - A. ClearSpan
 - B. Sprung Structures
 - C. Rubb Structures
 - D. Or Approved Equal

All materials used in the structure shall be new, without defects and free of repairs. The quality of the materials used shall be such that the structure is in conformance with the performance requirements specified herein.

- 2.2.1. Cladding Membrane (fabric): The structure shall be clad with a flame retardant, heavy weight polyolefin fabric manufactured by an approved and reputable supplier with demonstrated long-term performance. The polyolefin membrane fabric shall be waterproof and free from defects. All roofs, walls, end walls and connecting sections shall be weather tight.

The material shall be selected from the manufacturer's standard colors for the sidewalls and roof panels. The material scrim and coating must be UV stabilized and must carry a minimum 10-year manufacturer's warranty. The minimum fabric specification is as follows:

Total Fabric Weight	12.0 oz/yd ² (407 g/m ²) +/- 5%
Coating Thickness	4 mil average, each side
Finished Thickness	23 mils (ASTM D5199)
Grab Tensile Strength	355 lbs (ASTM D5034)
Strip Tensile Strength	270 lbs/in (ASTM D5035)
Tongue Tear Strength	115 lbs (ASTM D2261)
Trapezoidal Tear	95 lbs (ASTM D-4533)
Mullen Burst	675 psi (ASTM D3786)
Cold Crack Resistance	-60 °C (ASTM D2136)
UV Resistance & Weathering	>90% retention after 2000 hrs. ASTM G151
Flame Retardancy:	Passing NFPA 701
Flame Spread Index	25 or less, when tested in accordance with ASTM E84, Class A

2.2.2. Metal: The main structure shall consist of welded truss arches with parallel tube chords separated apart by webbing.

2.2.3 Frame to be Hot Dipped Post Fabrication (ASTM A123). Tension: 55 KSI & Yield: 50 KSI

2.2.4. Rafter spacing to be as shown on drawings.

2.3. HARDWARE:

2.3.1. Bolts: Bolts subject to extreme stress and wear shall be structural bolts of Grade 5 and plated/galvanized that has been upgraded with a corrosion resistant topcoat finish. All bolts shall be installed and securely torque so as the prevent change in tightness. Those subject to removal or adjustment shall not be swaged, peened, staked or otherwise installed.

2.3.2. Membrane Tensioning Hardware: The fabric membrane shall be tensioned with load rated hardware. Hardware shall allow full and free rotation at the foundation connection to avoid fatigue of threaded assemblies.

2.3.3. Membrane Tensioning Webbing: The membrane shall be tensioned with load-tested tie-downs.

2.3.4. Cable Assemblies: Main and wind bracing cable assemblies shall be manufactured to the required length and press swaged with metal sleeves. The cables are manufactured using performed galvanized cables, sized with appropriate safety factors.

3/16" dia. = 4,200 lbs.

1/4" dia. = 7,000 lbs.

5/16" dia.	=	9,800 lbs.
3/8" dia.	=	14,400 lbs.
1/2" dia.	=	22,800 lbs.

2.3.5. Other Fasteners: Non-structural fasteners such as wood screws, Tek screws, etc., shall be standard commercial quality.

2.3.6. Exterior Trim: The aluminum alloy used in the extrusion shall meet or exceed 6063-T5.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine area to receive structure. Notify Architect if area is not acceptable. Do not begin installation until unacceptable conditions have been corrected.
- B. Examine foundations and anchor bolts for location and elevation. Notify Architect of inaccuracies. Do not begin installation until unacceptable conditions have been corrected.

3.2 PREPARATION

- A. Prepare an erection plan for all structural and fabric installation activity, including a detailed sequence of the work.
- B. Prepare a clear, flat, smooth, and clean layout area on ground of sufficient size for assembly of fabric panels. Prepare area adjacent to location of structure installation.

3.3 INSTALLATION

- A. Conform to pre-established erection plan.
- B. Do not undertake erection of fabric during inclement weather conditions. The installer has sole responsibility to determine when conditions are safe for erection.
- C. Install structure in accordance with manufacturer's instructions at location indicated on the drawings.
- D. Support Steel:
 - 1. Erect support steel plumb, level, and square, to correct location and elevation.
 - 2. Do not perform field welding without approval of Architect. Use experienced welders.
- E. Install structure in the necessary sequence and with sufficient bracing to ensure stability at all times.
- F. Architect will inspect installed concrete foundations, support steel, cables, and fittings before installation of fabric only to ensure compliance with data submittals.
- G. Install and tension fabric in accordance with manufacturer's instructions.
 - 1. Use care in installation of fabric to avoid damage to base material, coating, and surface treatment.

2. Ensure surfaces of fabric are smooth, uniform, and clean, with even curved edges and interfaces, and with no cuts, scratches, abrasions, stains, marks, blemishes, or welding irregularities.
- H. Repair or replace defective or damaged materials, coatings, and finishes as directed by Architect.

3.4 ADJUSTING

- A. Make final adjustments to structure as required for structural integrity, geometric shape, and free from objectionable wrinkles when viewed from the normally occupied space.

3.5 CLEANING

- A. Clean structure in accordance with fabric manufacturer's instructions.

3.6 MAINTENANCE SCHEDULE

- A. Maintenance: To be performed once a year minimum
 1. Adjustments
 - a. The cover of your Structure may relax after installation. It is important to keep the cover tight to prevent wear and ensure a long life. Adjust the cover over the entire structure to remove as many wrinkles, creases and bagging as possible. Adjust the end winches until the fastening pipe is level.
 2. Routine Maintenance
 - a. Cover/Panels - Ensure the cover and curtain lashing straps are secure and the cover is tensioned. The cover should be drum tight and free of wrinkles.
 - b. Side Panel Lashing Winches - Ensure the straps/lacing are secure. The fabric should be drum tight and free of wrinkles.
 - c. End Panel Lashing Winches - Ensure the straps are secure and the end panels have adequate tension. The fabric should be drum tight and free of wrinkles.
 - d. Inspect fabric termination to ensure fabric is secured tightly. Inspect termination materials for signs of wear. Replace or adjust as necessary.
 - e. Inspect each cross cable for signs of wear and check turnbuckle tension. Replace or tighten if necessary.
 - f. Inspect and check that all base plate anchor bolts are secure and nuts are tight.
 - g. Check that all lashing winch bolts and nuts are tight. Tighten any other loose bolts or nuts.
 - h. Inspect all Structure ends' belting, ropes and cables for signs of wear and check for proper tension. Replace or adjust if necessary.
 - i. Inspect all side entrances'/curtains' belting, ropes and cables for signs of wear and check for proper tension. Replace or adjust if necessary.
 - j. Check for premature wear on fabric panels particularly where tension is applied and where there is contact with the frame.
 3. General
 - a. To maintain appearance, clean fabric as needed with water and nonabrasive soap. Do not use solvents or chemicals. Use of a pressure washer is not recommended.

END OF SECTION 013121

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DIVISION 26

SECTION 260010 - GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 26.

1.2 SUMMARY

- A. This Section includes general administrative and procedural requirements for Electrical system installations. It is intended to supplement Division 1 sections. Any conflicts shall be brought to the attention of the Architect/Engineer for clarification.
- B. Furnish and install all work indicated and specified in accordance with these specifications and accompanying contract drawings. This shall include all required labor, materials, equipment, programming, testing, and supervision.

1.3 DEFINITIONS

- A. The following definitions used in mechanical and electrical sections are in addition to those listed in Supplementary General Conditions:
 - 1. Provide: Shall mean "furnish and install" indicated work.
 - 2. Install: Installation of item and all necessary related work to provide fully operational devices.
 - 3. Furnish: Procurement and delivery to jobsite of equipment for installation.
 - 4. Remove: Disconnect and take from existing location, including accompanying sealant, supports, anchors, and associated materials, and remove from the site for legal disposal or recycling, or store and protect for reinstallation when noted.
 - 5. Replace: Remove and provide new.
 - 6. Re-install: Install existing item in same or new location as indicated. Provide all necessary hardware, supports, extension of existing services, etc as required.
 - 7. Herein: shall mean the contents of a particular section where this term appears.
 - 8. Indicated: Indicated on contract drawings.
 - 9. Exposed Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
 - 10. Exposed Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
 - 11. Listed or labeled shall mean as defined in NFPA 70 Article 100, by a Testing Agency acceptable to Authorities having jurisdiction (AHJ) and marked for intended use.
 - 12. Wiring: Conduit, fittings, wire, junction and outlet boxes, switches, and items necessary or relating to such wiring.
 - 13. Work: The labor, equipment, and materials required as part of the project.

14. Trades: refers to those specifically skilled in the work performed under a particular section of this contract.

1.4 DRAWINGS

- A. The Electrical work is generally indicated on the Electrical Drawings, but additional related information and details may appear on other project drawings, and these shall become a part of the Contract. All project drawings are intended to be complimentary.
- B. The Drawings are diagrammatic in nature and indicate the general configuration of the work. All work that will be required for the actual installation is not necessarily indicated due to the scale of the drawings. Coordinate the actual installation of all work with all other building system components, and provide all necessary coordination, offsets, accessories, materials, etc. as part of the work.
- C. Coordinate and assign work such that all work and materials are provided and coordinated between all subcontractors and suppliers to provide complete and operational systems. The specification format, section numbers and drawing numbering or nomenclature is not intended to assign work within the Contract.

1.5 DIMENSIONS, GRADES AND SURVEYS

- A. Dimensions, grades, elevations and locations shown on the Drawings are approximate. Verify all lines, grades and dimensions prior to starting the work. All necessary measurements, surveys, lines, grades, and elevations are the responsibility of the Contractor.

1.6 PERMITS, FEES AND CODES

- A. Perform all work in compliance with the codes, laws, ordinances, rules or regulations of federal, state, or local Authorities Having Jurisdiction over the premises. All such codes, laws, ordinances, rules and regulations are hereby incorporated and made a part of these specifications.
- B. All work performed on this project and all equipment furnished for this project shall be in conformance with the regulations and requirements of the Occupational Safety and Health Act (OSHA). The Contractor is solely responsible for compliance with OSHA regulations. All purchased equipment shall be designed, manufactured, and furnished with the necessary accessories to meet OSHA requirements. All construction facilities, including ladders, platforms, guard rails, safety features, etc. shall meet OSHA requirements.

1.7 MATERIALS AND EQUIPMENT

- A. All materials and equipment shall be new, and shall conform to the grade, quality and standards specified. All equipment shall be limited to products regularly produced for the intended service, in accordance with manufacturer's engineering data, rating, and literature. Major items of equipment shall be manufactured for the intended purpose in commercial practice and shall have the manufacturer's name, address and catalog number affixed in a prominent place.
- B. Equipment shall be installed in strict accordance with manufacturer's instructions for type and capacity of equipment used. Manufacturer's instructions shall be considered part of the

specifications. Type, capacity and application of equipment shall be suitable and shall operate satisfactorily for the purpose intended.

- C. Equipment used as the basis-of-design as indicated on the Drawings defines the general space requirements, weights and related services (electrical services, piping connections, etc.). Provide equipment of similar size, requirements and clearances which shall not necessitate revisions to the building construction or other trades. No revisions shall be made without Architect/Engineer's written approval.

1.8 PERFORMANCE OF EQUIPMENT

- A. All materials, equipment and systems specified or required for the completion of the work, shall be completely satisfactory and acceptable in operation, performance, and capacity. No approval, either written or verbal, of any drawings, descriptive data of samples of such material, equipment and/or appurtenances, shall relieve the Contractor of his responsibility to provide systems in complete working order at the completion of the work.
- B. All equipment and systems shall be electrically and mechanically correct. All equipment and systems shall operate without objectionable noise or vibration as determined by the Architect/Engineer. Eliminate any objectionable noise or vibration produced and transmitted to occupied portions of the building by any system or equipment, to the satisfaction of the Architect/Engineer and Owner.

1.9 CUTTING AND PATCHING

- A. All Cutting and Patching shall be completed in accordance with Division 1, Cutting and Patching section.

1.10 TESTS AND CERTIFICATIONS

- A. The following requirements are supplementary to test requirements specified in individual equipment or systems Sections.
 - 1. Written notice of test date shall be given to Architect/Engineer and other parties at least 72 hours prior to tests.
 - 2. Concealed work shall remain uncovered until required tests have been completed
 - 3. Conduct preliminary test of equipment as soon as conditions permit. Make changes, adjustments, or replacements based on test results prior to final acceptance tests.
 - 4. Conduct performance and operating tests for each system or equipment in presence of the Architect/Engineer. Coordinate testing with the manufacturer's representative and/or AHJ when required.
 - 5. Furnish labor, material, and instruments and include all other costs in connection with tests.
 - 6. Obtain certificates of approval and/or acceptance in compliance with regulations of AHJ. Work shall not be complete until such certificates have been delivered to the Architect/Engineer and Owner.
- B. Contractor shall certify after testing that all systems and equipment operate safely, efficiently, and in accordance with manufacturer's instructions and the intent of the drawings and specifications.

1.11 PROTECTION AND CLEANING

- A. Protect work and materials against dirt, water, or damage. All openings in stored or installed materials (conduit, etc.), shall be sealed to exclude dirt, sand, and other foreign substances. Any damaged materials shall be removed and replaced regardless of the cause of the damage.
- B. Clean all materials and equipment to remove all paint, oil, scale, rust, dirt, mud, dust, sand, and other foreign material prior to substantial completion inspection. Clean the interior of all cabinets, fixtures and equipment and remove dust, dirt and debris.

1.12 SUBSTITUTIONS

- A. Various products are used as the Basis-of-Design for systems and equipment and are specified by a manufacturer's name and model number. Unless otherwise indicated, other manufacturer's products may be submitted for consideration as a substitution in accordance with the requirements set forth in Instructions to Bidders and/or Division 1 sections, and as follows.
 - 1. The Architect/Engineer shall be the sole judge as to the acceptance of a product that is submitted for acceptance as a substitution
 - 2. The proposed substitute shall include all labor and materials required to install and operate the equipment in accordance with the original design concept, including the cost of any changes to work under this section, or other sections or Contracts, such as; access openings, equipment pads, supports, pipe or duct connections, motors, controls, electrical and control wiring.
 - 3. Contractor shall verify that substitute equipment will fit into the designated spaces, verify that dimensions provide adequate space for the equipment and allow clearances for connections and servicing, and verify acceptance of any additional costs from other Contractors resulting from the substitute product, prior to submission to the Architect/Engineer for acceptance.

1.13 SUBMITTALS AND SHOP DRAWINGS

- A. General: Follow the procedures specified in Division 1 "Submittals".
- B. Submit Shop Drawings and Submittals and obtain acceptance of the Architect/Engineer before any equipment is ordered or work is accomplished. Verify the required number of copies of each submittal to be submitted.
 - 1. Submittals shall be in the form of clearly legible manufacturers printed catalogs, drawings, pamphlets, technical data, test information, and installation instructions. Clearly indicate the location, service and function of each particular item. Identification shall be made in ink with specific model numbers highlighted and accessories highlighted.
 - 2. Submittals shall be completely referenced and identified. Descriptive information and data shall be complete. Submittals which only show partial or general information will not be acceptable and will be returned.
 - 3. Shop Drawings and Submittals which are prepared by sub-contractors and vendors shall be checked and coordinated by the Contractor prior to submission to the Architect/Engineer. Contractor shall check these drawings and submittals with respect to measurements, materials, identifications, and details so as to make certain that they

conform to the intent of the Contract Documents and make any corrections before submission to the Architect/Engineer.

4. Contractor shall inform the Engineer, in writing, of any deviations in the shop drawings and submittals where the submitted item deviates from the Contract Documents. This written advisory shall accompany the initial submittal and shall state the reasons for the deviations.

- C. Contractor shall be responsible for dimensions that are to be confirmed at the job site, for coordination in the ordering and assembly of systems and equipment, for information that pertains solely to fabrication processes or to techniques of construction, and for coordination of the work of all trades.

1.14 RECORD DRAWINGS

- A. General: Follow the procedures specified in Division 1 "Record Documents".
- B. In addition to the requirements specified in Division 1, indicate the following installed conditions:
 1. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
 2. Approved substitutions, Contract Modifications, and actual equipment and materials installed. Revise schedules on the drawings.
 3. Exterior underground equipment and materials located with triangulated dimensions.

1.15 OPERATION AND MAINTENANCE MANUALS

- A. Prepare and provide minimum of three (3) maintenance manuals in accordance with Division 1 "Operation and Maintenance Data".
- B. In addition to the requirements specified in Division 1, include the following information for equipment items:
 1. Written description of system operation.
 2. An equipment list for each piece of equipment furnished. The list shall be in order of equipment label and shall indicate the manufacturer, model number, serial number, and motor horsepower and voltage ratings.
 3. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and list of replacement parts.
 4. A copy of all final corrected equipment submittals, control diagrams, descriptive brochures, and a list of all parts of each piece of equipment.
 5. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
 6. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions, and lubrication charts and schedules.
 7. Copies of all permits required for occupancy.

- C. The purpose of this manual is to assist the Owner in routine operation, maintenance, servicing, trouble shooting and procurement of replacement parts. All information in the manual shall be as-built and only material pertinent to the project shall be included.

1.16 TRAINING AND INSTRUCTIONS

- A. General: Follow the procedures specified in Division 1 "Demonstration and Training".
- B. At the completion of the work, and before final acceptance of the building by the Owner, each Contractor, together with manufacturers' representatives, shall instruct the Owner's designated representatives in the care, adjustment, maintenance and operation of equipment and systems in accordance with Division 1.
- C. A manufacturer's representative of each major component or system shall inspect his work, make final adjustments, place them in a satisfactory working condition, and instruct the owner in their operation. Each representative shall also provide a letter to the Architect/Engineer indicating that an inspection has been performed, instruction given, and the equipment is installed and operating in conformance with the manufacturer's written installation instructions.

1.17 TEMPORARY ELECTRIC

- A. Provide temporary electric facilities in accordance with Division 1 and applicable Division 26 sections.
- B. Temporary power shall meet minimum OSHA requirements. All power outlets shall be ground fault protected. Contractor shall insure compliance with all OSHA regulations.
 - 1. Comply with applicable provisions of NEC regarding temporary electric materials and methods.
- C. Remove all temporary construction power wiring, poles, panels, hardware, accessories etc. when it is no longer required, and prior to substantial completion.

1.18 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

1.19 ELECTRICAL INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of systems, materials, and equipment. Comply with the following requirements:
 - 1. Arrange for chases, slots, and openings in other building components during progress of construction.
 - 2. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
 - 3. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.

4. Coordinate connection of systems with utilities and services. Comply with requirements of governing regulations, service companies, and controlling agencies. Provide required connection for each service.
5. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect/Engineer.
6. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
7. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
8. Install materials and equipment firmly supported and secured to the building construction where required, and according to manufacturer's instructions.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 260010

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DIVISION 26

SECTION 260519 - LOW-VOLTAGE POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.
 - 3. Sleeves for cables.

1.3 SUBMITTALS

- A. Submit product data for each type of product, indicating construction, materials and ratings.
- B. Submit qualification data for testing agency.
- C. Field quality-control test reports.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use. Comply with NFPA 70.
- B. Conductor sizes based on copper. Aluminum conductors will not be accepted unless specifically noted.

1.5 COORDINATION

- A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- B. Wire and cable routing, if shown on Drawings, is approximate unless dimensioned. Route wire and cable as required to meet project conditions. Field verify all dimensions.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver wires and cables according to NEMA WC26.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Copper Conductors: Insulated soft-drawn copper conductors with dual-rated type THHN//THWN-2 600v insulation, to comply with NEMA WC 70, unless otherwise noted. Conductors shall be rated for 90 degrees C. wet or dry.
- B. Copper Conductors: Insulated soft-drawn copper conductors with type XLPE RHW-2 or USE-2 with 600v insulation, to comply with NEMA WC 70, unless otherwise noted. Conductors shall be rated for 90 degrees C. wet or dry.

2.2 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SLEEVES

- A. Steel Pipe Sleeves: Schedule 40, galvanized steel, ASTM A 53/A 53M Type E, Grade B, plain ends.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine raceways and building finishes to receive wires and cables for compliance with requirements for installation tolerances and other conditions affecting performance of wires and cables. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Verify that all conduits or raceways are clean and dry prior to installation of conductors or cables. If conduits or raceways are not clean and/or dry, clean and dry conduits or raceways prior to installation of new conductors or cables.

3.2 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders and Branch Circuits: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.3 CONDUCTOR INSULATION AND CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type RHW-2, single conductors in raceway.
- B. Feeders or Branch Circuits; Type THHN/THWN-2, single conductors in raceway.
- C. Class 1 Control Circuits: Type THHN/THWN-2 in raceway.
- D. Class 2 Control Circuits: Type THHN/THWN-2 in raceway.

3.4 INSTALLATION OF CONDUCTORS

- A. Install conductors in conduit in all areas.

- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
- C. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems". Identify each conductor with its circuit number or other designation indicated on drawings, at each end and in all pull boxes.
- D. Neatly train and lace conductors inside boxes, equipment and panel boards.

3.5 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B. Make terminations so there is no bare conductor at the terminal.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.
- D. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than No. 10 AWG cabled in individual circuits. .

3.6 FIELD QUALITY CONTROL

- A. Perform conductor tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. After installing conductors and before electrical circuitry has been energized, test the conductors for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- C. Remove and replace malfunctioning conductors and retest as specified above.

END OF SECTION 260519

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DIVISION 26

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- 1. This Section includes methods and materials for grounding electrical systems and equipment.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 - 5. Bonding Conductor: No. 6 AWG, stranded conductor.
 - 6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
 - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTORS

- A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel, solid or sectional type; 3/4 inch diameter by 96 inches in length unless otherwise indicated on the drawings.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No.8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum unless indicated otherwise.
 - 1. Bury at least 24 inches below grade.
- C. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors
 - 3. Connections to Structural Steel: Clamped and bolted connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors within all feeder and branch circuit runs, in addition to those required by NFPA 70.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
 2. For grounding electrode system, install at least two rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 2. Use exothermic-welded connectors for outdoor locations or use a bolted clamp.
- D. Grounding for Steel Building Structure: Connect using clamps at column(s) indicated.
- E. Concrete-Encased Grounding Electrode: Fabricate according to NFPA 70, using a minimum of 20 feet of bare copper conductor not smaller than No. 4 AWG.
1. If concrete foundation is less than 20 feet long, coil excess conductor within base of foundation.
 2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building grounding grid or to grounding electrode external to concrete.

END OF SECTION 260526

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DIVISION 26

SECTION 260530 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 QUALITY ASSURANCE

- A. Comply with NFPA 70. Provide electrical components which are UL listed and labeled.
- B. Comply with NECA "Standard of Installation" pertaining to anchors, fasteners, hangers, supports and mounting equipment.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Metallic Coatings: Hot-dip galvanized after fabrication.
 - 2. Channel Dimensions: Selected for applicable load criteria.

- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used. Verify suitability of fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick.
 - 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 - 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 - 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 - 6. Hanger Rods: Threaded galvanized steel.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps, single-bolt conduit clamps or single-bolt conduit clamps using spring friction action for retention in support channel.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To New Concrete: Bolt to concrete inserts.
 - 2. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 3. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete.
 - 4. Items Mounted on Walls and Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet anchorage requirements.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

3.4 PAINTING

- A. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260530

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DIVISION 26

SECTION 260533 – RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.3 SUBMITTALS

- A. Product Data: For conduits and fittings, surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, cabinets, and other products.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Rigid Steel Conduit: ANSI C80.1, hot-dipped galvanized, tapered NPT threads, UL-6 listed.
- B. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit. Comply with NEMA RN 1, 0.040 inch minimum coating thickness.
- C. Liquidtight Flexible Metal Conduit: Flexible steel conduit with PVC jacket.
- D. Fittings for Conduit (Including all Types and Flexible and Liquidtight): NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
 - 1. Fittings for EMT: Steel or die-cast, set-screw or compression type.
- E. Joint Compound for Rigid Steel Conduit: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 NONMETALLIC CONDUIT AND TUBING

- A. Rigid Nonmetallic Conduit (RNC): NEMA TC 2,
 - 1. Type EPC-80-PVC, underground.
 - 2. Type EPC-40-PVC, aboveground.
- B. Liquidtight Flexible Nonmetallic Conduit (LFNC): Type NM spiral reinforced PVC, UL 1660.
- C. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.
- D. Fittings for LFNC: UL 514B.

2.3 BOXES, ENCLOSURES, AND CABINETS

- A. Non-metallic Outlet Boxes: Single or double gang, solid, Schedule 80 PVC hubs.
- B. Non-metallic Junction Boxes: UL –listed and NEMA Type 4/4x rated, solid, Schedule 80 PVC, gasketed and screwed lid.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, aluminum, Type FD, with gasketed cover.
- D. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum or galvanized, with gasketed cover.

2.4 PULLBOXES FOR EXTERIOR UNDERGROUND WIRING

- A. Polymer-Concrete Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel or fiberglass or a combination of the two. Comply with NJDOT Standards (T-3807) ASTM C857-87, Tier 15 structural load rating.
 - 1. Color of Frame and Cover: Gray.
 - 2. Configuration: Units shall be designed for flush burial and have open bottom.
 - 3. Cover: Weatherproof, secured by hexhead bolts and having structural load rating consistent with enclosure.
 - 4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 - 5. Cover Legend: Molded lettering, "ELECTRIC." as indicated for each service.
 - 6. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Armorcast Products Company.
 - b. Carson Industries LLC.
 - c. CDR Systems Corporation.
 - d. Or approved equal

2.5 SLEEVES FOR RACEWAYS

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
1. Exposed Conduit: Rigid steel conduit, or rigid non-metallic conduit Type EPC-80-PVC, as indicated on drawings.
 2. Underground Conduit:
 - a. Rigid Galvanized Steel, where indicated.
 - b. RNC, Type EPC-80-PVC, where indicated.
 3. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R or 4.
 4. Application of Handholes and Boxes for Underground Wiring:
 - a. Handholes and Pull Boxes in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Polymer concrete, SCTE 77, Tier 15 structural load rating.
- B. Minimum Raceway Size: 3/4-inch trade size.
- C. Raceway Fittings: Compatible with raceways and suitable for use and location.

3.2 RACEWAY INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation. Use temporary closures to prevent foreign matter from entering raceway.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab. Protect stub-ups from damage where conduits rise through floor slabs.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- G. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- H. Raceway Terminations at Locations Subject to Moisture: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- I. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.

- J. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet.
 - 1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
 - c. Attics: 125 deg F temperature change.
 - 2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg of temperature change.
 - 3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.

- K. Flexible Conduit Connections: Use maximum of 24 inches of flexible conduit for suspended light fixtures.
 - 1. Use LFNC in damp or wet locations not subject to severe physical damage.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

- 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches in nominal diameter.
- 2. Install backfill as specified in Division 31 Section "Earth Moving."
- 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction.
- 4. Install manufactured PVC-coated rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
 - b. For stub-ups at equipment mounted on outdoor concrete bases, extend PVC-coated steel conduit horizontally in trench a minimum of 36 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. In other areas, set covers of enclosures 1 inch above finished grade and taper same material as adjacent area to top of cover.
- D. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls. Coordinate locations with contractor installing slabs and walls.
- B. Cut sleeves to length for mounting flush with both surfaces of walls.
- C. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and conduit.

3.6 APPLICATIONS FOR BOXES, CABINETS AND ENCLOSURES

- A. Outlet Boxes and Fittings: Install outlet and device boxes and associated covers and fittings of materials and NEMA types suitable for each location and in conformance with the following requirements.
 - 1. Locations Exposed to Weather or Dampness: Cast metal, NEMA type 3 or 4R.
 - 2. Locations Exposed to Weather or Dampness: Molded PVC or glass fiber reinforced plastic, NEMA type 3R.
 - 3. Wet locations: NEMA type 4 enclosures.
- B. Pull and Junction Boxes: Install pull and junction boxes of materials and NEMA types suitable for each location except as otherwise indicated.

3.7 INSTALLATION OF OUTLET BOXES

- A. Gasketed boxes: At the following locations use PVC boxes with gasketed weatherproof covers.
 - 1. Exterior locations.
 - 2. Where exposed to moisture laden atmosphere.
- B. Cover Plates for Surface Boxes: Use plates sized to box front without overlap.
- C. Protect outlet boxes to prevent entrance of plaster, and debris. Thoroughly clean foreign material from boxes before conductors are installed.

END OF SECTION 260533

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DIVISION 26

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Identification for raceway and conductors.
 - 2. Underground-line warning tape.
 - 3. Warning labels.

1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Identification Schedule: A list of nomenclature for electrical equipment and system components identification signs and labels.

1.4 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes and standards. Use consistent designations throughout Project.

PART 2 - PRODUCTS

2.1 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.2 UNDERGROUND-LINE WARNING TAPE

- A. Description: Permanent, bright red colored, continuous-printed, polyethylene tape.
 - 1. Not less than 6 inches wide by 4 mils thick.
 - 2. Formulated to resist degradation in direct-burial service.

3. Embedded continuous solid metallic foil strip or core.
4. Printed legend shall indicate type of underground line.

2.3 WARNING LABELS

- A. Labels shall comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory printed polyester or vinyl, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment, unless otherwise indicated.
- C. Warning labels include, but are not limited to, the following:
 1. Arc Flash Warning: Adhesive-applied printed polyester or vinyl label, white background with colored imprint, 2" x 4" minimum size, to read: "WARNING – ARC FLASH & SHOCK HAZARD – APPROPRIATE PERSONAL PROTECTION EQUIPMENT REQUIRED".
 2. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES".

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Power-Circuit Conductor Identification: For conductors in vaults, pull and junction boxes, manholes, and handholes use color-coding conductor tape and wraparound marker labels. Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.
- B. Branch-Circuit Conductor Identification: Identify conductors for branch circuits in junction, pull boxes and panelboard gutters. Identify each ungrounded conductor according to source and circuit number using wraparound marker labels.
- C. Locations of Underground Lines: Identify with underground-line warning tape for power, wiring. Install underground-line warning tape for cables in raceway.
- D. Warning Labels for Electrical Equipment: Apply self-adhesive warning labels to comply with NFPA 70 and 29 CFR 1910.145. Apply labels to exterior of door, cover, or access panel in mechanical rooms, electrical rooms, or other similar unfinished spaces. Apply to inside of cover or door for panelboards or equipment located in finished spaces.
 1. Arc Flash Warning: provide labels on equipment including, but not limited to, the following:
 - a. Panelboards, transfer switches, meter socket enclosures, and other electrical equipment.
 2. Equipment with Multiple Power or Control Sources: including, but not limited to, the following:
 - a. Automatic or manual transfer switches.

3.2 INSTALLATION

- A. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- B. Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors, except match an existing color code when in an existing facility having a different color coding.
 - 1. Color shall be factory applied, or field applied for sizes larger than No. 10 AWG if authorities having jurisdiction permit.
 - 2. Colors for 240/120-V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Neutral: White.
 - 3. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- C. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 12 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

END OF SECTION 260553

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DIVISION 26

SECTION 262416 – PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Lighting and appliance branch-circuit panelboards.

1.3 SUBMITTALS

- A. Product Data: For each specified product, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types and details for types.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
- C. Operation and Maintenance Data

1.4 DEFINITIONS

- A. NRTL: Nationally recognized testing laboratory.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and shipping materials from inside equipment. Handle and prepare panelboards for installation according to manufacturer's instructions.

- B. Store in clean, dry environment. Maintain in factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect enclosure(s) from dirt, water, construction debris, and traffic.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Subject to the compliance with these specifications, the following manufacturers may offer specified or equivalent products:
 - 1. Panelboards and Accessories:
 - a. Square D Company (Basis of Design).
 - b. Eaton Corp.; Cutler-Hammer Products.
 - c. General Electric Co.; Electrical Distribution & Control Div.
 - d. Siemens Energy & Automation, Inc.
 - e. Or approved equal.
- B. Enclosures:
 - 1. Refer to panel schedules for recessed or surface-mounted cabinet type. Cabinets shall be rated for environmental conditions as scheduled or required by location.
 - a. Outdoor Locations: Type 3R
 - 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
 - 3. Finishes:
 - a. Panels and Trim: Steel factory finished immediately after cleaning and pre-treating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - b. Back Boxes: Galvanized steel for surface mounting outdoors. Same painted finish as panel front and trim.
 - 4. Directory Card: Inside panelboard door, mounted in metal frame with transparent protective cover.
 - 5. Provide four (4) extra keys for each style lock.
- C. Phase, Neutral, and Ground Buses:
 - 1. Material: Tin-plated aluminum.
 - 2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
- D. Conductor Connectors: Compression type suitable for use with copper or aluminum conductor material and sizes.
 - 1. Material: Tin-plated aluminum.
 - 2. Main and Neutral Lugs: Top or bottom as Installer's option.
 - 3. Ground Lugs: Compression type, suitable for use with copper or aluminum conductor material.

- E. Service Equipment Label: NRTL labeled for use where indicated as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.
- F. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- G. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include size and type of allowable upstream and branch devices, listed and labeled for series-connected short-circuit rating by an NRTL.

2.2 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- B. Mains: Circuit breaker or lugs only. Refer to panel schedules on drawings.
- C. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- D. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with series-connected rating to meet available fault currents. Provide type and trip ratings as scheduled.
 - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 - 3. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
 - 4. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
 - 5. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Lugs: with mechanical connectors for copper feeders and branch-circuit ground conductors, or compression connectors for aluminum feeders; style, suitable for number, size, trip ratings, and conductor materials.
 - c. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
 - d. Multipole units enclosed in a single housing or factory assembled to operate as a single unit.
 - e. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in 'on' or 'off' position.
 - f. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

- B. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.
 - 1. Fuses: Provide type and rating indicated."
 - 2. Fused Switch Features and Accessories: Standard ampere ratings and number of poles.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation
- B. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install panelboards and accessories according to manufacturer's instructions and NEMA PB 1.1.
- B. Mounting: Install panelboards using anchorage devices appropriate for the substrate. Mount top of trim a maximum of 90 inches above finished floor, unless otherwise indicated. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- C. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.
 - 2. The operating handle of top-most switch or circuit breaker, in on position, shall not exceed 79 inches above finished floor or grade.
 - 3. Install filler plates in unused spaces.
- D. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

3.3 IDENTIFICATION

- A. Identify field-installed conductors and components. Provide warning signs complying with Division 26 Section "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads after balancing panelboard loads.
 - 1. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Tests and Inspections:

1. Test continuity of each circuit.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification.
3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

B. Panelboards will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports, including a certified report that identifies panelboards tested and that describes deficiencies detected, remedial action taken and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable component to function smoothly.

B. Set field-adjustable circuit-breaker trip ranges as indicated.

3.6 PROTECTION

A. Protect installed equipment from damage, paint, moisture, dirt and dust during remainder of construction period.

3.7 CLEANING

A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 262416

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DIVISION 26

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Receptacles.
 - 2. Switches.
 - 3. Device cover plates.
 - 4. Pendant cord-connector devices and cord and plug sets.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 DEFINITIONS

- A. GFCI: Ground-fault circuit interrupter.
- B. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 WIRING DEVICES - GENERAL:

- A. Refer to electrical drawings for types and locations of wiring devices required.

2.2 STRAIGHT BLADE RECEPTACLES

- A. Duplex Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
 - 1. Basis-of-Design: Pass & Seymour 5362
 - 2. Cooper
 - 3. Hubbell
 - 4. Leviton
 - 5. Or approved equal

2.3 HEAVY DUTY RECEPTACLES

- A. Wiring Devices for Heavy-Duty (special use): Comply with NEMA FB 11 and UL 1010.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper Crouse-Hinds.
 - b. EGS/Appleton Electric.
 - c. Killark; a division of Hubbell Inc.
 - d. Or approved equal.

2.4 PENDANT CORD-CONNECTOR DEVICES

- A. Description: Matching, locking-type plug and receptacle body connector; NEMA WD 6 configurations L5-20P and L5-20R, heavy-duty grade.
 - 1. Body: Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.
 - 2. External Cable Grip: Woven wire-mesh type made of high-strength galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.5 SNAP SWITCHES

- A. Comply with NEMA WD 1 and UL 20.
- B. Switches, 120/277 V, 20 amp, specification grade commercial duty, back and side wired.
 - 1. Basis-of-Design: Pass & Seymour; CSB20AC1 (single pole), CSB20AC2 (two pole), CSB20AC3 (three way), CSB20AC4 (four way).
 - 2. Other manufacturers who may offer equal products include the following:
 - a. Cooper.
 - b. Hubbell.
 - c. Leviton.
 - d. Or approved equal.

2.6 WALL PLATES

- A. Wet-Location, Weatherproof “In-Use” Cover Plates: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum or thermoplastic with lockable cover.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Conductors:
 - 1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
- C. Device Installation:
 - 1. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
 - 2. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
 - 3. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
 - 4. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
 - 5. Tighten unused terminal screws on the device.
 - 6. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

3.2 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
 - 1. Test Instruments: Use instruments that comply with UL 1436.
 - 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.
- B. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 3. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 4. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

3.3 CLEANING

- A. Clean devices, device outlet boxes and enclosures. Replace stained or improperly painted wall plates on devices.

END OF SECTION 262726

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DIVISION 26

SECTION 265110 – LIGHTING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior lighting fixtures.
 - 2. LED light engines and drivers.
 - 3. Lighting fixture supports and accessories.

1.3 SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
 - 1. Physical description of lighting fixture including dimensions.
 - 2. Driver characteristics and energy-efficiency data.
 - 3. Life, output, and energy-efficiency data for LED engines.
 - 4. Photometric data, in IESNA format, based on laboratory tests of each lighting fixture type.
- B. Shop Drawings: Show details of nonstandard or custom lighting fixtures. Indicate dimensions, weights, methods of field assembly, components, features, and accessories.
- C. Maintenance Data: Submit maintenance data and parts list for each luminaire and accessory; including product data, and shop drawings in accordance with requirements of Division 1.

1.4 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by UL or other testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Severe Location Compliance: Lighting fixtures designated and scheduled as such shall be designed and constructed for outdoor corrosive environments, be listed and labeled for indicated location.

1.5 DELIVERY AND STORAGE

- A. Deliver luminaires in factory-fabricated containers or wrappings, which properly protect luminaires from damage. Handle luminaires carefully to prevent damage, breaking and scoring of finishes. Do not install damaged units or components; replace with new.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Design and specification is based on the manufacturers' products noted or scheduled on drawings. Subject to the compliance with these specifications and Architect/Engineer approval, the following manufacturers may provide equivalent products:
 - 1. Exterior fixtures:
 - a. Hubbell.
 - b. Phillips.
 - c. RAL.
 - d. HEW.
 - e. GE Lighting.
 - f. Columbia.
 - g. Or approved equal.

- B. The Architect/Engineer reserves the right to reject any submitted products which do not meet the same level of quality, photometric performance, energy efficiency, finish, aesthetic qualities, features, or other criteria as determined by the A/E to be not acceptable. The Architect/Engineer reserves the right to request samples of alternate manufacturers' products prior to completing review of fixture submittal. Samples shall be delivered to the designated location for review at no cost to the Owner or Architect/Engineer.

2.2 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

- A. General: Provide luminaires, of sizes, types and ratings indicated; complete with sealed optic housing, LED engines, drivers, trim, accessories and wiring.
- B. Fixtures: Comply with UL 1598, IP56.
- C. Housing: Construct luminaires with integrated heat dissipating cast housing, metal parts grounded as common unit, suitable for 55deg C ambient rating, -40 deg C operating temperature. Provide integral surge suppression, cord and plug connector, fixture mounting hook.
- D. LED Light Engine: Light engine shall utilize remote phosphor lens and mixing chamber to ensure perfectly mixed light, resulting in uniform colors and superior color consistency from fixture to fixture. Provide 2700K, 3000K, 3500K and 4100K color temperatures as scheduled or selected by Architect/Engineer. CRI shall be greater than 80. Cast aluminum heat sink integrated directly with housing provides thermal management. LEDs shall operate below manufacturer's published junction temperature to ensure attainment of rated life of the LEDs. Light engine shall mount directly to heat sink and be easily replaceable.

- E. LED Driver: Universal driver accommodates 120V to 277V input volts AC at 50/60Hz . Power factor shall be greater than 0.9. Unit shall be easily replaceable from above or below the ceiling. Rated life shall be a minimum of 50,000 hours at 70% lumen maintenance.

2.3 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Comply with Division 26 Section "Hangers and Supports for Electrical Systems" for channel- and angle-iron supports.
- B. Special 'hook' hanging system; refer to detail on Drawings.
- C. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Factory-finish shall match fixture or as selected.
- D. Rod Hangers: 3/16-inch minimum diameter, zinc or cadmium-plated, threaded steel rod, for use in unfinished areas.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Lighting fixtures: Set level, plumb, and square with structure and walls. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- B. Suspended Lighting Fixture Support:
 - 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
 - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with stem hanger.

3.2 CLEANING AND ADJUSTING

- A. Clean interior lighting luminaires of dirt and construction debris upon completion of installation, or at date of substantial completion, whichever is the nearest to final completion.

3.3 WARRANTY

- A. Special Warranty for LED Drivers and Light Engines: Manufacturer's standard form in which manufacturer agrees to repair or replace LED light engines and/or drivers that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for LED Drivers and Light Engines: Five years from date of Substantial Completion.

END OF SECTION 265110

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DIVISION 26

SECTION 265600 - EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior light fixtures.
 - 2. Poles, bases, and accessories.

1.3 RELATED SECTIONS:

- 1. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019 as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.

1.4 DEFINITIONS

- A. CRI: Color-rendering index.
- B. HID: High-intensity discharge.
- C. Luminaire: Complete lighting fixture, including ballast housing if provided.
- D. Pole: Luminaire support structure, including tower used for large area illumination.
- E. Standard: Same definition as "Pole" above.

1.5 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

- A. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4.
- B. Live Load: Single load of 500 lbf (2224 N), distributed as stated in AASHTO LTS-4.
- C. Ice Load: Load of 3 lbf/sq. ft. (143.6 Pa), applied as stated in AASHTO LTS-4.
- D. Wind Load: Pressure of wind on pole and luminaire, calculated and applied as stated in AASHTO LTS-4.

1.6 SUBMITTALS

- A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:
 - 1. Physical description of luminaire, including materials, dimensions, effective projected area, and verification of indicated parameters.
 - 2. Details of attaching luminaires and accessories.
 - 3. Details of installation and construction.
 - 4. Luminaire materials.
 - 5. Photometric data based on laboratory tests of each luminaire type, complete with indicated lamps, ballasts, and accessories.
 - a. For indicated luminaires, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
 - b. Photometric data shall be certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
 - 6. Photoelectric relays.
 - 7. Lamps, including life, output, and energy-efficiency data.
 - 8. Materials, dimensions, and finishes of poles.
 - 9. Means of attaching luminaires to supports, and indication that attachment is suitable for components involved.
 - 10. Anchor bolts for poles.
 - 11. Manufactured pole foundations.
- B. Shop Drawings:
 - 1. Anchor-bolt templates keyed to specific poles and certified by manufacturer.
 - 2. Wiring Diagrams: Power and control wiring.

- C. Pole and Support Component Certificates: Signed by manufacturers of poles, certifying that products are designed for indicated load requirements in AASHTO LTS-4 and that load imposed by luminaire has been included in design.
- D. Qualification Data: For agencies providing photometric data for lighting fixtures.
- E. Field quality-control test reports.
- F. Operation and Maintenance Data: For luminaires and poles to include in emergency, operation, and maintenance manuals.
- G. Warranty: Special warranty specified in this Section.

1.7 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with IEEE C2, "National Electrical Safety Code."
- E. Comply with NFPA 70.
- F. Comply with standards and codes as indicated by the luminaires and poles specified herein.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Package aluminum poles for shipping according to ASTM B 660.
- B. Store poles on decay-resistant-treated skids at least 12 inches (300 mm) above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.
- C. Retain factory-applied pole wrappings on metal poles until right before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.
1. Warranty Period for LED fixtures, arrays, drivers and integral control devices: Free from defect in material and workmanship for a period of **five** years from date of shipment. The LED arrays in the Product(s) will be considered defective in material or workmanship only if a total of 15% or more of the individual light emitting diodes in the Product(s) fail to illuminate. The painted finish of the Product(s) will be considered defective in material or workmanship only if there is substantial deterioration, in the form of blistering, cracking, or peeling. The painted finish is not warranted against fading or chalking, as Product(s) may naturally fade or chalk over time due to normal aging.
 2. Warranty Period for Poles: Free from defect in material and workmanship for a period of **one** year from date of shipment. The painted finish of the Product(s) will be considered defective in material or workmanship only if there is substantial deterioration, in the form of blistering, cracking, or peeling. The painted finish is not warranted against fading or chalking, as Product(s) may naturally fade or chalk over time due to normal aging.

1.10 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Lamps (including light engine, driver, and lenses): Furnish **One** of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Subject to compliance with requirements and specifications, provide:
1. Eaton Cooper Galleon LED;
 2. Halophane Mongoose LED;
 3. Phillips Lumec Roadstar LED;
 4. Or approved equal.

2.2 REQUIREMENTS FOR INDIVIDUAL EXTERIOR LIGHTING DEVICES

A. Exterior Lighting Device Types:

1. Lamps/ Light Engine: Composed of 4 main components: LED lamp / Optical System / Heat Sink / Driver Electrical components are RoHS compliant, maximum ambient operating temperature up to 40C(104F) degrees.

Lamp: (Included), Composed of high performance white LEDs. Operating lifespan, 60,000 hours after which the system emits 90% of its original lumen output, all of those parameters are tested for 100% of light engines.

2. Pole Description: Standard NJDOT light pole and base.

PART 3 - EXECUTION

3.1 LUMINAIRE INSTALLATION

A. Install lamps in each luminaire.

B. Fasten luminaire to indicated structural supports.

1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources.

3.2 POLE INSTALLATION

A. Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.

B. Concrete Pole Foundations: Set anchor bolts according to anchor-bolt templates furnished by pole manufacturer. Provide NJDOT Class B pre-cast concrete bases, in accordance with the specifications.

C. Foundation-Mounted Poles: Mount pole with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.

1. Use anchor bolts and nuts selected to resist seismic forces defined for the application and approved by manufacturer.
2. Install base covers, unless otherwise indicated.
3. Use a short piece of 1/2-inch- (13-mm-) diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.

- D. Raise and set poles using web fabric slings (not chain or cable).

3.3 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

3.4 GROUNDING

- A. Ground metal poles and support structures as follows:
 - 1. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

3.5 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Illumination Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.
 - 1. Verify operation of photoelectric controls.
- C. Illumination Tests:
 - 1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IESNA testing guide(s):
 - a. IESNA LM-50, "Photometric Measurements of Roadway Lighting Installations."
 - b. IESNA LM-64, "Photometric Measurements of Parking Areas."
- D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain luminaires and control devices.

END OF SECTION 265600

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DIVISION 31

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Protecting existing vegetated areas to remain.
2. Removing above- and below-grade site improvements.
3. Disconnecting, capping or sealing, and abandoning site utilities in place.
4. Temporary erosion and sedimentation control measures.

1.2 RELATED SECTIONS:

A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019 as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.

1.3 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

- A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.
- B. Record drawings, according to Division 01 Section "Project Record Documents," identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

- A. Preconstruction Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- D. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earth Moving".

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to the "Standards for Soil Erosion and Sediment Control in New Jersey", latest edition, and in accordance with the NJDOT standards.
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE PROTECTION

- A. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.
 - 1. Do not store construction materials, debris, or excavated material within fenced area.
 - 2. Do not permit vehicles, equipment, or foot traffic within fenced area.
 - 3. Maintain fenced area free of weeds and trash.
- B. Do not excavate within tree protection zones, unless otherwise indicated.
- C. Where excavation is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
 - 1. Cover exposed roots with burlap and water regularly.
 - 2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - 3. Coat cut faces of roots more than 1-1/2 inches (38 mm) in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
 - 4. Backfill with soil as soon as possible.

- D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.
 - 1. Employ an arborist or Certified Tree Expert, licensed in New Jersey, to submit details of proposed repairs and to repair damage to trees and shrubs.
 - 2. Replace trees that cannot be repaired and restored to full-growth status, as determined by Architect.

3.4 UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
 - 1. Arrange with utility companies to shut off indicated utilities.
- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
- C. Excavate for and remove underground utilities indicated to be removed in accordance with utility owner requirements.

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit demolition and construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 - 3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches (450 mm) below exposed subgrade.
 - 4. Use only hand methods for grubbing within tree protection zone.
 - 5. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.

- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
 - 2. Do not stockpile topsoil within tree protection zones.
 - 3. Dispose of excess topsoil as specified for waste material disposal.
 - 4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated in the contract documents.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
 - 2. If applicable, paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

3.8 DISPOSAL

- A. Disposal: Remove any surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
 - 1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.
 - 2. Any demolished concrete will need to be characterized before being sent to a Class B recycling facility.
 - a. Contractor shall be responsible for all required sampling, testing, and reporting.
 - b. All related documentation shall be provided to and approved by the LSRP and NJDOT DER/ESSU prior to offsite recycling.

END OF SECTION 311000

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DIVISION 31

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Preparing subgrades for pavements and pads.
2. Excavating and backfilling for buildings and structures.
3. Subbase course for asphalt paving.
4. Excavating and backfilling for utility trenches.

1.2 RELATED DOCUMENTS

- A. The Standard Specifications of the New Jersey Department of Transportation for Road and Bridge Construction, dated 2019 as amended and augmented by the Supplementary Specifications (NJDOT Specifications) shall govern the material and construction requirements for poles, bases and accessories. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.

1.3 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 PROJECT CONDITIONS

- A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.
- B. Do not commence earth moving operations until Soil Erosion & Sediment Control Measures specified on the Drawings are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
 1. All imported soil and fill materials shall meet certified clean fill requirements.
 2. All related clean fill documentation to be provided to and approved by the LSRP and NJDOT DER/ESSU prior to bringing material onsite.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487 or Groups A-1, A-2-4, A-2-5, and A-3 according to AASHTO M 145, or a combination of these groups; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Subbase Course: Virgin Dense Graded Aggregate per 2007 NJDOT Specifications.

Sieve Size	Percent Passing
1-1/2"	100%
3/4"	55 – 90%
No. 4	25 – 50%
No. 50	5 – 20%
No. 200	3 – 10%

D. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

E. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve or as indicated on the plans.

F. Top Soil: 5" depth, see Turf & Grasses Specification Section.

G. Drainage Course: Narrowly graded mixture of clean crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

H. Geotextile: geotextile fabric, 12 foot minimum width, including the following properties:

1. Mechanical	Rating
a. Grab tensile strength, ASTM D4632	156 N
b. Grab elongation, ASTM D4632	60%
c. Trapezoidal tear strength, ASTM D4533	70 N
d. Puncture Strength, ASTM D4833	45 N
2. Hydraulic (MARV) ¹	Rating
a. Apparent opening size, ASTM D4751	.840 mm
b. Permittivity, ASTM D4491	1.5 sec ⁻¹
c. Water flow rate, ASTM D4491	9635 l/min/m ⁻¹

Geotextile shall be as described or approved equal. Provide submittal for review and approval to Owner's Representative.

I. Sand Base:

1. Base Sand: Base Sand shall be composed of no less than 99.7% mineral aggregates by dry weight (as measured by organic burn test) meeting the following particle analysis gradation:

SIEVE	% PASSING
1/4	100%
#4	90-100%
#10	80-90%
#20	60-80%
#30	40-60%
#60	<10%

#100	<5%
#200	<2%

Base Sand compacted to 95% of maximum dry density as measured by the Modified Proctor test (ASTM D1557) shall exhibit an infiltration rate of a minimum of 9 inches per hour.

Sand shall be as described or approved equal. Submit a certified report of an approved agricultural chemist for sand to be furnished.

2.2 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored to comply with local practice or requirements of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

- A. The NJDOT Freehold Maintenance facility is an active NJDEP remediation site. Coordinate with the NJDOT Division of Environmental Resources/ Environmental Support & Services Unit (DER/ESSU) prior to initiating any ground disturbances.
 - 1. The Contractor shall thoroughly review existing soil and groundwater data to properly prepare the MHP/HASP and to be aware of potential off-site disposal costs and groundwater discharge permit requirements.
- B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- C. Protect and maintain erosion and sedimentation controls during earth moving operations.
- D. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 2. Groundwater beneath the proposed structures contains CVOCS which will likely be need to be treated or disposed of as a hazardous waste if construction dewatering is needed during construction. No changes in the Contract Sum or the Contract Time will be authorized for dewatering or disposal of pumped groundwater.

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
 1. Clearance: 9 inches (minimum) each side of pipe or conduit or as indicated.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 1. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material, 4 inches (100 mm) deeper elsewhere, to allow for bedding course.
- D. Trenches in Tree- and Plant-Protection Zones:
 1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
3. Cut and protect roots according to NJDOT requirements.

3.6 SUBGRADE INSPECTION

- A. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Engineer.
 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Engineer.

3.8 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings.
- D. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch (25 mm) in any dimension, to a height of 12 inches (300 mm) over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- E. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- F. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.10 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 3 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
1. Under grass and planted areas, use satisfactory soil material.
 2. Under walks and pavements, use satisfactory soil material.
 3. Under steps and ramps, use engineered fill.
 4. Under building slabs, use engineered fill.
 5. Under footings and foundations, use engineered fill.

3.11 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 6 inches (200 mm) in loose depth for material compacted by low compaction wide track dozers , and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698 or ASTM D 1557:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 92 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent.

3.13 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
- B. Site Rough Grading: Grade site per plans and detail information. Grades shall be established using laser level. . Finish subgrades to required elevations within the following tolerances:
 1. Turf or Unpaved Areas: Plus or minus 1 inch (25 mm).
 2. Walks: Plus or minus 1 inch (25 mm).
 3. Pavements: Plus or minus 1/2 inch (13 mm).

3.14 SUBBASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course on subgrades free of mud, frost, snow, or ice.
- B. Place Sand Base on subgrades free of frost, snow, ice and vegetation.
- C. On prepared subgrade, place subbase course under pavements and walks as follows:
 1. Shape subbase course to required crown elevations and cross-slope grades using laser level.
 2. Place subbase course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
 3. Compact subbase course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698 or ASTM D 1557.
 4. Compact

3.15 FIELD QUALITY CONTROL

- A. Testing Agency: contractor will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Engineer.
- D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.16 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.17 CONSTRUCTION EQUIPMENT

- A. Non-road diesel construction equipment operating on the site shall implement the following measures to minimize the impact of diesel exhaust:
 - 1. All on-road vehicles and non-road construction equipment operating at, or visiting the construction site shall comply with the three minute idling limit, pursuant to N.J.A.C 7:27-14 and N.J.A.C 7:27-15. "No Idling" signs shall be posted at the site to remind operators to comply with the idling limits. Signs are available for purchase from the NJDEP Bureau of Mobile Sources at 609-292-7953.
 - 2. All non-road diesel construction equipment greater than 100 horsepower used on the project for more than 10 days shall have engines that meet USEPA Tier 4 non-road emission standards, or the best available emission control technology that is feasible for the application and is verified by the USEPA or the CARB as a diesel emission control strategy for reducing particulate matter and/or NOx emissions.
 - 3. All non-road diesel vehicles used to haul materials or traveling to and from the construction site should use designated truck routes that are designed to minimize

impacts on residential areas and sensitive receptors such as hospitals, schools, daycare facilities, senior citizen housing, and convalescent facilities.

- B. Contractor shall be conscious of truck traffic and avoid neighborhoods as much as possible during construction.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Excess soil will need to be characterized and disposed of offsite as regulated material. All related documentation shall be provided to the LSRP, via the NJDOT DER/ESSU. The disposal facility will need to be approved by the LSRP and NJDOT DER/ESSU.
- B. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.
- C. Load, transport, and dispose of regulated material and/or soils that have been determined to be excess, unusable, or unsuitable for the project according to Federal, State, and local laws, rules, and regulations.
 - 1. Contractor shall pay all fees associated with testing, removal and disposal of regulated materials and soils. Perform soil sampling and analyses according to disposal facility requirements and the Site-Specific HASP.
 - 2. Provide a copy of sampling log, chain of custody form, and analytical report to the Owner. Procedures for sampling should be in accordance with the NJDEP Field Sampling Procedures Manual, NJDEP Technical Requirements for Site Remediation, NJDEP Management of Excavated Soils Guidelines, Appendix 1 of the NJDEP Waste Classification Form, and EPA requirements.
 - 3. Submit the waste facility applications and acceptance documentation, and fee payment requirements to the Owner at least 15 days before planned removal of regulated material. Submit to the Owner a bill of lading for each truckload of regulated material removed from the Project Limits. Ensure that the bill of lading and waste manifest include the following information:
 - a. Transport subcontractor name, address, permit number, and telephone number.
 - b. Type and quantity of material removed.
 - c. Weight of vehicle with weigh slip.
 - d. Recycling or disposal facility name, address, permit number, and telephone number.
 - e. Date removed from the Project Limits.
 - f. Signature of transport vehicle operator.
 - 4. Submit 1 copy of the bill of lading to the Owner by the end of each working day that the transport vehicle leaves the site.
 - 5. Ensure the licensed hauler transports the regulated material to the disposal/recycling facility with no unauthorized stops in between, except as required by regulatory authority. Ensure the hauler uses appropriate vehicles and operating practices to prevent spillage or leakage from occurring during transport. Remove excess soil adhering to the wheels or under carriage of the vehicles before leaving the Project Limits. If soil or water escapes to the public roads, immediately clean the road to restore it to the original condition and

- immediately notify the Owner. Do not transport regulated material over public roads if they contain free liquid or are sufficiently wet to be potentially flowable during transport.
6. Submit 1 copy of the documentation of the disposal facility's acceptance of the regulated material, including the weight ticket slips, to the Owner and the county of origin within 15 days of acceptance at the disposal facility.
 7. Immediately submit written notification to the Owner if problems arise, regarding the facility chosen to accept the regulated material for off-site management, that would require the return of waste, or if the chosen facility has violated any environmental regulation that may result in regulatory enforcement action. Propose an alternate disposal facility, and obtain the Owner's written approval of off-site management at such facility.

END OF SECTION 312000

DPMC #T0564-02

DIVISION 32

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hot-mix asphalt paving.

B. Related Sections:

1. Division 31 Section "Earth Moving".
2. **Refer to the NJDOT Standard Specifications for Road and Bridge Construction, Section 401, for material, equipment, and construction requirements associated with the placement of Hot Mix Asphalt (HMA) courses.**
3. The State will not entertain asphalt price adjustments in accordance with NJDOT Specification Section 160.03.02.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
2. Pavement marking and striping.

B. Material Certificates: For each paving material, from manufacturer.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by the NJDOT.

B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of authorities having jurisdiction or the NJDOT for asphalt paving work.

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.
- C. Preinstallation Conference: Conduct conference at Project site.

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
1. Tack Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
 2. Asphalt Base Course: Minimum surface temperature of 40 deg F (4.4 deg C) and rising at time of placement.
 3. Asphalt Surface Course: Minimum surface temperature of 60 deg F (15.6 deg C) at time of placement.
- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F (4.4 deg C) for oil-based materials or 55 deg F (12.8 deg C) for water-based materials, and not exceeding 95 deg F (35 deg C).

PART 2 - PRODUCTS

2.1 ASPHALT MATERIALS

- A. Refer to Section 401 of the NJDOT Standard Specifications for Hot Mix Asphalt (HMA) material requirements.

2.2 TRAFFIC STRIPES AND MARKINGS

- A. Refer to Section 610.02 of the NJDOT Standard Specifications for traffic striping and marking material requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 COLD MILLING

- A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.

3.3 PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseal concrete pieces firmly.
 - 1. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.
- C. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- D. Patching: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

3.4 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
- C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.5 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 - 1. Spread mix at minimum temperature of 250 deg F (121 deg C).
 - 2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.6 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150 mm).
 - 3. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm).
 - 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

3.7 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
 - 1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 1. Base Course: Plus or minus 1/2 inch (13 mm).
 2. Surface Course: Plus 1/4 inch (6 mm), no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:
 1. Base Course: 1/4 inch (6 mm)
 2. Surface Course: 1/8 inch (3 mm)
 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm).

3.9 PAVEMENT MARKING

- A. Do not apply pavement-marking until layout, colors, and placement have been verified with Engineer.
- B. Allow paving to age for 14 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply pavement marking with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor to engage a qualified testing agency to perform tests and inspections.
- B. Replace and compact hot-mix asphalt where core tests were taken.
- C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.11 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an approved landfill.

END OF SECTION 321216

DPMC # T0564-02

DIVISION 32

SECTION 321313 - CONCRETE PAVING

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes exterior cement concrete pavement for the following:
 - 1. Concrete pads
- B. Related Sections include the following:
 - 1. Division 31 Section "Earth Moving" for subgrade preparation, grading, and subbase course.
 - 2. Refer to the NJDOT Standard Specifications for Road and Bridge Construction, Section 606, for material, equipment, and construction requirements associated with concrete sidewalks and islands.
 - 3. Refer to the NJDOT Standard Specifications for Road and Bridge Construction, Section 607, for material, equipment, and construction requirements associated with concrete curbing.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete pavement mixture.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.
- C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420); deformed.
- D. Plain Steel Wire: ASTM A 82, as drawn.
- E. Deformed-Steel Wire: ASTM A 496.
- F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice."

2.2 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:
 - 1. Portland Cement: ASTM C 150, Type II gray
- B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate, uniformly graded. Provide aggregates from a single source.
- C. Water: ASTM C 94/C 94M.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: ASTM C 494/C 494M, of type suitable for application, certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

2.3 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.

- D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
- E. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- F. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

2.4 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

2.5 CONCRETE MIXTURES

1. Concrete shall be NJDOT Class B, NJDOT Class C, or as indicated.

2.6 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Proof-roll prepared subbase surface below walkways with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.4 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness to match jointing of existing adjacent concrete.
- E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.5 CONCRETE PLACEMENT

- A. Moisten subbase to provide a uniform dampened condition at time concrete is placed.
- B. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- C. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- D. Screed pavement surfaces with a straightedge and strike off.
- E. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.6 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 - 1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.7 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

3.8 TOLERANCES

- A. Comply with tolerances of ACI 117 and as follows:
 - 1. Elevation: 1/4 inch (6 mm).
 - 2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
 - 3. Surface: Gap below 10-foot- (3-m-) long, unlevelled straightedge not to exceed 1/4 inch (6 mm).
 - 4. Joint Spacing: 3 inches (75 mm).
 - 5. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
 - 6. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.9 REPAIRS AND PROTECTION

- A. Remove and replace concrete that is broken, damaged, or defective or that does not comply with requirements in this Section.
- B. Protect concrete from damage. Exclude traffic from concrete for at least 14 days after placement.
- C. Maintain concrete free of stains, discoloration, dirt, and other foreign material.
- D. Protect all concrete work from vandalism during setting and initial stabilization through monitoring and physical barriers. The Contractor must repair any vandalized concrete at their cost.

END OF SECTION 321313

DPMC #T0564-02

DIVISION 32

SECTION 323113 - CHAIN LINK FENCES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes industrial chain link security fences.
- B. Related Sections:
 - 1. Refer to the NJDOT Standard Specifications for Road and Bridge Construction, Section 605, for material, equipment, and construction requirements associated with the placement of chain link fence. Where conflicts arise between the specifications contained herein or the NJDOT specifications, the more stringent requirement shall govern.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations, components, materials, dimensions, sizes, weights, and finishes of components. Include plans, sections, details of post anchorage, attachment, bracing, and other required installation and operational clearances.
- C. Samples: For each exposed finish.
- D. Product certificates.
- E. Operation and maintenance data.

1.3 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which Installer agrees to repair or replace components that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CHAIN-LINK FENCE FABRIC

- A. Description: Height indicated on Drawings. Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage. Comply with ASTM A 392 and CLFMI CLF 2445, and with requirements indicated below:
1. Steel Wire Fabric: Metallic-coated wire with a minimum diameter of 0.120 inches (3.05 mm).
 - a. Mesh Size: 2 inches (50 mm).
 - b. Metallic (Zinc) Coating: ASTM A 392, Type II.
 2. Aluminum Wire Fabric: ASTM F 1183, with minimum wire diameter of 0.192 inches (4.88 mm).
 - a. Mesh Size: 2 inches (50 mm).
 3. Selvage: Twisted and barbed top and bottom.
 - a. Coat selvage ends of fabric that is metallic coated before the weaving process with manufacturer's standard clear protective coating.

2.2 INDUSTRIAL FENCE FRAMING

- A. Posts and Rails: Comply with ASTM F 1043 for framing, ASTM F 1083 for Group IC round pipe, and the following:
1. Group: IA, round steel pipe, Schedule 40, or IB, aluminum pipe, Alloy 6063.
 2. Fence Height: 6 feet
 3. Strength Requirement: Heavy industrial according to ASTM F 1043.
 4. Coating for Steel Framing:
 - a. Metallic coating.
 5. Aluminum Finish: Mill finish complying with ASTM B 429.

2.3 TENSION WIRE

- A. General: Provide horizontal tension wire at top and bottom of fence fabric if no rail provided..
- B. Metallic-Coated Steel Wire: 0.177-inch- (4.5-mm-) diameter, marcelled tension wire complying with ASTM A 817 and ASTM A 824.
1. Metallic Coating: Type III, Zn-5-Al-MM alloy.

- C. Aluminum Wire: 0.192-inch- (4.88-mm-) diameter tension wire, mill finished, complying with ASTM B 211 (ASTM B211M), Alloy 6061-T94 with 50,000-psi (344-MPa) minimum tensile strength.

2.4 FITTINGS

- A. General: Comply with ASTM F 626.
- B. Post and Line Caps: Each post.
 - 1. Line post caps with loop to receive tension wire or top rail.
- C. Rail and Brace Ends: Attach rails securely to each corner, pull, and end post.
- D. Rail Fittings: Provide the following:
 - 1. Top-Rail Sleeves: Pressed steel or round steel tubing not less than 6 inches long.
 - 2. Rail Clamps: Line and corner boulevard clamps for connecting **intermediate and** bottom rails in the fence line to line posts.
- E. Tension and Brace Bands: Pressed steel, 0.105 inch thick, with 1.2-oz/sq. ft. metallic (zinc) coating.
- F. Tension Bars: Steel, length not less than 2 inches shorter than full height of chain-link fabric with 1.2-oz/sq. ft. metallic (zinc) coating. Provide one bar for each end post, and two for each corner and pull post unless fabric is integrally woven into post.
- G. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.
- H. Barbed Wire Arms: Pressed steel or cast iron, with clips, slots, or other means for attaching strands of barbed wire, and means for attaching to posts; for each post, unless otherwise indicated, and as follows:
 - 1. Line posts with arms designed with opening to accommodate top rail or tension wire.
 - 2. Corner arms at fence corner posts, unless extended posts are indicated.
 - 3. Type I, single slanted arm.
 - 4. Bolts or rivets for connection to post.
- I. Tie Wires, Clips, and Fasteners: According to ASTM F 626 and ASTM F 1916.
 - 1. High-Security Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
 - a. Metallic-Coated Steel: 0.148-inch-diameter wire; galvanized coating thickness matching coating thickness of chain-link fence fabric.
- J. Power-Driven Fabric Fasteners: Type 304, 0.0938-inch- thick, specially designed cap to anchor fabric to framing with a power-driven, heat-treated, knurled pin.

K. Finish:

1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz. /sq. ft of zinc.

2.5 BARBED WIRE

- A. Zinc-Coated Steel Barbed Wire: Comply with ASTM A 121.

2.6 CAST-IN-PLACE CONCRETE

- A. Materials: Portland cement complying with ASTM C 150, Type I aggregates complying with ASTM C 33, and potable water.
 1. Concrete Mixes: Normal-weight concrete air entrained with not less than 3000-psi (20.7-MPa) compressive strength (28 days), 3-inch (75-mm) slump, and 1-inch (25-mm) maximum size aggregate.

2.7 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.
- B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer for exterior applications.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install chain-link fencing to comply with ASTM F 567 and more stringent requirements specified.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- C. Post Setting: Set posts by mechanically driving into soil at indicated spacing into firm, undisturbed soil.
 1. Mechanically Driven Posts: Drive into soil to depth of 36 inches (914 mm). Protect post top to prevent distortion.
- D. Terminal Posts: Locate terminal end and corner posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment.

- E. Line Posts: Space line posts uniformly at 10 feet (3 m) o.c.
- F. Post Bracing and Intermediate Rails: Install according to ASTM F 567. Install braces at end posts and at both sides of corner and pull posts.
- G. Tension Wire: Install according to ASTM F 567 if rails not included, maintaining plumb position and alignment of fencing.
- H. Top Rail: Install according to ASTM F 567.
- I. Bottom Rails: Install, spanning between posts.
- J. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 2 inches (50 mm) between finish grade or surface and bottom selvage, unless otherwise indicated.
- K. Barbed Wire: Install barbed wire uniformly spaced. Pull wire taut and install securely to extension arms and secure to end post or terminal arms.
- L. Tie Wires: Attach wire per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
- M. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side.

END OF SECTION 323113

DPMC # T0564-02

DIVISION 32

SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Seeding.

1.2 RELATED SECTIONS

A. Division 31 Section "Earth Moving" for subgrade preparation, grading, and subbase course.

B. Refer to the NJDOT Standard Specifications for Road and Bridge Construction.

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

- H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- I. Surface Soil: Whatever soil is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Certification of grass seed.
 - 1. Certification of each seed mixture.

1.5 QUALITY ASSURANCE

- A. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory.
 - 1. The soil-testing laboratory shall oversee soil sampling.
 - 2. Report suitability of tested soil for turf growth.
 - a. State recommendations for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
 - b. Report presence of problem salts, minerals, or heavy metals; if present, provide additional recommendations for corrective action.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.
- B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.

1.7 MAINTENANCE SERVICE

- A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: 60 days from date of Substantial Completion.
 - a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.
2. Sodded Turf: 30 days from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

2.2 TURFGRASS SOD

- A. Turfgrass Sod: Certified, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

2.3 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
 1. Class: O, with a minimum of 95 percent passing through No. 8 (2.36-mm) sieve and a minimum of 55 percent passing through No. 60 (0.25-mm) sieve.
- B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 (3.35-mm) sieve and a maximum of 10 percent passing through No. 40 (0.425-mm) sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Aluminum Sulfate: Commercial grade, unadulterated.
- E. Perlite: Horticultural perlite, soil amendment grade.
- F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 (0.30-mm) sieve.
- G. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

2.4 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 3/4-inch (19-mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings.
- B. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.
- C. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.
- D. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.5 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

2.6 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

PART 3 - EXECUTION

3.1 TURF AREA PREPARATION

- A. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply fertilizer directly to subgrade before loosening.
 2. Thoroughly blend planting soil off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
 3. **Spread planting soil to a depth of 5 inches** but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
- B. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 5 inches of soil. Till soil to a homogeneous mixture of fine texture.
 3. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, trash, and other extraneous matter.
 4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
- D. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- E. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.2 SEEDING

- A. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- B. Sow seed at a total minimum rate of 2 lb/1000 sq. ft.
- C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas with slopes not exceeding 1:3 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
- E. Provide topsoil stabilization matting for slopes exceeding 1:3.

3.3 SODDING

- A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
 - 1. Lay sod across angle of slopes exceeding 1:3.
- C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

3.4 TURF MAINTENANCE

- A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
- B. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain height appropriate for species without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings.
- C. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

3.5 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Architect:
 - 1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft and bare spots not exceeding 5 by 5 inches.
 - 2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

END OF SECTION 329200

Salt Storage Structure
NJDOT Freehold Maintenance Facility

329200- 7

TURF AND GRASSES

APPENDIX A

GEOTECHNICAL EVALUATION REPORT

**Geotechnical Evaluation Report
NJDOT Freehold Yard Salt Storage**



NV5 Project Number: 728618-0000295

NJ DPMC
20 West State Street, 3rd Floor
Trenton, NJ 08608

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Phone 732-382-3553
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July 30, 2019

Mr. Hedger
DPMC
20 West State Street, 3rd Floor
Trenton, NJ 08608

Re: Report of Subsurface Exploration & Geotechnical Engineering Study
NJ DOT Freehold Yard Salt Storage
Freehold, New Jersey
NV5 Project No.: 728618-0000295

Dear Mr. Hedger:

NV5, Inc. submits this report in fulfillment of the scope of services described in the authorization to proceed. This report describes our understanding of the project, presents our evaluations, and provides our professional opinions and recommendations for foundation design and construction for the project.

Sincerely,
NV5, Inc.



Brian D. Arone, P.E.
Senior Business Unit Manager
NJ License No. 24GE04617100

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FIGURES

Drawing 1	Site Vicinity Map & Test Location Plan
Drawing 2	Generalized Subsurface Profile
Drawing 3	Surficial Geology Map
Drawing 4	Bedrock Geology Map

APPENDICES

Appendix A	Boring and DCP Logs (A-1 through A-11)
Appendix B	Laboratory Test Data (B-1 through B-7)

1.0 SITE AND PROJECT INFORMATION

The project site is at the existing NJDOT yard on Daniels Way in Freehold, NJ. A site and vicinity map is presented as Drawing 1. We understand that the objective of this project is to install a new salt storage facility and a covered storage area. The new salt storage will replace the existing salt storage structure at the site.

We were not provided with structural loading information but assume maximum column loads could be on the order of 50 kips, and wall loads around 1.5 kips per lineal foot (klf).

2.0 PURPOSE AND SCOPE OF WORK

The purpose of our services on this project is to explore the subsurface conditions in order to provide recommendations for foundation design and construction. Specifically, this report provides:

- Drawings showing boring locations, a graphic summary of the generalized subsurface conditions, and boring logs with detailed descriptions of the materials encountered.
- Discussion of generalized subsurface conditions at the site.
- Discussion of feasible foundation type(s) for the proposed construction.
- Design parameters for the recommended foundation type including.
- Estimates of foundation settlements.
- Recommendations for site preparation and grading, including the re-use of site-excavated materials for fill, fill placement and compaction.
- Construction considerations.

3.0 FIELD EXPLORATION AND LABORATORY TESTING

3.1 FIELD EXPLORATION

The subsurface conditions were explored with 9 engineering test borings at the locations shown on Drawing 1. The borings were drilled to a termination depth of 25 feet below existing grade. Borings were drilled in accessible locations with a track-mounted drill rig utilizing mud rotary.

Samples of the subsurface materials were recovered at roughly 2-foot intervals within the upper 10 feet of the borings and at approximately 5-foot intervals thereafter using a Standard Penetration Test



split-spoon sampler (SPT) in substantial accordance with ASTM D-1586, "Standard Test Method for Standard Penetration Test and Split-Barrel Sampling of Soils." This test procedure drives a 1.4-inch I.D. split-tube sampler into the subsurface profile using a 140-pound hammer falling 30 inches. The total number of blows required to drive the sampler the second and third six-inch increments is the SPT N-value, in blows per foot, and is an indication of material strength.

The soil/rock samples recovered from the borings were classified by a geotechnical engineer. The collected samples were later re-examined to confirm field classifications and to select specimens for laboratory testing. Visual soil classifications were made in accordance with ASTM D2487 and ASTM D2488. The results of the classification are shown on Drawing 2, the generalized subsurface profile, and in the records of test borings in Appendix A (sheets A-1 through A-11). Strata contacts shown on these drawings are approximate. The boring data reflect conditions at the specific test locations only, and at the time the borings were drilled.

3.2 LABORATORY TESTING

Selected samples collected from the borings were subjected to laboratory testing to determine physical characteristics. Laboratory testing consisted of determination of natural moisture content (ASTM D-2216), particle-size analysis (ASTM D-422) and atterberg limits (ASTM D-4318). The laboratory test results are discussed in Section 5 and presented in Appendix B (sheets B-1 through B-7).

4.0 LOCAL GEOLOGY

According to the New Jersey Department of Geology map, the site soils is underlain by soils of the Weather Coastal Plain Formation. The Weather Coastal Plain Formation is described as exposed sand and clay of Coastal Plain bedrock formations. Includes thin, patchy alluvium and colluvium, and pebbles left from erosion of surficial deposits.

According to the New Jersey Department of Geology map, the site bed rock is of the Hornerstown Formation. The Hornerstown Formation is a Paleogene or latest Mesozoic geologic formation in New Jersey.

5.0 SUBSURFACE CONDITIONS

5.1 BORINGS

In general, the borings encountered 4 to 8-inches of asphalt with varying depths of aggregate subbase. The subsurface materials encountered below the asphalt appear to be consistent with the geologic mapping, and generally consisted of natural silty sand, clayey sand and clay.

Samples tested in the laboratory yielded natural moisture contents of 22 to 51.3 percent. The laboratory tests are summarized below in Table 1.

Groundwater was not recorded because mud rotary drilling was used. Long-term (24-hour) water levels were not measured because the boreholes were backfilled upon completion for safety considerations. It should be expected that fluctuation in the groundwater seepage levels and intensity will occur due to variations in precipitation, seasonal fluctuation, and site development activities among other factors. Additionally, perched water trapped above low-permeability fine-grained materials could result in groundwater being encountered at higher elevations at the site.

The subsurface conditions are presented in more detail in the boring log and laboratory test data in appendices A and B.

TABLE 1 - SUMMARY OF LABORATORY TEST RESULTS

Boring Number	Sample Depth (ft.)	Description	Natural Moisture Content (%)	Percent Finer Than US No. 200 Sieve (%)	Atterberg Limit	
					LL	PL
B-1	8-10	Silty Sand	48.2	27.2	50	40
B-2	6-8	Clayey Sand	34.3	29.8	31	19
B-3	4-6	Silty Sand with Gravel	29.8	37.7	51	33
B-4	15-17	Silty Sand	33.4	27.6	-	-
B-6	2-4	Clayey Sand	21.3	38.5	43	19
B-7	4-6	Sandy Lean Clay	22.0	51.3	48	22
B-9	2-4	Silty Sand	11.2	17.6	-	-

6.0 EVALUATION AND RECOMMENDATIONS

6.1 GENERAL

Based on the results of our study, it is our opinion that the proposed construction is feasible, provided that the geotechnical recommendations herein are followed, and that the standard level of care is maintained during construction. It is our opinion that following the recommended earthwork procedures outlined in this report, the proposed structure may be supported on conventional spread footing foundations, and the floor slab may be supported on-grade. The primary geotechnical concern that could impact site development are the sensitive nature of the site soils to disturbance and softening from exposure to excess construction equipment traffic and moisture content, the presence of fill material and loose soils. Discussions of our recommendations for site development are presented in the following sections of this report.

6.2 EARTHWORK

The general sequence of construction should consist of demolition and removal of existing site improvements not to remain, and stripping the top soil and vegetation from within the building pad plus a 5-foot perimeter. Following this work, existing utilities to be abandoned or rerouted should be removed from within and at least 5 feet beyond the proposed building addition limits. Excavations to remove or relocate utilities from within the proposed building area should be backfilled with compacted structural fill as recommended herein.

Prior to fill placement in proposed structural areas to remain at grade or receive fill, the exposed subgrade soils should be proofrolled and compacted to a dense and unyielding consistency by several passes of a large smooth drum vibratory compactor with a static drum weight of at least ten tons under the observation of a representative of NV5. Depending on the prevailing weather, the subgrade evaluation may consist of some other method deemed appropriate by the NV5. Soils that are observed to be loose/soft or otherwise unstable during proofrolling should be selectively excavated or stabilized in-place as recommended in the field by the NV5. Any resulting over-excavations should be backfilled with compacted structural fill.

The surficial predominately granular soils are generally considered suitable for use as compacted structural fill in building and pavement areas, as these materials can be compacted over a relatively wide range of moisture contents. On-site materials that contain relatively high percentages of fine-

grained soil (silt and clay) are considered marginally suitable for reuse as compacted structural fill, as these soils are likely sensitive to disturbance and moisture-related compaction problems. While they can be used as fill below buildings and pavements, it is our opinion that these materials may be better suited for use as general fill in landscaped areas. NV5 should ultimately approve materials proposed for use as structural fill.

Moisture conditioning of the excavated on-site soils will likely be required to attain the recommended degree of compaction. Fine-grained soils should be compacted at moisture contents at or slightly above the optimum moisture content. Even if the excavated on-site fine-grained soils are successfully compacted to the required densities, they can still become unstable as a result of construction equipment traffic and excessive moisture from precipitation. It will therefore be important to maintain positive drainage to direct precipitation runoff away from building foundations.

Off-site borrow, if required to complete the site grading operations, should meet Unified Soil Classification System (USCS) designation SM, SP, SW, GP, GM, or GW and be approved by the NV5 prior to use. The material should not have more than 15 percent passing the number 200 sieve.

All structural fill should be constructed in maximum 8-inch thick loose lifts and be compacted to 95 percent of the Modified Proctor maximum dry density at moisture contents required to achieve the required densities (typically within approximately 2 percent \pm of the optimum moisture content), as per ASTM D-1557. The degree of fill compaction should be verified by in-place density testing by a representative of NV5.

Although it is anticipated that groundwater not will pose a significant problem for foundation construction, it could be encountered during installation of deeper utilities. Also, it should be anticipated that seepage of groundwater may be encountered perched atop relatively impermeable soil layers and emanating from within locally porous soil zones. Should groundwater or seepage be encountered during site work, the excavation should be dewatered using sumps to remove the water by pumping away from the building site. Positive drainage should be maintained during construction to prevent inundation of subgrade soils by surface water runoff. Excavations to remove wet, soft soils should be backfilled with compacted structural fill or AASHTO No. 57 stone aggregate.

All construction excavations should be sloped and shored in accordance with the OSHA excavation regulations or stricter local governing safety codes. It is our opinion that the undisturbed natural soils, or compacted structural fill composed of similarly graded materials would generally be classified as “Type C” soils under the OSHA excavation regulations. Permanent slopes (cut or fill) should generally be designed to be no steeper than three horizontal on one vertical (3H:IV).

6.3 FOUNDATIONS

Based on the assumed loads stated in Section 1 of the report, we conclude the proposed building may be supported on conventional shallow spread footings. Foundations established on the competent undisturbed natural soils or properly compacted structural fill placed atop the natural soils in accordance with our recommendations, may be designed to impose an allowable net bearing pressure of up to 3,000 pounds per square foot. Minimum widths of 18 and 30 inches are recommended for wall and column footings respectively to prevent a punching-type shear failure.

Exterior footings should be founded a minimum of 36 inches below the final exterior grades, or deeper if required by local building code, to provide protection from frost action. Interior foundations in permanently heated portions of the structures may be established at convenient depths below the floor slabs but should be at least 12 inches below lowest adjacent grades.

Total and differential settlements on the order of one (1) and ½ inch respectively can be anticipated for foundations established in the stiff undisturbed natural soils or compacted structural fill, based on the assumed loads.

Detailed foundation subgrade evaluations should be performed by a representative of NV5 in each footing excavation prior to the placement of reinforcing steel or concrete to confirm that the recommended allowable soil bearing capacity is available.

Once the site preparation has been performed, excavate to the planned footing subgrade. The footing subgrades are to be compacted with a jumping jack or a walk behind drum trench roller over the entire subgrade. A representative of NV5 is to inspect the subgrade material and compaction operation. Where loose or unstable soils are encountered at the footing subgrade levels or within the zone of stress influence, the foundations should be extended through these materials to bear on stable subsoils. If desired, the over excavations required to reach the stable subsoils may be backfilled to a

more convenient foundation subgrade level with compacted structural fill, AASHTO No. 57 stone aggregate compacted in maximum 12-inch lifts, or concrete.

Alternatively, it may be feasible to compact loose subgrade soils in-place, provided the thickness of the loose soils is minimal and the subgrade soils are at a moisture content suitable for compaction purposes. The decision of whether to undercut loose subgrade soils or compact them in-place should be determined in the field by a representative from NV5.

6.4 EARTH PRESSURE PARAMETERS

The soil parameters provided on the Table 2 can be used to estimate earth pressures for the design of retaining (foundation) walls. If the top of the structure is restrained from movement, thereby preventing the mobilization of active soil pressures, the structure should be designed using the at-rest pressure coefficient, K_0 .

The earth pressure coefficients are based on the assumption of vertical walls, horizontal backfill, no surcharges, no wall friction, and a safety factor of 1.0. To alleviate hydrostatic stress behind the retaining walls, we recommend that drainage boards extending down to a drainage tile be installed along the back and base of wall, respectively, and installing drains (weep holes) through the face of the wall.

TABLE 2 – EARTH PRESSURE PARAMETERS

Parameter	On-site Silty Sand Soils	On-site Clayey Soils	Imported Processed Aggregate (NJDOT I-5 or similar)
Unit Weight	120 pcf	110 pcf	135 pcf
Angle of Internal Friction	32°	28°	38°
Friction Factor	0.35	0.3	0.47
Active Earth Pressure Coeff., K_a	0.31	0.36	0.24
At-Rest Earth Pressure Coeff., K_0	0.47	0.53	0.38
Passive Earth Pressure Coeff., K_p	3.25	2.77	4.2



6.5 SEISMIC SITE CLASS

It is our opinion that the subsurface conditions at the site may be categorized as Site Class D as defined in the International Building Code, New Jersey Edition. This categorization is based on the subsurface conditions encountered in the borings performed for this study, general geologic information for the region, and the information contained in the code.

6.6 FLOOR SLAB

Following the earthwork procedures recommended in this report, it is our opinion that the floor slab can be designed as a concrete slab-on-grade with a modulus of subgrade reaction (k) of 150 pounds per cubic inch. NV5 recommends that the concrete floor slab be founded on a minimum 4-inch thick coarse granular layer covered with polyethylene vapor barrier to interrupt the rise of capillary moisture through the slab. Washed gravel or crushed stone meeting the gradation of AASHTO Size No. 57 aggregate can be used for the granular layer unless otherwise required by local code. Natural and compacted structural fill subgrade soils should be observed to evaluate compaction and stability prior to the placement of the granular layer. The slab may bear on wall projections; however, it should be jointed so that the foundation walls can settle slightly without affecting the slab.

6.7 OTHER RECOMMENDATIONS

Construction activities could have adverse impacts on structures outside the proposed structure footprints. We recommend that pre- and post-construction surveys of adjacent structures of concern be conducted to document conditions.

NV5 should participate in the design development phases of this project in order to modify the recommendations provided above as changes occur during the design development process.

NV5 should participate in the evaluation of field problems as they arise and recommend solutions. We should also be involved with site work activities so we can address needed changes to the foundation recommendations if site conditions different from those described herein are encountered. NV5 should observe and test the foundation installation to satisfy the requirements of the New Jersey Building Code.



7.0 REPORT LIMITATIONS

This report has been prepared pursuant to authorization to proceed between NJ DPMC and NV5 and in general accordance with the standard of care ordinarily practiced by members of Consultant's profession performing similar services on similar projects in similar localities; no other warranty is expressed or implied. The report should be read in its entirety. NV5 is not responsible for misinterpretations arising from reading sections of the report only.

This report has been prepared for the exclusive use of the Owner and other members of the design/construction team for the specific site(s) and project(s) discussed in this report. The report should not be used for any other site(s) or project(s) without express written permission from NV5.

The evaluation and recommendations submitted in this report are based in part upon the data collected from the field exploration. These data were collected at specific locations and describe subsurface conditions encountered at those specific locations at the time(s) the field explorations were made. Further, the plan area of the field test locations is relatively small as compared to the total site area. Consequently, subsurface conditions could be different at site locations other than those tested. The nature or extent of variations throughout the subsurface may not become evident until the time of construction. If variations later become evident, it may be necessary for NV5 to revisit the recommendations provided in this report.

In the event changes are made in the nature, design, or location(s) of the proposed project construction, the conclusions and recommendations contained in this report cannot not be relied upon unless the changes are reviewed by NV5, and the conclusions and recommendations herein are either verified or modified as needed in writing by NV5. Therefore, NV5 must be informed of any such changes if those changes are not addressed in this report.

The scope of services performed by NV5 did not include any environmental assessment or investigation for the presence or absence of wetlands, sinkholes, chemically hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around the site.



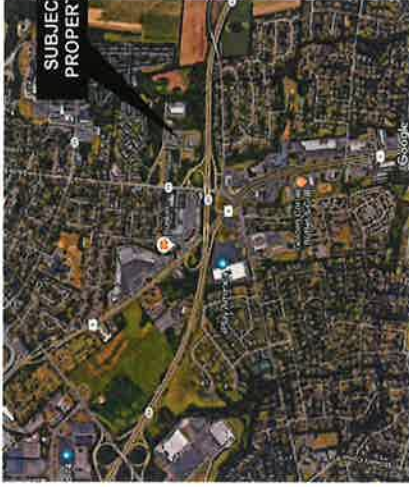
NV5 should be retained to provide consultation to the ownership and design team during the design development phase of the project, to review final foundation specifications and review foundation design drawings in order to ascertain that its recommendations have been properly interpreted and implemented. Furthermore, NV5 should be retained to provide inspections during geotechnical construction. If NV5 is not afforded the opportunity to participate in foundation installation as recommended in this report, NJ DPMC agrees that NV5 has no responsibility for the interpretation of the recommendations made in this report or for foundation performance

8.0 CLOSURE

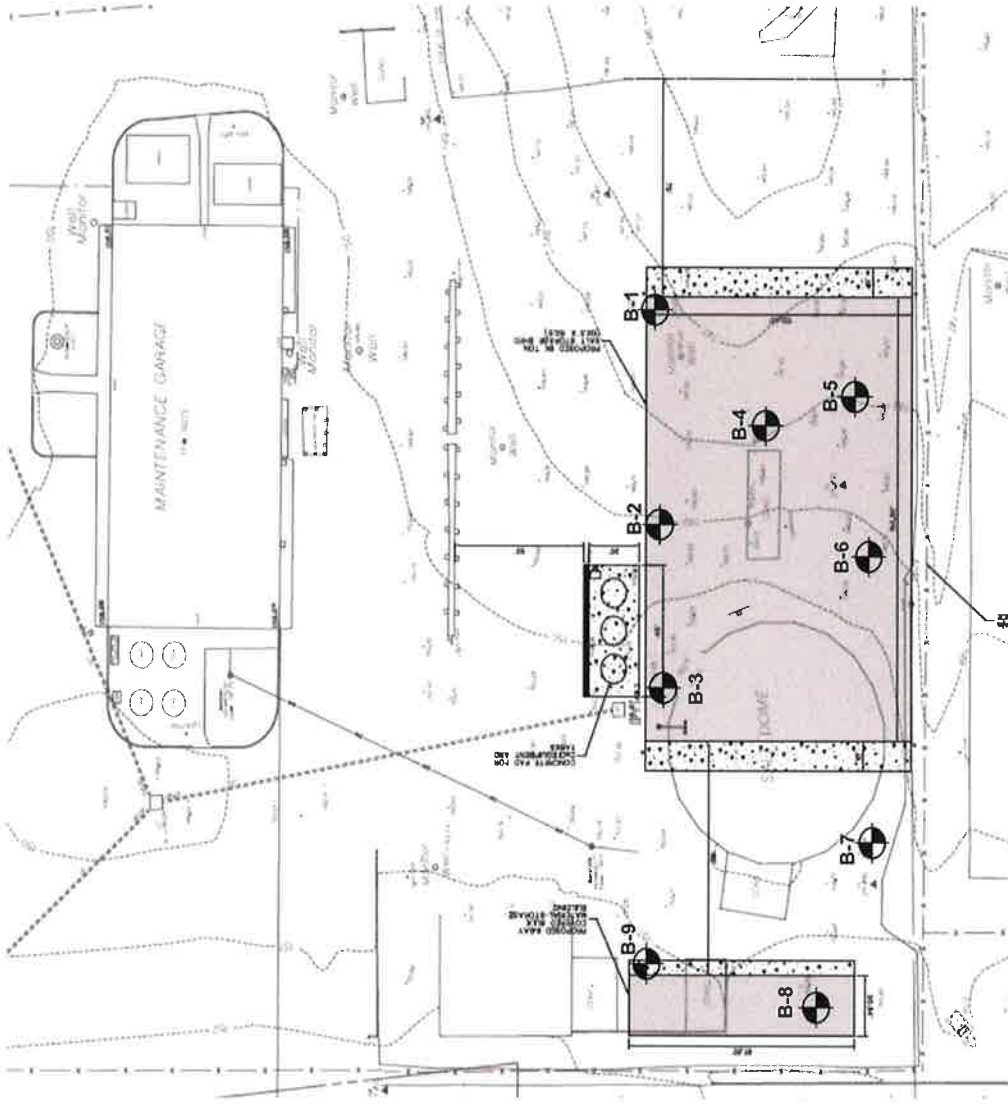
We appreciate the opportunity to provide specialized engineering services on this project and look forward to an opportunity to participate in construction related aspects of the development. If you have questions about information contained in this report contact the writer at 732-382-3553.



DRAWINGS



Site Vicinity Map



LEGEND:



Indicates the numbers and approximate locations of test boring performed for this study.

NOTES:

1. Test location shown are approximate.
2. Test location symbols are not to scale

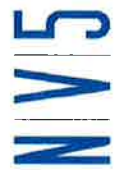


DRAWING TITLE: Boring Location Plan
 PROJECT NAME: Freehold Salt Storage
 PROJECT LOCATION: Freehold, NJ

PROJECT NO.: 18-295

DATE: July 2019 DWR NO: 1

DWN BY: ME
 CHD BY: BA
 APD BY:



BORING SUMMARY SHEET

PROJECT NAME: Salt Storage NJDOT Freehold Yard

PROJECT LOCATION: Freehold, New Jersey

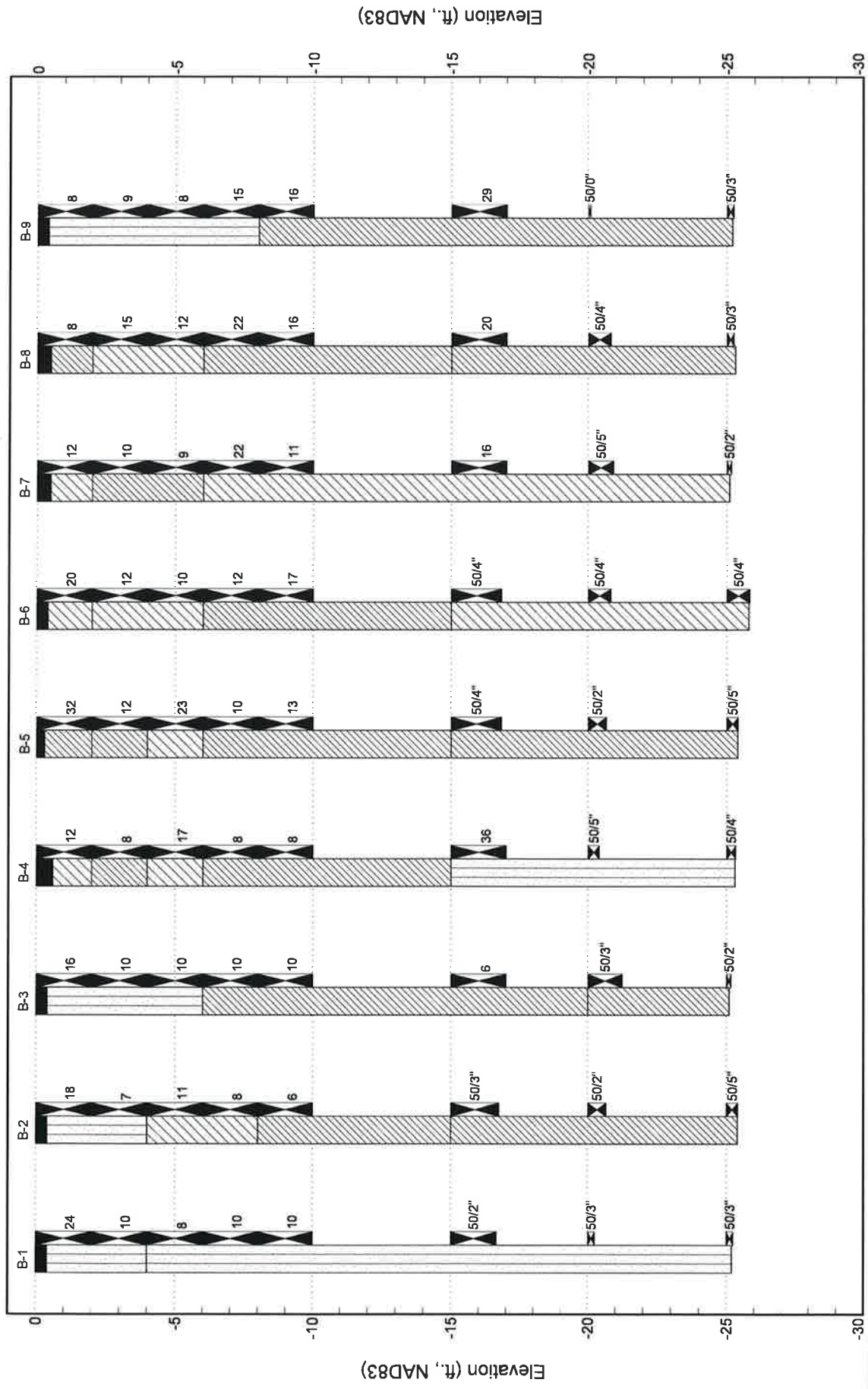
PROJECT NUMBER: 728718-0000295

DRAWN BY: PO

CHECKED BY: BA

DATE: 07-19-2019

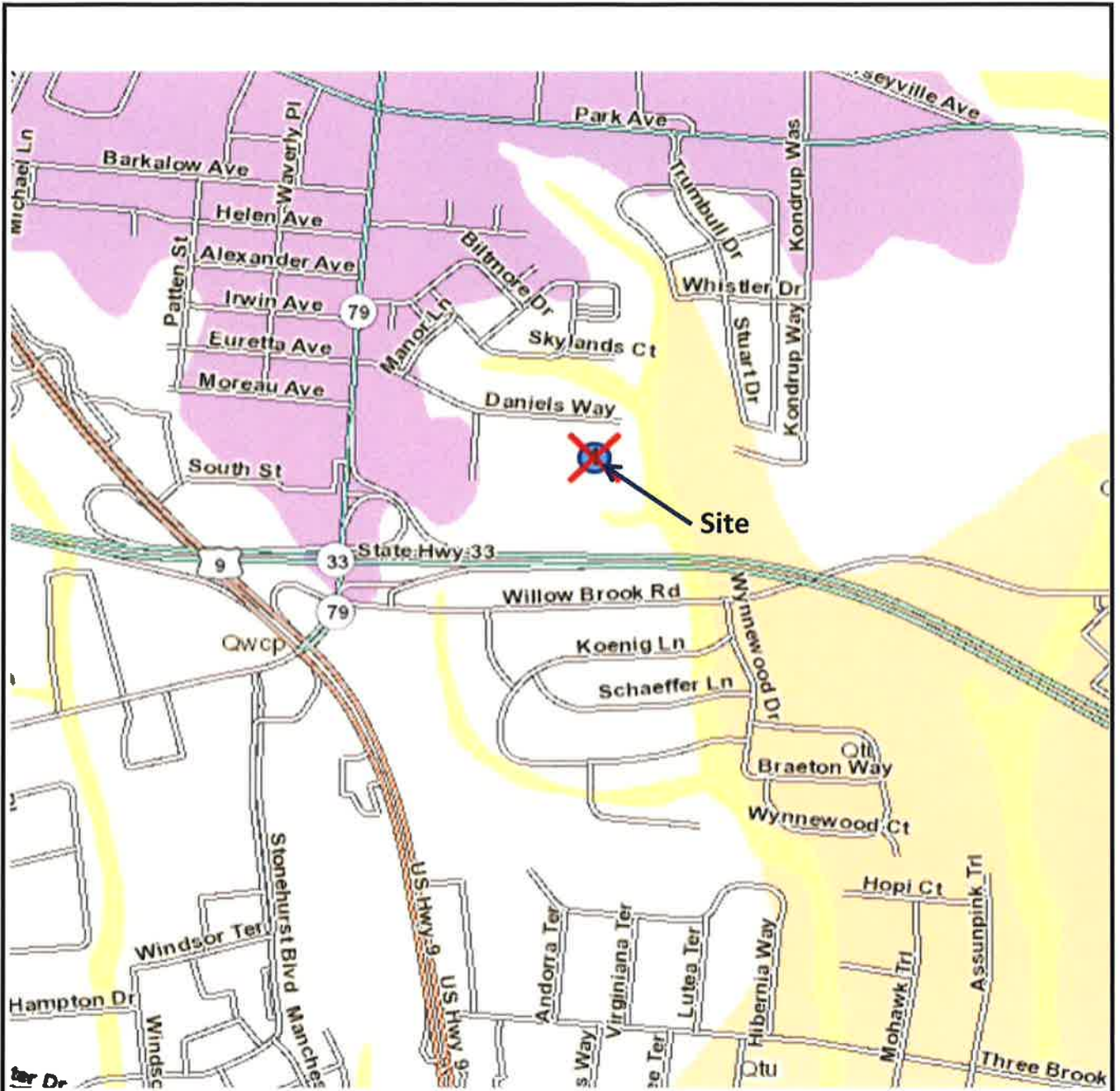
DRAWING NO.: 2



LEGEND

- Asphalt
- Clayey Sand
- Sandy Clay
- Silty Sand
- Clay
- Standard Penetration Test
- Water Level

Note: Boring top elevations have been estimated



* Map is from NJ DEP Geo mapping.

Surficial Geology Map



903 E. Hazelwood Ave
 Rahway, New Jersey 07065
 (732) 382-3553
 fax (732) 382-8840

**Freehold Salt Storage
 Freehold, New Jersey**

DWR NO: 3

DESIGN BY: *

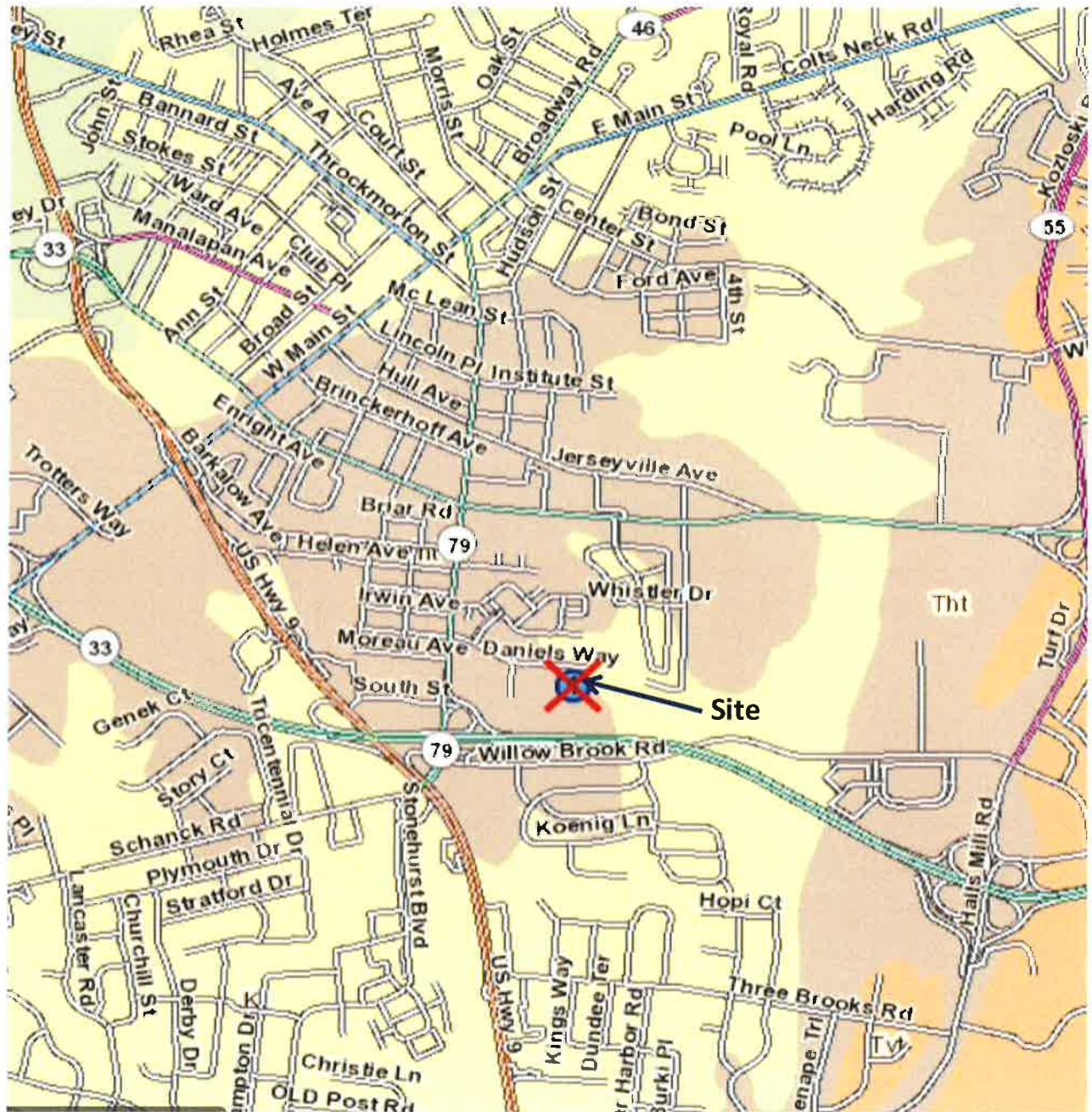
DRAWN BY: ME

REVIEWED BY: BDA

SCALE: NTS

DATE: July 2019

PROJECT #: 18-295



* Map is from NJ DEP Geo mapping.

Bedrock Geology Map



903 E. Hazelwood Ave
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Freehold Salt Storage
 Freehold, New Jersey

DWR NO: 4

DESIGN BY: *

DRAWN BY: ME

REVIEWED BY: BDA

SCALE: NTS

DATE: July 2019

PROJECT #: 18-295

APPENDIX A
BORING LOG DATA



BORING NUMBER B-1

PROJECT NAME Salt Storage NJDOT Freehold Yard
 PROJECT NUMBER 728718-0000295 PROJECT LOCATION Freehold, New Jersey
 DATE STARTED 6/27/19 COMPLETED 6/27/19 GROUND ELEVATION 0 ft NAD 83 HOLE SIZE 4.25 inches
 DRILLING CONTRACTOR Boring Brothers GROUND WATER LEVELS: --- Not recorded
 DRILLING METHOD Mud Rotary
 LOGGED BY M. Ellahi CHECKED BY B. Arone
 NOTES _____

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft., NAD83)
0						0
	SPT	15-9-8 (24)	SM		0.4 5 inches of Asphalt	-0.4
	SPT	11-6-4-4 (10)			4.0 SILTY SAND, medium dense, dark brown, with wood and concrete fragments (Fill)	-4.0
5	SPT	6-4-4-3 (8)			SILTY SAND, loose, dark brown, with wood and concrete fragments (Fill)	-5
	SPT	7-5-5-5 (10)			SILTY SAND, loose, brown	-10
10	SPT	7-5-5-5 (10)			SILTY SAND, loose, brown	-10
15	SPT	22-25-48-50/2" (100)	SM		SILTY SAND, very dense, brown	-15
20	SPT	50/3" (100)			SILTY SAND, very dense, brown	-20
25	SPT	50/3" (100)			SILTY SAND, very dense, brown	-25.2

Boring terminated at 25.2 feet.

PROJECT NAME Salt Storage NJDOT Freehold Yard
PROJECT NUMBER 728718-0000295 **PROJECT LOCATION** Freehold, New Jersey
DATE STARTED 6/27/19 **COMPLETED** 6/27/19 **GROUND ELEVATION** 0 ft NAD 83 **HOLE SIZE** 4.25 inches
DRILLING CONTRACTOR Boring Brothers **GROUND WATER LEVELS:** — Not recorded
DRILLING METHOD Mud Rotary
LOGGED BY M. Ellahi **CHECKED BY** B. Arone
NOTES _____

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft., NAD83)
0					0.4 5 inches of Asphalt	0
	SPT	11-7-5 (18)	SM		SILTY SAND, medium dense, brown	-0.4
	SPT	4-3-4-5 (7)			4.0 SILTY SAND, loose, brown	-4.0
5	SPT	9-6-5-5 (11)	SC		CLAYEY SAND, medium dense, brown	-5
	SPT	5-5-3-3 (8)			8.0 CLAYEY SAND, loose, gray	-8.0
10	SPT	4-2-4-3 (6)	CL		CLAY, medium stiffm gray	-10
15	SPT	11-22-41-50/3" (100)			15.0 SNADY CLAY, hard, gray	-15.0
20	SPT	46-50/2" (100)	CL		SNADY CLAY, hard, gray	-20
25	SPT	50/5" (100)			25.4 SNADY CLAY, hard, gray	-25.4

Boring terminated at 25.4 feet.

PROJECT NAME Salt Storage NJDOT Freehold Yard
PROJECT NUMBER 728718-0000295 **PROJECT LOCATION** Freehold, New Jersey
DATE STARTED 6/27/19 **COMPLETED** 6/27/19 **GROUND ELEVATION** 0 ft NAD 83 **HOLE SIZE** 4.25 inches
DRILLING CONTRACTOR Boring Brothers **GROUND WATER LEVELS:** --- Not recorded
DRILLING METHOD Mud Rotary
LOGGED BY M. Ellahi **CHECKED BY** B. Arone
NOTES _____

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft., NAD83)
0					5 inches of Asphalt, 4 inches of DGA	0
	SPT	8-8-6 (16)	SM		SILTY SAND, medium dense, brown	-0.4
	SPT	3-5-5-4 (10)			SILTY SAND, loose, brown, with gravel	
5	SPT	6-5-5-6 (10)			SILTY SAND, loose, brown, with gravel	
	SPT	6-5-5-5 (10)				
	SPT	5-5-5-7 (10)	CL		CLAY, stiff, green-gray	-6.0
10					CLAY, stiff, green-gray	
	SPT	5-3-3-5 (6)			CLAY, medium stiff, green-gray	
15			CL		SANDY CLAY, hard, green-gray	-20.0
20	SPT	32-40-50/3" (100)			SANDY CLAY, hard, green-gray	
25	SPT	50/2" (100)			SANDY CLAY, hard, green-gray	-25.1

Boring terminated at 25.1 feet.

PROJECT NAME Salt Storage NJDOT Freehold Yard
PROJECT NUMBER 728718-0000295 **PROJECT LOCATION** Freehold, New Jersey
DATE STARTED 6/27/19 **COMPLETED** 6/27/19 **GROUND ELEVATION** 0 ft NAD 83 **HOLE SIZE** 4.25 inches
DRILLING CONTRACTOR Boring Brothers **GROUND WATER LEVELS:** — Not recorded
DRILLING METHOD Mud Rotary
LOGGED BY M. Ellahi **CHECKED BY** B. Arone
NOTES _____

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft., NAD83)
0						0
	SPT	7-5-11 (12)	SC		0.6 8 inches of Asphalt	-0.6
					2.0 CLAYEY SAND, medium dense, brown	-2.0
	SPT	10-5-3-6 (8)	CL		4.0 SANDY CLAY, medium stiff, brown	-4.0
5					6.0 CLAYEY SAND, medium dense, brown	-6.0
	SPT	11-11-6-8 (17)	SC			-5
	SPT	5-4-4-6 (8)			CLAY, medium stiff, green-gray	
	SPT	8-4-4-6 (8)			CLAY, medium stiff, green-gray	
10			CL			-10
15					15.0	-15.0
	SPT	6-15-21-38 (36)			SILTY SAND, dense, brown	
20			SM			-20
	SPT	50/5" (100)			SILTY SAND, very dense, brown	
25					25.3	-25.3
	SPT	50/4" (100)			SILTY SAND, very dense, brown	

Boring terminated at 25.3 feet.

PROJECT NAME Salt Storage NJDOT Freehold Yard
PROJECT NUMBER 728718-0000295 **PROJECT LOCATION** Freehold, New Jersey
DATE STARTED 6/27/19 **COMPLETED** 6/27/19 **GROUND ELEVATION** 0 ft NAD 83 **HOLE SIZE** 4.25 inches
DRILLING CONTRACTOR Boring Brothers **GROUND WATER LEVELS:** -- Not recorded
DRILLING METHOD Mud Rotary
LOGGED BY M. Ellahi **CHECKED BY** B. Arone
NOTES _____

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft., NAD83)
0						0
	SPT	20-12-5 (32)	CL		0.3 4 inches of Asphalt	-0.3
					2.0 SANDY CLAY, hard, gray-brown, with wood and brick fragments (Fill)	-2.0
	SPT	10-7-5-6 (12)	CL		4.0 CLAY, stiff, brown	-4.0
5	SPT	9-12-11-9 (23)	SC		6.0 CLAYEY SAND, medium dense, brown	-6.0
	SPT	9-5-5-8 (10)	CL		CLAY, stiff, green-gray	
	SPT	8-7-6-9 (13)			CLAY, stiff, green-gray	
10						
15	SPT	15-26-32-50/4" (100)	CL		15.0 SANDY CLAY, hard, brown-green	-15.0
20	SPT	48-50/2" (100)	CL		SANDY CLAY, hard, brown-green	-20
25	SPT	50/5" (100)			25.4 SANDY CLAY, hard, brown-green	-25.4

Boring terminated at 25.4 feet.

PROJECT NAME Salt Storage NJDOT Freehold Yard
PROJECT NUMBER 728718-0000295 **PROJECT LOCATION** Freehold, New Jersey
DATE STARTED 6/28/19 **COMPLETED** 6/28/19 **GROUND ELEVATION** 0 ft NAD 83 **HOLE SIZE** 4.25 inches
DRILLING CONTRACTOR Boring Brothers **GROUND WATER LEVELS:** -- Not recorded
DRILLING METHOD Mud Rotary
LOGGED BY M. Ellahi **CHECKED BY** B. Arone
NOTES _____

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft., NAD83)
0						0
	SPT	15-5-7 (20)	SC		0.4 5 inches of Asphalt	-0.4
	SPT	8-6-6-7 (12)	SC		2.0 CLAYEY SAND, medium dense, gray (Fill)	-2.0
5	SPT	7-5-5-5 (10)			6.0 CLAYEY SAND, medium dense, brown	-5
	SPT	5-5-7-7 (12)	CL		CLAYEY SAND, loose, brown	-6.0
10	SPT	7-8-9-11 (17)			SANDY CLAY, stiff, brown	-10
					SANDY CLAY, very stiff, brown	-15
15	SPT	17-30-48-50/4" (100)	SC	15.0 CLAYEY SAND, very dense, gray-brown	-15.0	
20	SPT	36-50/4" (100)	SC	CLAYEY SAND, very dense, gray-brown	-20	
25	SPT	48-50/4" (100)		25.8 CLAYEY SAND, very dense, gray-brown	-25	

Boring terminated at 25.8 feet.

PROJECT NAME Salt Storage NJDOT Freehold Yard
PROJECT NUMBER 728718-0000295 **PROJECT LOCATION** Freehold, New Jersey
DATE STARTED 6/28/19 **COMPLETED** 6/28/19 **GROUND ELEVATION** 0 ft NAD 83 **HOLE SIZE** 4.25 inches
DRILLING CONTRACTOR Boring Brothers **GROUND WATER LEVELS:** -- Not recorded
DRILLING METHOD Mud Rotary
LOGGED BY M. Ellahi **CHECKED BY** B. Arone
NOTES _____

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft., NAD83)
0						0
	SPT	7-5-3 (12)	SC	0.5	6 inches of Asphalt	-0.5
				2.0	CLAYEY SAND, medium dense, gray-brown (Fill)	-2.0
	SPT	5-4-6-7 (10)	CL		SANDY CLAY, stiff, brown	
5	SPT	5-5-4-7 (9)			SANDY CLAY, stiff, brown	-5
				6.0		-6.0
	SPT	10-11-11-11 (22)	SC		CLAYEY SAND, medium dense, brown	
10	SPT	5-5-6-7 (11)			CLAYEY SAND, medium dense, green-brown	-10
15	SPT	5-6-10-13 (16)	SC		CLAYEY SAND, medium dense, red-brown	-15
20	SPT	28-50/5" (100)			CLAYEY SAND, very dense, green-gray	-20
25	SPT	50/2" (100)		25.1	CLAYEY SAND, very dense, green-gray Boring terminated at 25.1 feet.	-25.1

PROJECT NAME Salt Storage NJDOT Freehold Yard
PROJECT NUMBER 728718-0000295 **PROJECT LOCATION** Freehold, New Jersey
DATE STARTED 6/28/19 **COMPLETED** 6/28/19 **GROUND ELEVATION** 0 ft NAD 83 **HOLE SIZE** 4.25 inches
DRILLING CONTRACTOR Boring Brothers **GROUND WATER LEVELS:** -- Not recorded
DRILLING METHOD Mud Rotary
LOGGED BY M. Ellahi **CHECKED BY** B. Arone
NOTES _____

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft., NAD83)
0						0
	SPT	4-4-5 (8)	CL		0.5 6 inches of Asphalt	-0.5
					2.0 SANDY CLAY, medium stiff, brown (Fill)	-2.0
	SPT	6-8-7-8 (15)	SC		CLAYEY SAND, medium dense, brown	
5					6.0 CLAYEY SAND, medium dense, brown	-5
	SPT	5-6-6-14 (12)				-6.0
	SPT	11-12-10-12 (22)			CLAY, very stiff, gray-green	
	SPT	9-7-9-7 (16)			CLAY, very stiff, gray-green	
10			CL			-10
15					15.0	-15.0
	SPT	4-7-13-22 (20)			SANDY CLAY, medium stiff, dark brown	
20			CL			-20
	SPT	24-50/4" (100)			SANDY CLAY, hard, dark brown	
25					25.3	-25
	SPT	50/3" (100)			SANDY CLAY, hard, dark brown	-25.3

Boring terminated at 25.2 feet.

PROJECT NAME Salt Storage NJDOT Freehold Yard
PROJECT NUMBER 728718-0000295 **PROJECT LOCATION** Freehold, New Jersey
DATE STARTED 6/28/19 **COMPLETED** 6/28/19 **GROUND ELEVATION** 0 ft NAD 83 **HOLE SIZE** 4.25 inches
DRILLING CONTRACTOR Boring Brothers **GROUND WATER LEVELS:** --- Not recorded
DRILLING METHOD Mud Rotary
LOGGED BY M. Ellahi **CHECKED BY** B. Arone
NOTES _____

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft., NAD83)
0						0
					0.4 5 inches of Asphalt	-0.4
	SPT	4-4-4 (8)	SM		SILTY SAND, loose, brown	
	SPT	7-5-4-4 (9)			SILTY SAND, loose, brown	
5	SPT	5-4-4-6 (8)			SILTY SAND, loose, brown	
	SPT	5-6-9-8 (15)			SILTY SAND, medium dense, brown	8.0
10	SPT	8-7-9-10 (16)	CL		CLAY, very stiff, green-gray	-10
15	SPT	6-11-18-29 (29)			CLAY, very stiff, black	
20	SPT	43-50/0" (100)			CLAY, hard, green-gray	
25	SPT	50/3" (100)			CLAY, hard, green-gray	-25.2

Boring terminated at 25.2 feet.

KEY TO SYMBOLS

Symbol Description

Strata symbols



Sand



Asphalt



Clayey Silt



Silty sand



Sand with Silt



Sandy Clay



Topsoil



Bedrock



Weathered Rock



Clayey Sand



Silt



Cobbles and Boulders

Misc. Symbols



Groundwater level measured at boring completion. The date checked is indicated.



Boring continues



End of Boring

Soil Samplers



Standard penetration test. 140 lb. hammer dropped 30"



Hand Auger



Rock Core



Shelby Tube

Notes:

1. Exploratory borings were drilled on 06-27-2019 and on 06-28-19, using a 4.25-inch-diameter hollow stem auger.
2. Groundwater was not recorded.
3. Boring locations were taped from existing features.
4. These logs are subject to the limitations, conclusions, and recommendations in this report.
5. Results of tests conducted on samples recovered are reported on the logs.

NOTES RELATED TO RECORDS OF TEST BORING AND GENERALIZED SUBSURFACE PROFILE

1. Groundwater level was encountered and recorded (if shown) following the completion of the soil test boring on the date indicated. Fluctuations in groundwater levels are common; consult report text for a discussion.
2. The boring location was identified in the field by offsetting from existing reference marks and using a cloth tape and survey wheel.
3. The borehole was backfilled to site grade following boring completion, and patched with asphalt cold patch mix when pavement was encountered.
4. The Record of Test Boring represents our interpretation of field conditions based on engineering examination of the soil samples.
5. The Record of Test Boring is subject to the limitations, conclusions and recommendations presented in the report text.
6. "Field Test Data" shown on the Record of Test Boring indicated as 11/6 refers to the Standard Penetration Test (SPT) and means 11 hammer blows drove the sampler 6 inches. SPT uses a 140-pound hammer falling 30 inches.
7. The N-value from the SPT is the sum of the hammer blows required to drive the sampler the second and third 6-inch increments.
8. The soil/rock strata interfaces shown on the Record of Test Boring are approximate and may vary from those shown. The soil/rock conditions shown on the Record of Test Boring refer to conditions at the specific location tested; soil/rock conditions may vary between test locations.
9. Relative density for sands/gravels and consistency for silts/clays and limestone are described as follows:

SPT Blows/ Foot	Sands/Gravels Relative Density	SPT Blows/Foot	Silt/Clay Relative Consistency	SPT Blows/ Foot	Limestone Relative Consistency
0-4	Very loose	0-2	Very Soft	0-20	Very Soft
5-10	Loose	3-4	Soft	21-30	Soft
11-30	Medium Dense	5-8	Medium Stiff	31-45	Medium Hard
31-50	Dense	9-15	Stiff	46-60	Moderately Hard
Over 50	Very Dense	16-30	Very Stiff	61-50/2"	Hard
		Over 30	Hard	Over 50/2"	Very Hard

10. Grain size descriptions are as follows:

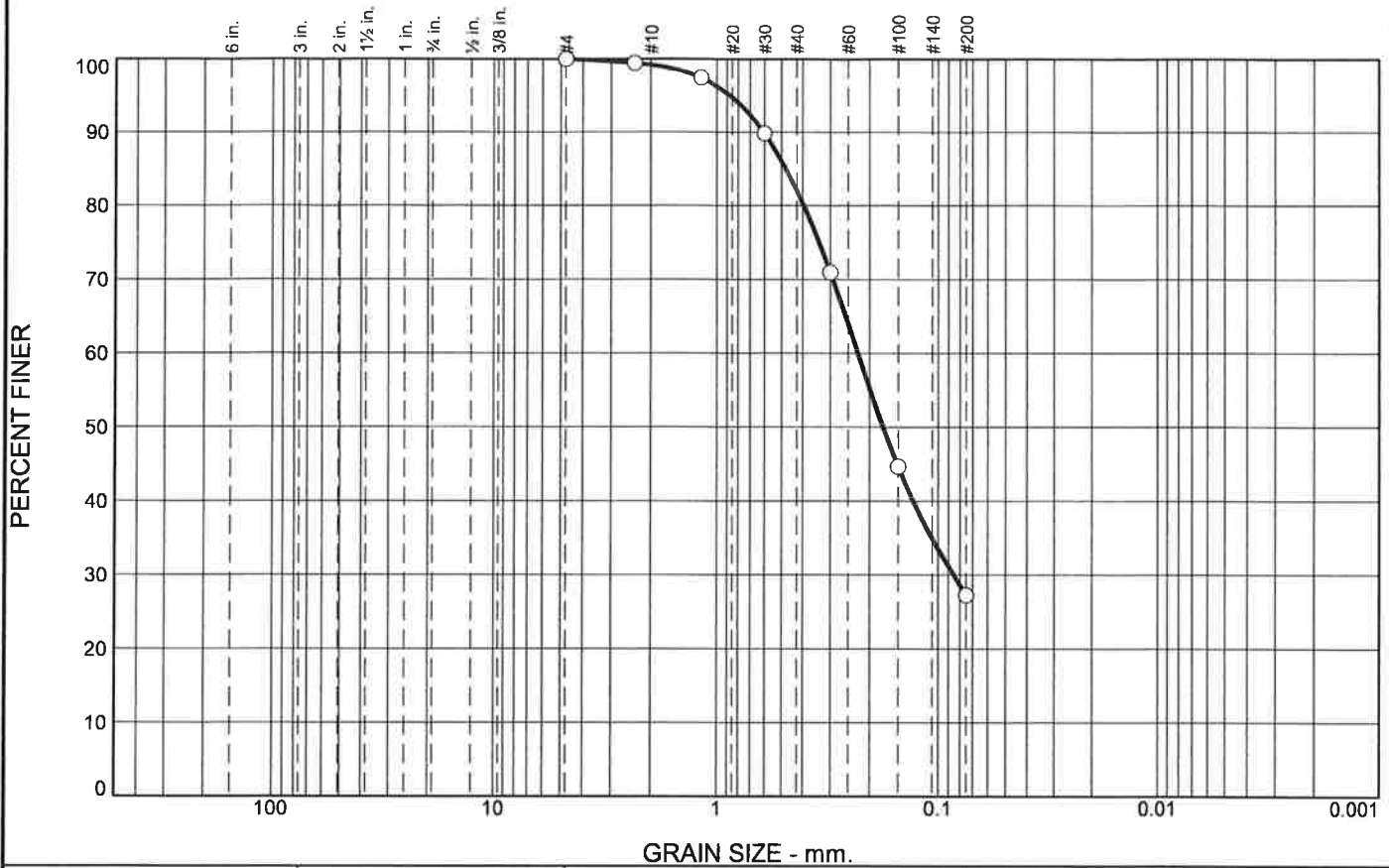
<u>NAME</u>	<u>SIZE LIMITS</u>
Boulder	12 inches or more
Cobbles	3 to 12 inches
Coarse Gravel	3/4 to 3 inches
Fine Gravel	No. 4 sieve to 3/4 inch
Coarse Sand	No. 10 to No. 4 sieve
Medium Sand	No. 40 to No. 10 sieve
Fine Sand	No. 200 to No. 40 sieve
Fines	Smaller than No. 200 sieve
11. Definitions related to adjectives used in soil/rock descriptions:

<u>PROPORTION</u>	<u>ADJECTIVE</u>	<u>APPROXIMATE ROOT DIAMETER</u>	<u>ADJECTIVE</u>
About 5%	with a trace	Less than 1/32"	Fine roots
About 5% to 12%	with	1/32" to 1/4"	Small roots
About ≥ 12%	silty, sandy, etc.	1/4" to 1"	Medium roots
		Greater than 1"	Large roots

APPENDIX B

LABORATORY TEST DATA

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.8	17.2	54.8	27.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.4		
#16	97.3		
#30	89.8		
#50	71.0		
#100	44.6		
#200	27.2		

Material Description

silty sand

Atterberg Limits

PL= 40 LL= 50 PI= 10

Coefficients

D₉₀= 0.6054 D₈₅= 0.4775 D₆₀= 0.2257
D₅₀= 0.1747 D₃₀= 0.0854 D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-5(0)

Remarks

Natural Moisture Content is 48.2%

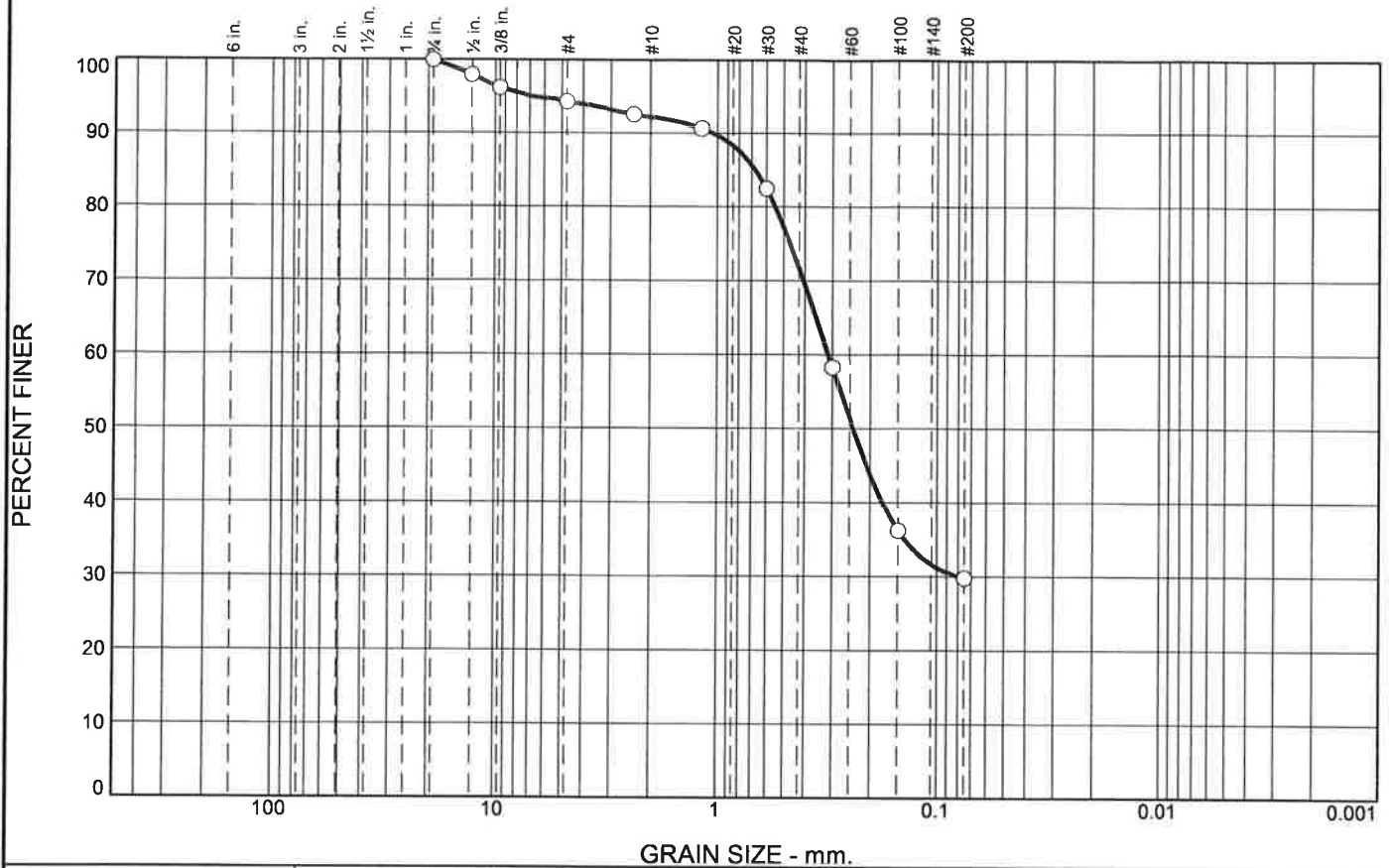
* (no specification provided)

Location: B-1 Sample Number: S-5 Depth: 8-10 Date: 07/11/2019

Vertical V-Northeast, Inc.	Client: NJ DPMC
Rahway, New Jersey	Project: Freehold Salt Storage Shed
	Project No: 728718-0000295
	Figure B-1

Tested By: Leo C. Checked By: B. Arone

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		5.6	2.1	20.5	41.9	29.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	99.9		
1/2"	97.9		
3/8"	96.2		
#4	94.3		
#8	92.6		
#16	90.6		
#30	82.5		
#50	58.3		
#100	36.2		
#200	29.8		

Material Description

clayey sand

Atterberg Limits
 PL= 19 LL= 31 PI=

Coefficients
 D₉₀= 1.0469 D₈₅= 0.6753 D₆₀= 0.3134
 D₅₀= 0.2407 D₃₀= 0.0790 D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= SC AASHTO= A-2-6(0)

Remarks
 Natural Moisture Content is 34.3%

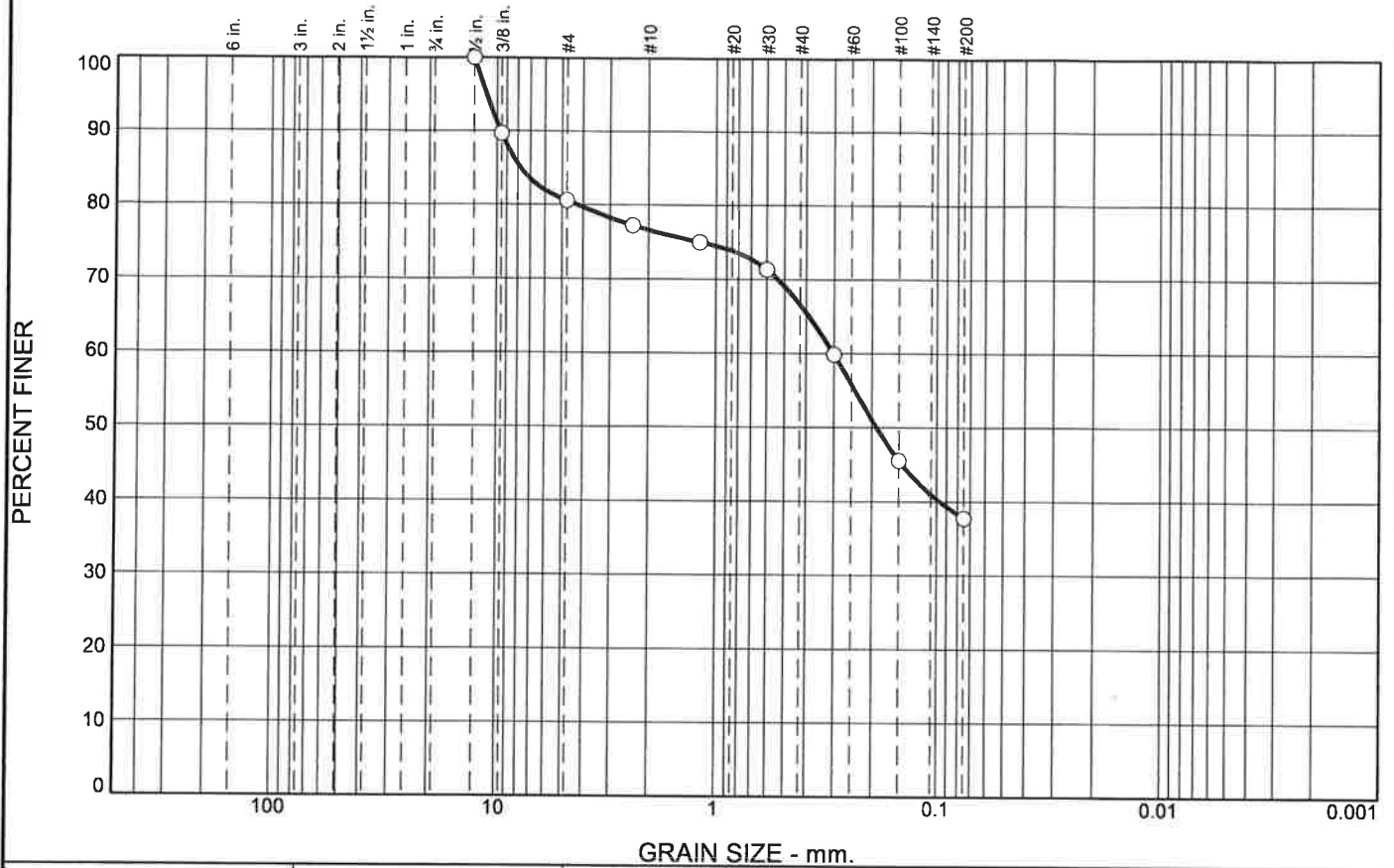
* (no specification provided)

Location: B-2 Sample Number: S-4 Depth: 6-8 Date: 7/12/19

Vertical V-Northeast, Inc. Rahway, New Jersey	Client: NJ DPMC Project: Freehold Salt Storage Shed Project No: 728718-0000295
Figure B-2	

Tested By: Leo C. Checked By: B. Arone

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	19.4	4.0	10.0	28.9	37.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	89.6		
#4	80.6		
#8	77.2		
#16	75.0		
#30	71.3		
#50	59.9		
#100	45.5		
#200	37.7		

Material Description

silty sand with gravel

Atterberg Limits

PL= 33 LL= 51 PI= 18

Coefficients

D₉₀= 9.6382 D₈₅= 7.7676 D₆₀= 0.3018
 D₅₀= 0.1903 D₃₀= D₁₅=
 D₁₀= C_u= C_c=

Classification

USCS= SM AASHTO= A-7-5(3)

Remarks

Natural Moisture Content is 29.8 %

* (no specification provided)

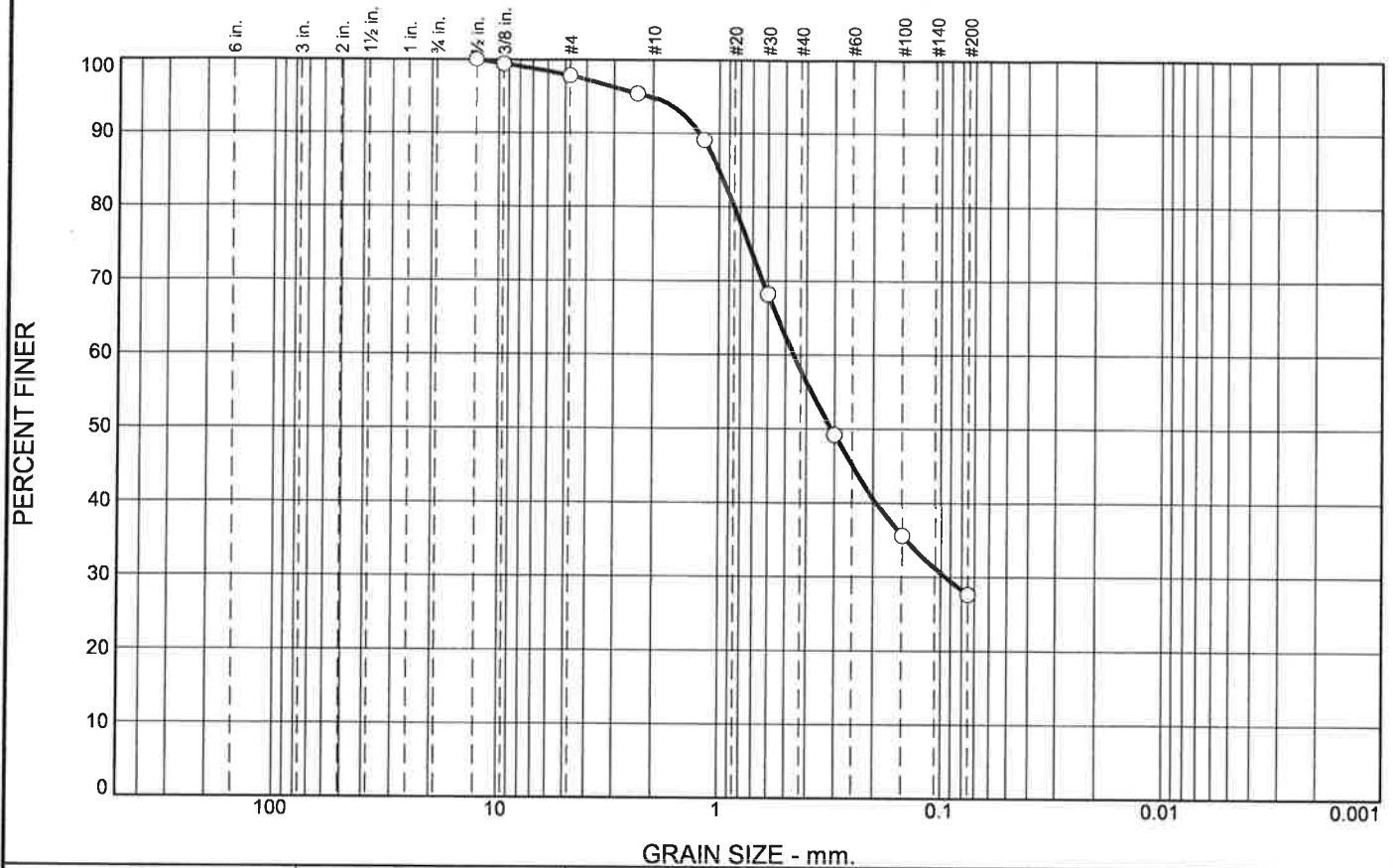
Location: B-3 Sample Number: S-3 Depth: 4-6 Date: 07/11/2019

Vertical V-Northeast, Inc.
Rahway, New Jersey

Client: NJ DPMC
 Project: Freehold Salt Storage Shed
 Project No: 728718-0000295 Figure B-3

Tested By: Leo C. Checked By: B. Arone

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.2	3.0	36.9	30.3	27.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	99.5		
#4	97.8		
#8	95.4		
#16	89.1		
#30	68.2		
#50	49.2		
#100	35.6		
#200	27.6		

Material Description

silty sand

Atterberg Limits

PL= 0 LL= 0 PI=

Coefficients

D₉₀= 1.2355 D₈₅= 1.0019 D₆₀= 0.4580
D₅₀= 0.3103 D₃₀= 0.0952 D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Natural Moisture Content is 33.4%

* (no specification provided)

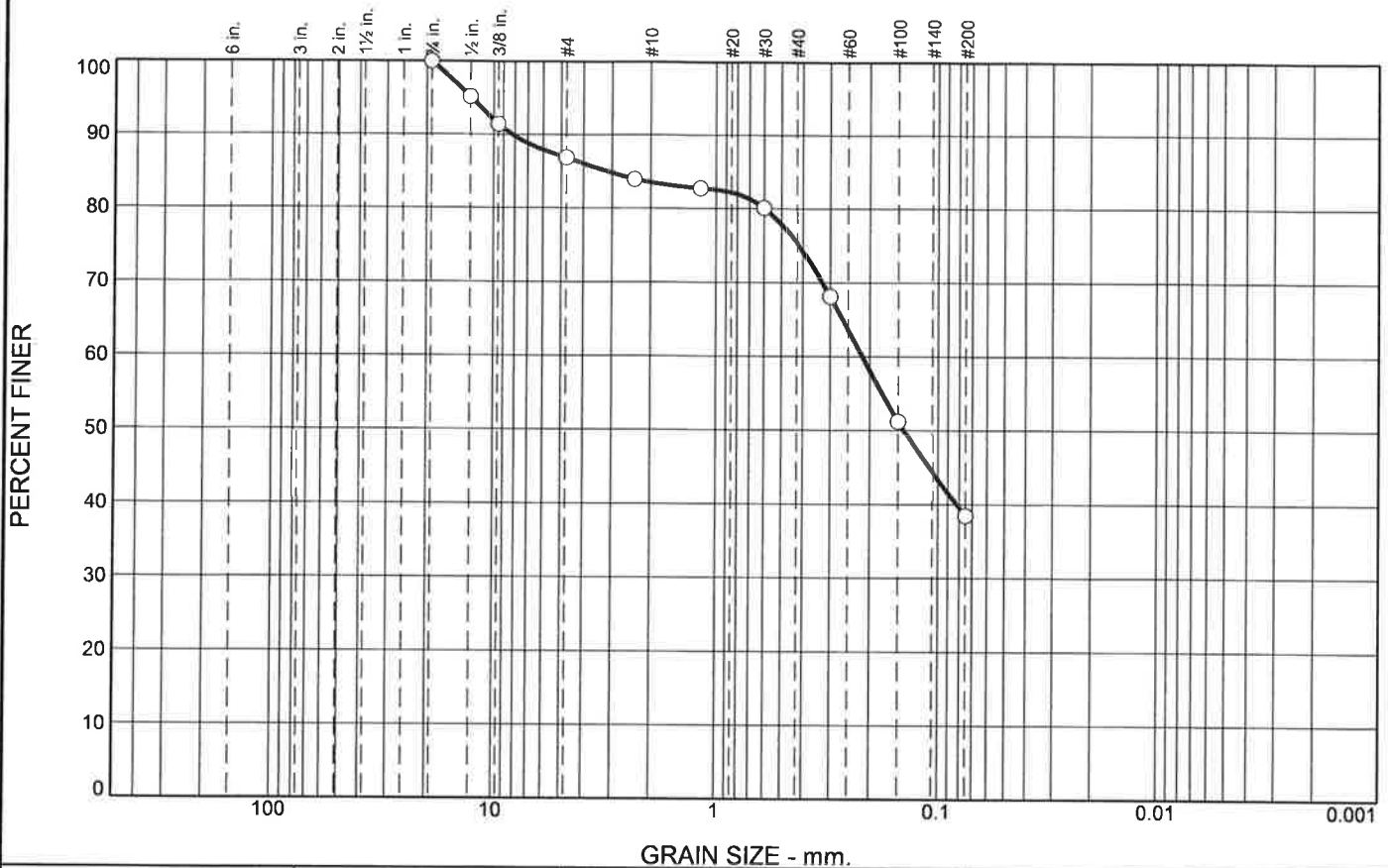
Location: B-4 Sample Number: S-6 Depth: 15-17 Date: 07/11/2016

Vertical V-Northeast, Inc.
Rahway, New Jersey

Client: NJ DPMC
Project: Freehold Salt Storage Shed
Project No: 728718-0000295 Figure B-4

Tested By: Leo C. Checked By: B. Arone

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	13.2	3.3	8.2	36.8	38.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	95.2		
3/8"	91.4		
#4	86.8		
#8	84.0		
#16	82.8		
#30	80.1		
#50	68.1		
#100	51.2		
#200	38.5		

Material Description

clayey sand

Atterberg Limits

PL= 19 LL= 43 PI= 24

Coefficients

D₉₀= 8.2416 D₈₅= 3.1400 D₆₀= 0.2157
D₅₀= 0.1417 D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-7-6(4)

Remarks

Natural Moisture Content is 21.3%

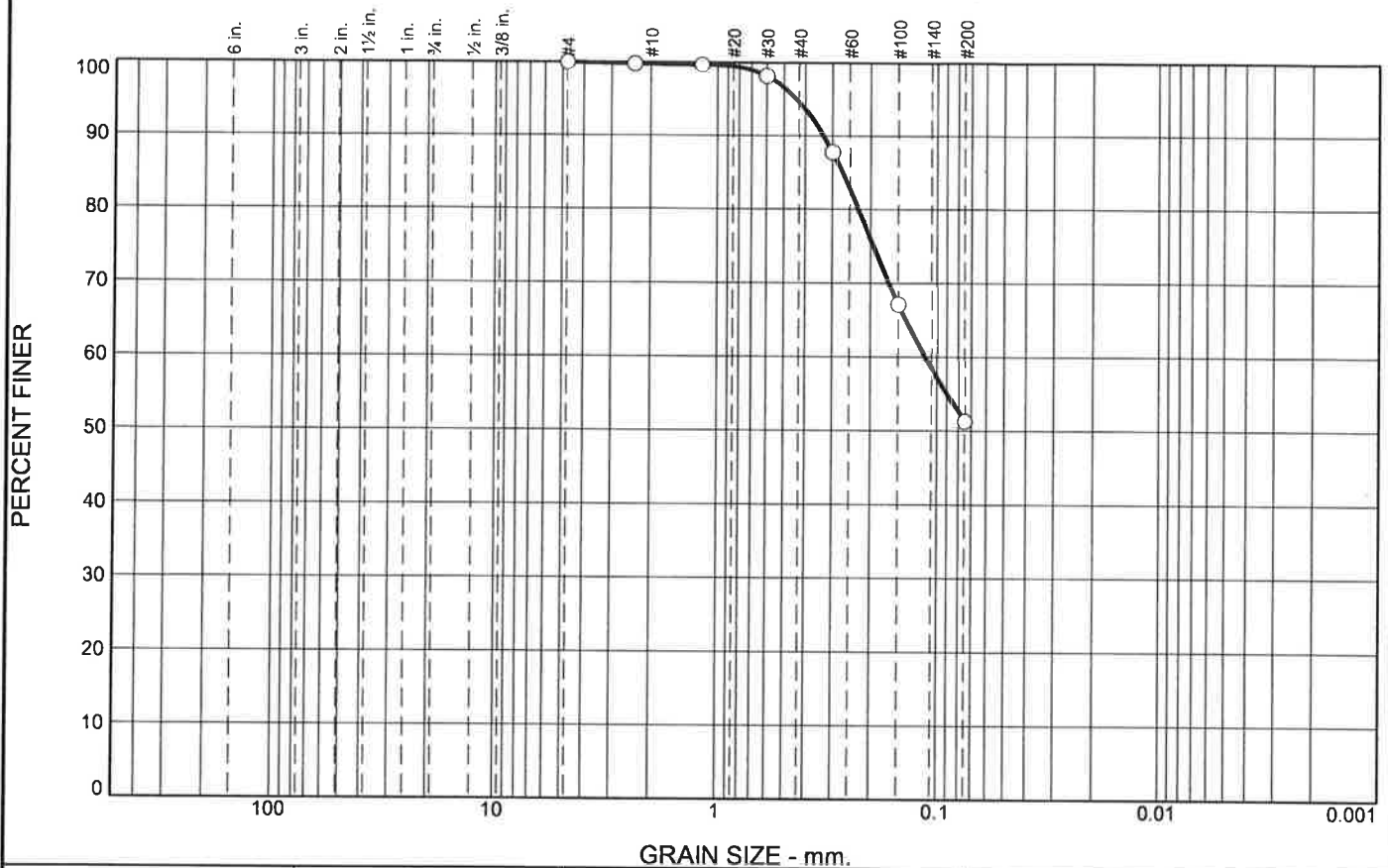
* (no specification provided)

Location: B-6 Sample Number: S-2 Depth: 2-4 Date: 07/11/2019

Vertical V-Northeast, Inc. Rahway, New Jersey	Client: NJ DPMC Project: Freehold Salt Storage Shed Project No: 728718-0000295
Figure B-5	

Tested By: Leo C. Checked By: B. Arone

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	5.1	43.3	51.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.8		
#16	99.7		
#30	98.2		
#50	87.8		
#100	67.2		
#200	51.3		

Material Description

sandy lean clay

Atterberg Limits

PL= 22 LL= 48 PI= 26

Coefficients

D₉₀= 0.3301 D₈₅= 0.2702 D₆₀= 0.1131
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(10)

Remarks

Natural Moisture Content is 22.0%

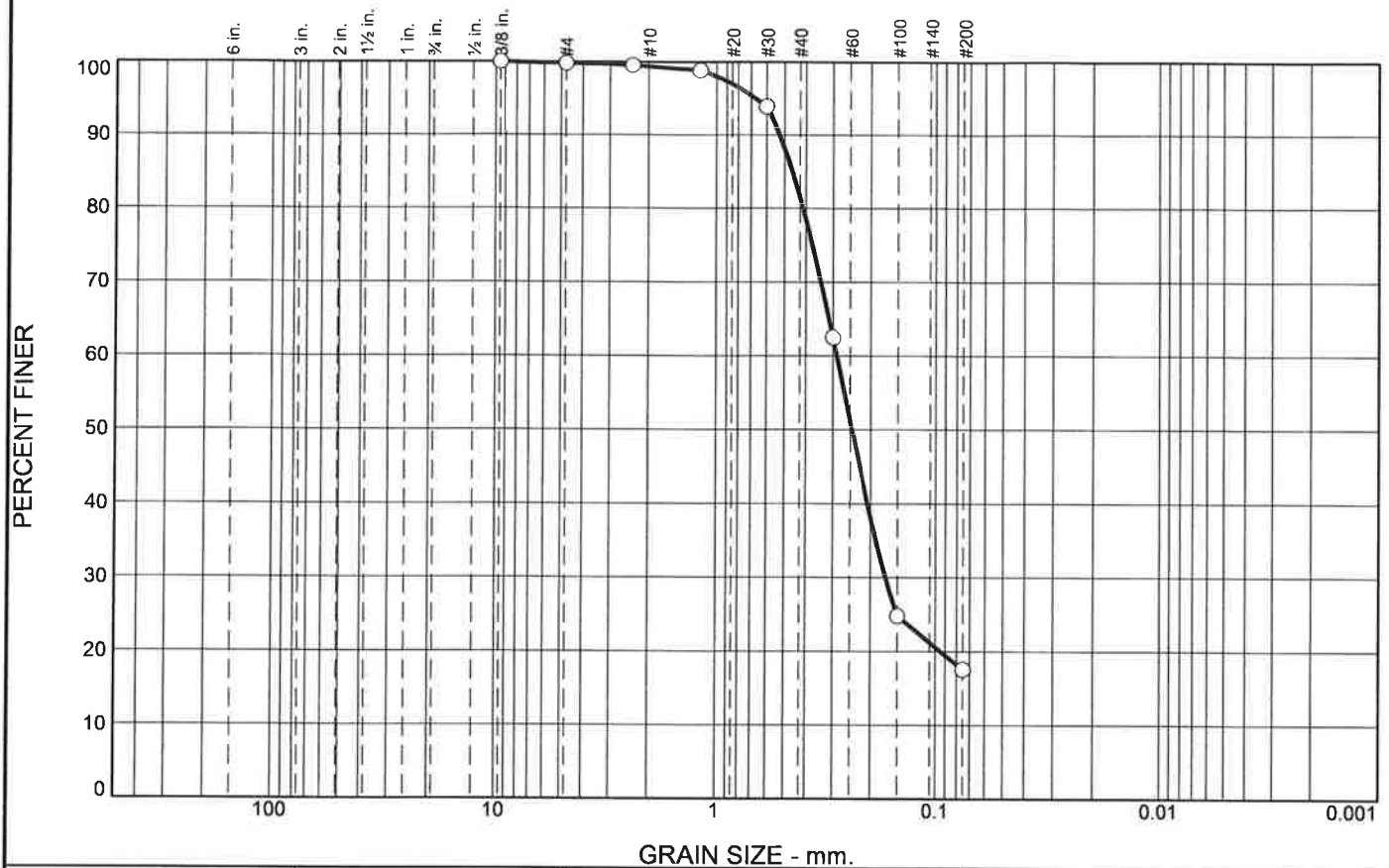
* (no specification provided)

Location: B-7 Sample Number: S-3 Depth: 4-6 Date: 7/11/2019

Vertical V-Northeast, Inc. Rahway, New Jersey	Client: NJ DPMC Project: Freehold Salt Storage Shed Project No: 728718-0000295
Figure B-6	

Tested By: Leo C. Checked By: B. Arone

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.4	18.0	63.8	17.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	99.8		
#8	99.5		
#16	98.8		
#30	93.9		
#50	62.5		
#100	24.8		
#200	17.6		

Material Description

silty sand

Atterberg Limits

PL= 0 LL= 0 PI=

Coefficients

D₉₀= 0.5256 D₈₅= 0.4610 D₆₀= 0.2878
D₅₀= 0.2448 D₃₀= 0.1708 D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Natural Moisture Content is 11.2%

* (no specification provided)

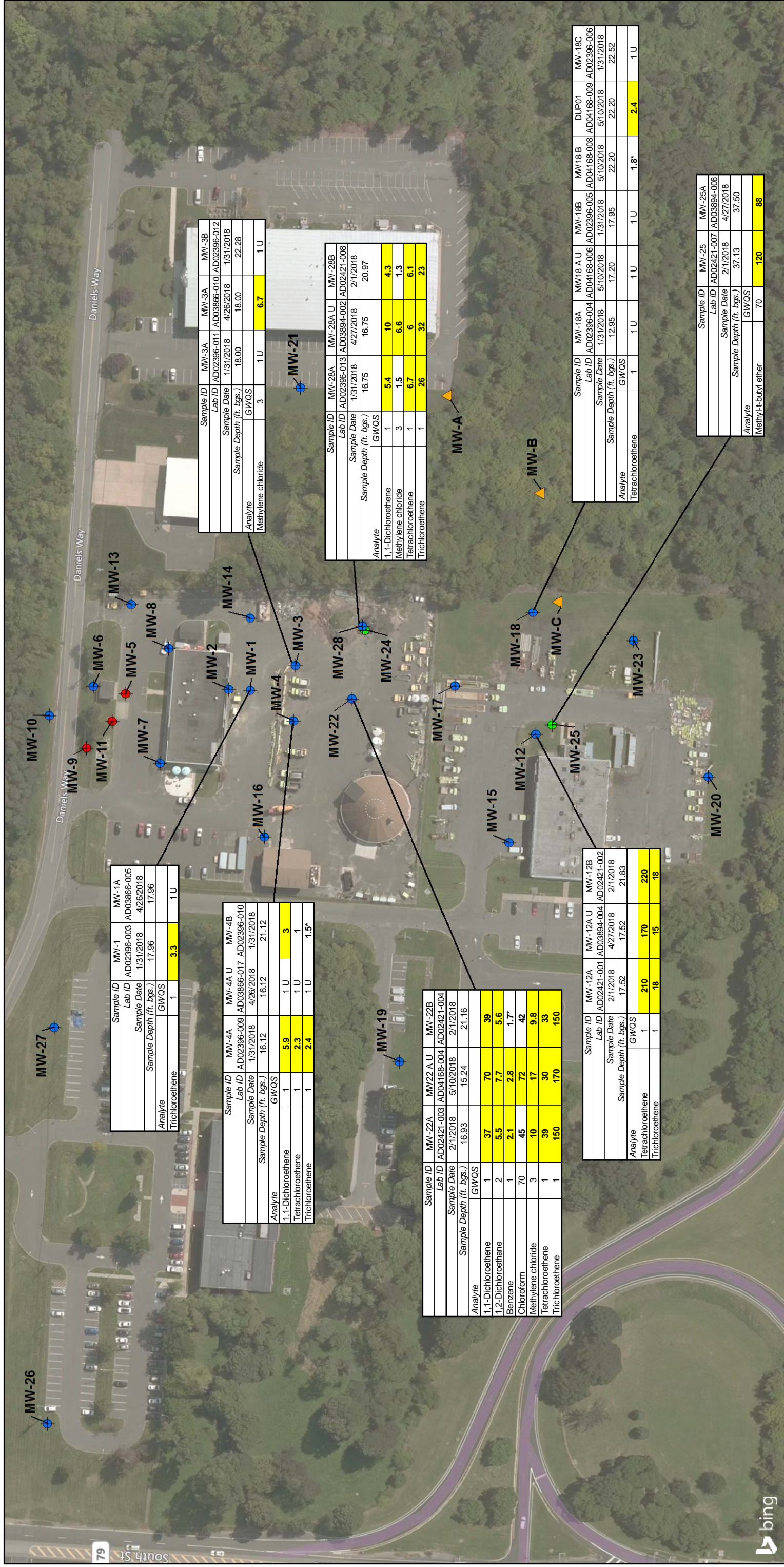
Location: B-9 Sample Number: S-2 Depth: 2-4 Date: 7/11/19

Vertical V-Northeast, Inc. Rahway, New Jersey	Client: NJ DPMC Project: Freehold Salt Storage Shed Project No: 728718-0000295 Figure B-7
--	---

Tested By: Leo C. Checked By: B. Arone

APPENDIX B

**SITE PLAN WITH VOC EXCEEDANCES AND
ORIGINAL BORINGS LOGS FOR
MAINTENANCE FACILITY CONSTRUCTION**



Sample ID	MW-1	MW-1A	MW-4B
Lab ID	AD02396-003	AD03866-005	AD03866-010
Sample Date	1/31/2018	4/26/2018	1/31/2018
Sample Depth (ft. bgs.)	17.96	17.96	22.28
GWQS	1	3.3	1 U
Analyte	Trichloroethene		

Sample ID	MW-4A	MW-4A U	MW-4B
Lab ID	AD02396-009	AD03866-017	AD02396-010
Sample Date	1/31/2018	4/26/2018	1/31/2018
Sample Depth (ft. bgs.)	16.12	16.12	21.12
GWQS	1	5.9	1 U
Analyte	1,1-Dichloroethene		
Sample Depth (ft. bgs.)	1	2.3	1 U
GWQS	1	2.4	1 U
Analyte	Tetrachloroethene		

Sample ID	MW-22A	MW-22A U	MW-22B
Lab ID	AD02421-003	AD04168-004	AD02421-004
Sample Date	2/1/2018	5/10/2018	2/1/2018
Sample Depth (ft. bgs.)	16.93	15.24	21.16
GWQS	1	37	70
Analyte	1,1-Dichloroethene		
Sample Depth (ft. bgs.)	2	5.5	7.7
GWQS	1	2.1	2.8
Analyte	1,2-Dichloroethane		
Sample Depth (ft. bgs.)	70	45	72
GWQS	3	10	17
Analyte	Chloroform		
Sample Depth (ft. bgs.)	1	39	30
GWQS	1	150	170
Analyte	Methylene chloride		
Sample Depth (ft. bgs.)	1	39	30
GWQS	1	150	170
Analyte	Tetrachloroethene		

Sample ID	MW-12A	MW-12A U	MW-12B
Lab ID	AD02421-001	AD03894-004	AD02421-002
Sample Date	2/1/2018	4/27/2018	2/1/2018
Sample Depth (ft. bgs.)	17.52	17.52	21.83
GWQS	1	210	170
Analyte	Tetrachloroethene		
Sample Depth (ft. bgs.)	1	18	15
GWQS	1	220	18
Analyte	Trichloroethene		

Sample ID	MW-3A	MW-3A	MW-3B
Lab ID	AD02396-011	AD03866-010	AD02396-012
Sample Date	1/31/2018	4/26/2018	1/31/2018
Sample Depth (ft. bgs.)	18.00	18.00	22.28
GWQS	3	1 U	6.7
Analyte	Methylene chloride		

Sample ID	MW-28A	MW-28A U	MW-28B
Lab ID	AD02396-013	AD03894-002	AD02421-008
Sample Date	1/31/2018	4/27/2018	2/1/2018
Sample Depth (ft. bgs.)	16.75	16.75	20.97
GWQS	1	5.4	10
Analyte	1,1-Dichloroethene		
Sample Depth (ft. bgs.)	3	1.5	6.6
GWQS	1	6.7	6
Analyte	Methylene chloride		
Sample Depth (ft. bgs.)	1	26	32
GWQS	1	26	23
Analyte	Trichloroethene		

Sample ID	MW-18A	MW-18A U	MW-18B	MW-18C
Lab ID	AD02396-004	AD04168-008	AD02396-005	AD04168-009
Sample Date	1/31/2018	5/10/2018	1/31/2018	5/10/2018
Sample Depth (ft. bgs.)	12.95	17.20	17.95	22.20
GWQS	1	1 U	1 U	1.8*
Analyte	Tetrachloroethene			
Sample ID	MW-25	MW-25A	MW-25B	MW-25C
Lab ID	AD02421-007	AD03894-006	AD02421-008	AD03894-007
Sample Date	2/1/2018	4/27/2018	2/1/2018	4/27/2018
Sample Depth (ft. bgs.)	37.13	37.50	37.13	37.50
GWQS	70	120	70	88
Analyte	Methyl-t-butyl ether			

- Shallow Monitoring Well
- Deep Monitoring Well
- Sealed Monitoring Well
- ▲ Proposed Monitoring Well Location
- AOC 5: Groundwater

Notes:

- All results are presented in ug/l (ppb), unless otherwise noted.
- * = Not an exceedance based on significant figures.
- GWQS = New Jersey Groundwater Quality Standard, January 2018
- U = Compound was not detected
- **Bold values indicated positive detections**
- **Shaded values exceed the GWQS**

Image Courtesy of:
 2018 Microsoft Corp;
 2018 Digital Globe;
 2018 CNES, Distribution Airbus DS

Coordinate System:
 New Jersey FIPS 2900 FT
 Datum: North American 1983

July 2018

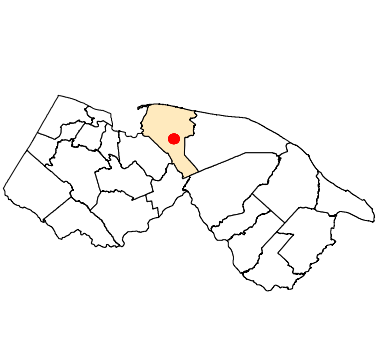


Figure 1

Site Plan with VOC Exceedances and Proposed Monitoring Well Locations

Freehold Maintenance Facility
Freehold, New Jersey

Louis Berger

N

0 60 120 240 Feet

WALKER SANDER FORD AND KERR, P.A. ARCHITECTS AND PLANNERS
 18 NASSAU STREET PRINCETON, NEW JERSEY 08540
 609-924-5678

PAULUS & SOKOLOWSKI
 744 MOUNTAIN BOULEVARD
 WATCHUNG, NEW JERSEY 07060
 201-755-5737

STRUCTURAL ENGINEERS

LOUIS GOLDBERG & ASSOCIATES
 14 CHARLES STREET
 METUCHEN, NEW JERSEY 08840
 201-549-8844

MECHANICAL & ELECTRICAL ENGINEERS

FERMIAN FORD III, AIA, C350
 JAMES A. KERR, AIA, C283
 HANS K. SANDER, AIA, C380
 WM. H. WALKER II, AIA, C2754

D.O.T. MAINTENANCE FACILITY
 FREEHOLD TOWNSHIP, N.J.

STATE OF NEW JERSEY
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANT ENGG & OPERN

PROJECT ENGINEER: *William R. Amstutz* DATE: *3/18/73*

PROJECT NO. *3/18/73*

CHIEF, BUREAU OF PLANT ENGINEERING & OPERN

DEPARTMENT OF THE TREASURY
 DIVISION OF BUILDING & CONSTRUCTION

DATE: *3/18/73*

WALTER PETERS, JR.
 DIRECTOR, DIVISION OF BUILDING & CONSTRUCTION

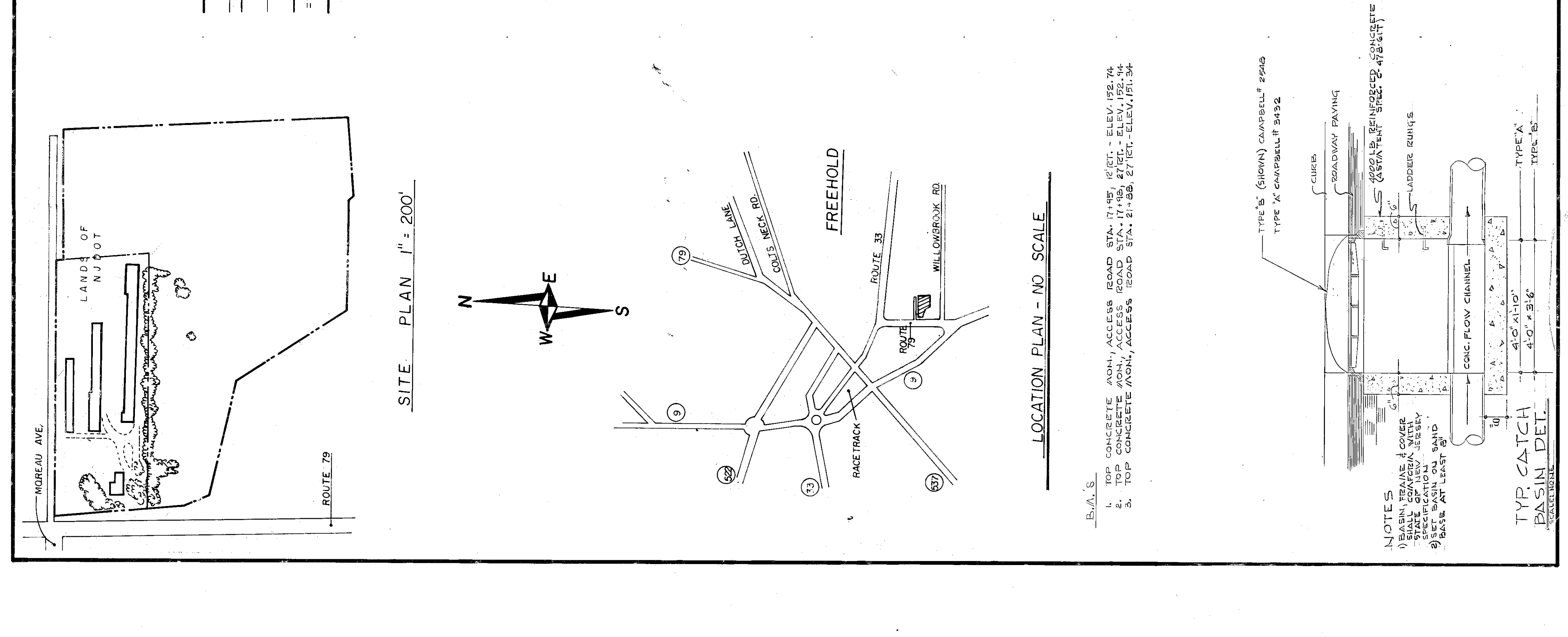
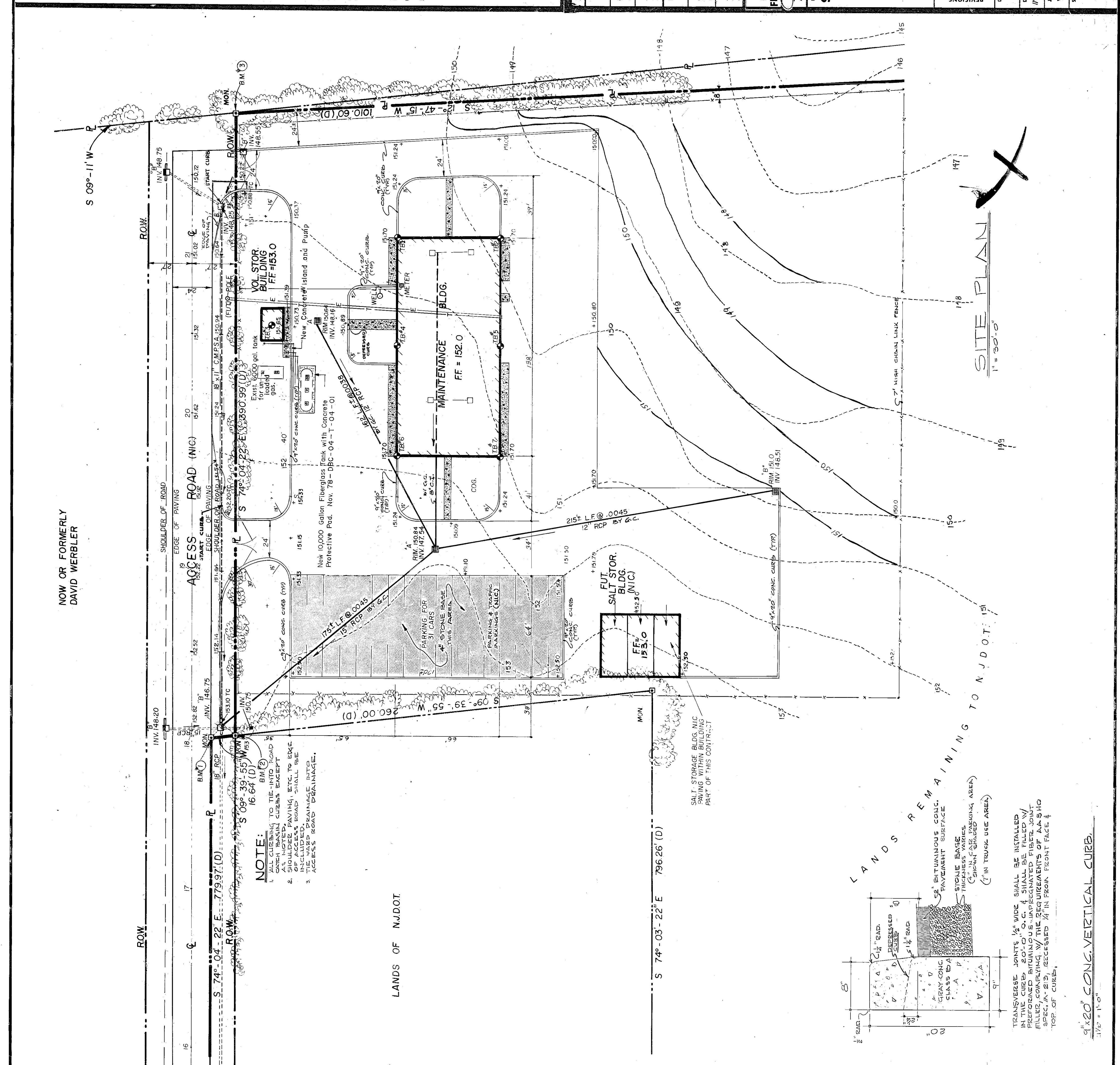
ADMINISTRATOR / STATE ARCHITECT: *DATE: 3/18/73*

D.O.T.
 NEW MAINTENANCE FACILITY
 FREEHOLD TOWNSHIP, N.J.

ARCHITECT: *Walker Sander Ford and Kerr, P.A.* CERTIFICATE NO. *CA-252*

SCALE: AS NOTED
 DATE: 1/29/73
 DRAWN BY: M.L. / A.P.B.
 CHECKED BY:

JOB NO.: W5FK 7207 JOB NO.: DBC 8146
 SHEET NO.: 2/18 DRAWING NO.: A-2



4.3-200

WALKER SANDER FORD AND KERR, P.A. ARCHITECTS AND PLANNERS
 18 NASSAU STREET PRINCETON, NEW JERSEY 08540
 609-924-5678

JEFFREY H. FORD III, AIA C2250
 JAMES A. KERR, AIA C2283
 HANS K. SANDER, AIA C2308
 WM. H. WALKER III, AIA C2354

PAULUS & SOKOLOWSKI
 744 MOUNTAIN BOULEVARD
 WATCHUNG, NEW JERSEY 07060
 201-755-5737

LOUIS GOLDBERG & ASSOCIATES
 MECHANICAL & ELECTRICAL ENGINEERS
 14 CHARLES STREET
 METUCHEN, NEW JERSEY 08840
 201-549-8844

CLIENT: State of New Jersey Dept. Construction DATE: February 13, 1973
 PROJECT: Freehold Maintenance Facility LAB. No. 11222
 CONTROL No. DBC-8146
 Boring No. TP-1 Sheet No. 1 of 1
 Ground Surface Elev. 150.6
 Method of Advancing Boring: 4" Drilled in Casing

Depth	No.	Depth	Soil Classification	Remarks
0	S-1	0'-1.5'	Loose to Med Dense, Moist to Wet, Silty Clay and Fine Sand	
1.5	S-2	2'-3.5'		
3.5	S-3	4'-5.5'		
5.5	S-4	6'-7.5'		
7.5	S-5	8'-10'	Med Dense, Moist, Brown Silty Clayey Sandy Marl	11.5'
10	S-6	13.5'-15'		15.0'

Test Boring Completed at 15.0 feet.

Ground Water Data: No. 1, Date: 1/29/73, Depth: 0' to 15.0'

Soil Classification: Loose to Med Dense, Moist to Wet, Silty Clay and Fine Sand

Remarks: 11.5', 15.0'

CLIENT: State of New Jersey Dept. Construction DATE: February 13, 1973
 PROJECT: Freehold Maintenance Facility LAB. No. 11222
 CONTROL No. DBC-8146
 Boring No. TP-5 Sheet No. 1 of 1
 Ground Surface Elev. 150.5
 Method of Advancing Boring: 4" Drilled in Casing

Depth	No.	Depth	Soil Classification	Remarks
0	S-1	0'-1.5'	Loose, Moist, Brown Silty, Sandy Clay	
1.5	S-2	2'-3.5'	Brown, Moist to Dry, Med Dense, Silty Sand with trace Gravel	4.0'
3.5	S-3	4'-5.5'		
5.5	S-4	6'-7.5'	Brown Green Silty Clay with trace Fine Sand (Marl)	8.0'
7.5	S-5	8'-10'		
10	S-6	13.5'-15'		15.0'

Test Boring Completed at 15.0 feet.

CLIENT: State of New Jersey Dept. Construction DATE: February 13, 1973
 PROJECT: Freehold Maintenance Facility LAB. No. 11222
 CONTROL No. DBC-8146
 Boring No. TP-6 Sheet No. 1 of 1
 Ground Surface Elev. 152.1
 Method of Advancing Boring: 4" Drilled in Casing

Depth	No.	Depth	Soil Classification	Remarks
0	S-1	0'-1.5'	Soft to Stiff, Moist, Brown Silty Clay	
1.5	S-2	2'-3.5'	Med Dense, Moist, Brown Silty Sand	2.0'
3.5	S-3	4'-5.5'		
5.5	S-4	6'-7.5'		
7.5	S-5	8'-10'	Brown Silty, Clayey Marl	10.0'
10	S-6	13.5'-15'		15.0'

Test Boring Completed at 15.0 feet.

Ground Water Data: No. 1, Date: 1/29/73, Depth: 0' to 15.0'

Soil Classification: Soft to Stiff, Moist, Brown Silty Clay

Remarks: 2.0', 10.0', 15.0'

14-3-200

APPENDIX C

PRIOR APPROVALS



State of New Jersey

DEPARTMENT OF TRANSPORTATION
P.O. Box 600
Trenton, New Jersey 08625-0600

PHILIP D. MURPHY
Governor

DIANE GUTIERREZ-SCACCETTI
Commissioner

SHEILA Y. OLIVER
Lt. Governor

November 14, 2019

Ines Zimmerman
District Manager
Freehold Soil Conservation District
4000 Kozloski Road, PO Box 5033
Freehold, NJ 07728-5033

Ref: **T0564-02 Freehold Salt Storage Building**
(Freehold Township, Monmouth County)

Dear Ms. Ines,

This letter is to certify that the plans and specifications for the above referenced project are in conformance with the New Jersey Department of Transportation Soil Erosion and Sediment Control Standards, and in compliance with the Soil Erosion and Sediment Control Act, Chapter 251.

The plans for the project are available upon written request to Mr. Chris Sagliocco, Division of Support Services, New Jersey Department of Transportation, 1035 Parkway Avenue, P.O. Box 600, Trenton, New Jersey 08625. Please indicate the route and section or project name in the request.

Sincerely,

A handwritten signature in black ink, appearing to read 'Jay Khetani'.

JK Jay Khetani
Project Engineer, Surface Design
Landscape Architecture & Environmental Solutions

cc:

F. Minch
C. Sagliocco

State of New Jersey
 Honorable Philip D. Murphy, Governor
 Honorable Sheila Y. Oliver, Lt. Governor

NJDOT FREEHOLD MAINTENANCE FACILITY

DPMC PROJECT NO. T0564-02
 RTE 79 AND DANIELS WAY, TOWNSHIP OF FREEHOLD, FREEHOLD, NEW JERSEY

DEPARTMENT OF TRANSPORTATION
 Diane Gutierrez-Scaccetti, Commissioner

DEPARTMENT OF THE TREASURY
 Elizabeth Maher Muoio, State Treasurer
 DIVISION OF PROPERTY MANAGEMENT AND CONSTRUCTION
 Christopher Chianese, Director

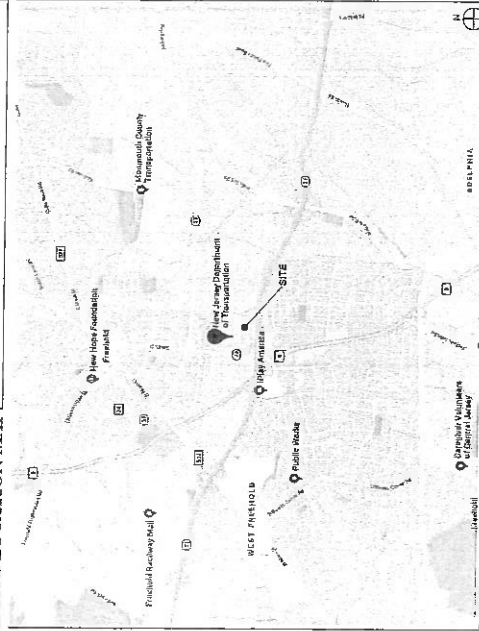


NIV5 NVS - ARCHITECTURE PC
 7 Campus Drive, Suite 300, Parsippany, NJ 07054-4435 TEL: 973-946-5800

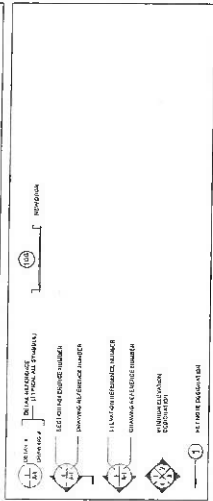
CONSULTANTS:
STRUNK-ALBERT ENGINEERING
 MECHANICAL/ELECTRICAL CONSULTING ENGINEERS
 1400 W. 10TH STREET, SUITE 100
 EAST STROUBERSBURG, PA 15601
 TEL: 814-411-5032 FAX: 814-411-3819

PBA ENGINEERING, P.C.
 STRUCTURAL ENGINEERS
 1240 LUCKY ROAD FREEHOLD, NJ 08041
 TEL: 732-476-1100 FAX: 732-226-1006

□ SITE LOCATION MAP



□ TYPICAL SYMBOLS



□ ABBREVIATIONS

SYMBOL	ABBREVIATION	DESCRIPTION
1	1/4\"/>	

□ LIST OF DRAWINGS

SYMBOL	DESCRIPTION
C-101	CONCRETE FOUNDATION PLAN
C-102	FOUNDATION WALL AND CROSS SECTION
C-103	FOUNDATION WALL AND CROSS SECTION
C-104	FOUNDATION WALL AND CROSS SECTION
C-105	FOUNDATION WALL AND CROSS SECTION
C-106	FOUNDATION WALL AND CROSS SECTION
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C-200	FOUNDATION WALL AND CROSS SECTION

SYMBOL	DESCRIPTION
E-101	ELECTRICAL SYMBOLS
E-102	ELECTRICAL SYMBOLS
E-103	ELECTRICAL SYMBOLS
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E-159	ELECTRICAL SYMBOLS
E-160	ELECTRICAL SYMBOLS

DESIGN
 DEVELOPMENT
 SUBMISSION
 SEPTEMBER 17, 2019

Project Title: State of New Jersey
 Department: Division of Property
 Management and Construction
 SALT STORAGE STRUCTURE
 NJDOT FREEHOLD
 MAINTENANCE FACILITY
 DPMC PROJECT NO. T0564-02
 177 JAMES DUNN WAY
 FREEHOLD, NJ 08041

NIV5
 NVS - ARCHITECTURE PC
 7 Campus Drive, Suite 300
 Parsippany, NJ 07054
 Tel: 973-946-5800
 Fax: 973-946-5801

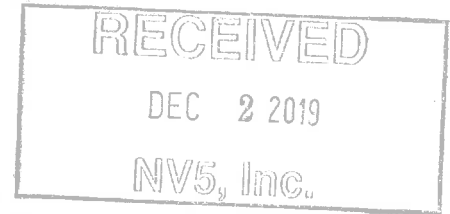
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 Project No: 2019-000000-02
 Drawing No: G-001

DATE: 09/17/19
 SCALE: AS SHOWN
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 PROJECT NO: 2019-000000-02
 DRAWING NO: G-001



State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF PERMIT COORDINATION AND ENVIRONMENTAL REVIEW
P.O. Box 420 Mail Code 401-07J Trenton, New Jersey 08625-0420
Phone Number (609) 292-3600
FAX NUMBER (609) 292-1921



PHILIP D. MURPHY
Governor

CATHERINE R. MCCABE
Commissioner

SHEILA Y. OLIVER
Lt. Governor

November 27, 2019

Mr. Brendan Brock
New Jersey Department of Transportation
P.O. Box 500
Trenton, New Jersey 08625-0500

Mr, Bryan VanderGhenst
NV5 Consultants
7 Campus Drive, Suite 300
Parsippany, NJ 07054

**RE: EO-215 Environmental Assessment
NJDOT Freehold Maintenance Yard
120-140 Daniels Way
Freehold Township, Monmouth County, New Jersey
Block 49, Lot 41**

Dear Mr. Brock:

On October 15, 2019 the New Jersey Department of Environmental Protection's (NJDEP) Office of Permit Coordination and Environmental Review (PCER) received an Environmental Assessment (EA) prepared pursuant to the environmental review requirements of New Jersey Executive Order No. 215 of 1989 (EO #215) by the New Jersey Department of Transportation (NJDOT) for proposed storage capacity and site operations improvements at the Freehold Maintenance Yard at the above address. These improvements include a six bay covered bulk material storage building.

In response to your request for a determination as to whether the proposal will have any adverse impacts to land use, historical or cultural resources, threatened and endangered species and migratory birds, or whether there are any impacts to Green Acres-encumbered parkland held by the State, local government units and/or nonprofit organizations, the Department offers the following comments for your consideration:

Natural Resources

The New Jersey Division of Fish and Wildlife (DFW) would concur with the information provided. The proposed project, based on the documents reviewed and the Scope of Work would be unlikely to impact threatened and endangered species as most work will occur on previously disturbed Maintenance Yard property, there will be no increase to impervious surface, stormwater patterns will not change and the existing wetland transitional area to the east outside the development area will be restored. Please note the following:

For Bog Turtle:

Although no work is being conducted near a stream, Bog Turtle potential habitat has been identified in the area of construction. While it is unlikely that bog turtle will be encountered, they must be safely moved if encountered. During the turtles active period of March 15 to - November 15 the DFW would like to have a qualified herpetologist on-site to clear the work area of any turtles prior to work beginning and then have temporary fencing erected to keep turtles moving into the work area. This is especially critical when the work site is from 0-250 meters from a stream edge. Out-of-stream work is safe to do from December 1 - March 1 at any distance from the stream. Out of stream work conducted during November 16 - November 30 or March 1 to March 14 that is less than 10 meters from a wood turtle stream should still have a qualified herpetologist on staff to clear the work area of any turtles prior to work

Bats:

This area is potential maternity habitat for Indiana Bat, Federally Endangered, Northern Myotis, Federally Threatened and Little Brown & Tricolored Bats which are “Candidate Species” for listing. Removal of highly suitable roost trees including snags (dead trees), shagbark hickories (*Carya ovata*), other trees with shaggy or exfoliating bark, and trees of any species over 26 inches dbh, should be avoided or checked for usage before removal between April 1 and September 30.

General Comment:

County Soil Conservation District BMP's for prevention of sediment movement should be used at all times and maintained for function.

If you have any additional questions, please contact Joseph Corleto at (609)-984-3859 or by email at joseph.corleto@dep.nj.gov

Historic and Cultural Resources:

Thank you for providing the Historic Preservation Office (HPO) with the opportunity for review and comment on the potential for the above-referenced project to affect historic and archaeological resources. The proposed project consists of demolishing the existing salt storage facility and constructing a new six bay covered bulk storage facility. Upon review, there are no districts, buildings, structures, or archaeological sites listed in, or identified on HPO maps as eligible for listing in, the New Jersey or National Registers of Historic Places within the project site. Based on the project site's geographic location, the project area has a moderate potential to encounter Pre-Contact period archaeological resources. However, based on the lack of high sensitivity, no Phase I archaeological survey is recommended. In consequence, the HPO does not recommend any additional consideration of effects on historic and archaeological resources prior to permit issuance. If you have any questions, please feel free to contact Vincent Maresca at 609-633-2395. If additional consultation with the HPO is needed for this undertaking, please reference the HPO project number 20-0083 in any future calls, emails, submissions or written correspondence to help expedite your review and response.

Land Use Regulation

A GIS review of subject property project indicates the presence of wetlands and transition areas along eastern boundaries of the subject development. There is also evidence of a stream, an unnamed tributary to the Debois creek located in the undeveloped eastern side of the site. The submitted information indicates that the project will impact freshwater wetlands transition area to redevelop the maintenance yard and the construction of a salt storage shed. The DLUR recommends that applicant apply for a Freshwater Wetlands Special Activity Transition Area Waiver for redevelopment under NJAC 7:7A-8.3(f). If you have any additional questions, please contact Matthew Resnick at (609) 777-3955.

Air Permitting

The applicant should review NJAC 7:27-8.2 to determine air permit applicability for all operations at this site. An air operating permit is required for any boilers and/or heaters and emergency generators over 1 MMBtu as well as non emergency generators over 37 Kw. If you have any additional questions, please contact Danny Wong at (609) 984-2608.

Mobile Sources

Diesel exhaust contributes the highest cancer risk of all air toxics in New Jersey and is a major source of NO_x within the state. Therefore, NJ DEP recommends that construction projects involving non-road diesel construction equipment operating in a small geographic area over an extended period of time implement the following measures to minimize the impact of diesel exhaust:

1. All on-road vehicles and non-road construction equipment operating at, or visiting, the construction site shall comply with the three minute idling limit, pursuant to N.J.A.C. 7:27-14 and N.J.A.C. 7:27-15. Consider purchasing “No Idling” signs to post at the site to remind contractors to comply with the idling limits. Signs are available for purchase from the Bureau of Mobile Sources at 609/292-7953 or <http://www.stophesoot.org/sts-no-idle-sign.htm>.
2. All non-road diesel construction equipment greater than 100 horsepower used on the project for more than ten days should have engines that meet the USEPA Tier 4 non-road emission standards, or the best available emission control technology that is technologically feasible for that application and is verified by the USEPA or the CARB as a diesel emission control strategy for reducing particulate matter and/or NO_x emissions.
3. All on-road diesel vehicles used to haul materials or traveling to and from the construction site should use designated truck routes that are designed to minimize impacts on residential areas and sensitive receptors such as hospitals, schools, daycare facilities, senior citizen housing, and convalescent facilities

In addition, the applicant should be conscious of truck traffic and avoid neighborhoods as much as possible during construction. If you have any additional questions, please contact Kris Dahl at (609) 292-1259.

Water Supply

Water Allocation

If construction related dewatering is required at rates exceeding 100,000 gallons per day of water (70 gallons per minute pumping capacity) then that activity would be regulated under a short term water use permit by rule if less than 31 days, or a dewatering permit if 31 days or longer. A dewatering permit by rule may be applicable if the dewatering occurs from within a coffer dam, or similar confined space.

Any well drilling activities are required to be performed by a New Jersey licensed well driller. Well construction permits are required for any well construction activities except for: in kind well screen replacements, test borings less than 50 feet deep and 8.5 inches or less in diameter, cathodic protection wells which are 50 feet or less in depth and six inches or less in diameter, and dewatering wells or dewatering wellpoints which are 25 feet or less in depth and six inches or less in borehole diameter. The drilling of blast holes in quarries or mines is not regulated under the Well Construction regulations.

Stormwater Management

Construction projects that disturb 1 acre or more of land, or less than 1 acre but are part of a larger common plan of development that is greater than 1 acre, are required to obtain coverage under the Stormwater construction general permit (5G3). Applicants must first obtain certification of their soil erosion and sediment control plan (251 plan) from their local soil conservation district office. Upon certification, the district office will provide the applicant with two codes process (SCD certification code and 251 identification code) for use in the DEPonline portal system application. Applicants must then become a registered user for the DEPonline system and complete the application for the Stormwater Construction General Authorization. Upon completion of the application the applicant will receive a temporary authorization which can be used to start construction immediately, if necessary. Within 3-5 business days the permittee contact identified in the application will receive an email including the application summary and final authorization.

If you have any additional questions, please contact Eleanor Krukowski at (609) 633-7021.

NJPDES DSW

Based on a review of the EO 215 Environmental Assessment for the proposed project, no new surface water discharges are anticipated from this project. However, if a surface water discharge becomes necessary during construction (i.e., dewatering), a NJPDES Discharge to Surface Water permit will be needed.

Provided that the discharge is not contaminated, the appropriate discharge permit will be the B7- Short term De minimis permit (see <http://www.state.nj.us/dep/dwq/pdf/b7-rfa-checklist.pdf>). This is determined by running a pollutant scan as described in the application checklist where the data can be collected up to a year in advance of the discharge.

If, however, the discharge is contaminated (the analytical results demonstrate levels greater than the Appendix A standards as specified in the De minimis permit see <http://www.state.nj.us/dep/dwq/pdf/b7-deminimis-final-permit-5-20-15.pdf>), the appropriate NJPDES discharge to surface water permit will be the BGR – General Remediation Cleanup permit (see <http://www.state.nj.us/dep/dwq/pdf/sw-gp-chklist.pdf>). The BGR permit can generally be processed in less than 30 days although a treatment works approval may be needed for any treatment. If you have any questions, please contact Dwayne Kobesky at (609) 777-0285 or Dwayne.Kobesky@dep.nj.gov.

Site Remediation

Remedial action measures are required during and after construction as contamination has been identified in groundwater. The Site Remediation Reform Act (SRRA), establishes a program for the licensing of Licensed Site Remediation Professionals (“LSRPs”) who will have responsibility for oversight of environmental investigation and cleanup. All parties remediating contaminated sites on or after May 7, 2012 will be required to follow SRRA. While the law changes the process of how sites are remediated, it ensures the same stringent standards required for cleanup remain intact. The NJDEP will retain significant authority over the remediation process and will ensure that LSRPs comply with all applicable regulations, but the day-to-day management of site remediation will be overseen by qualified LSRPs. Under SRRA, NJDEP approval is no longer required prior to proceeding with remediation.

Pursuant to SRRA, a person responsible for conducting remediation shall: (1) hire a licensed site remediation professional to perform the remediation; (2) notify the Department of the name and license information of the licensed site remediation professional who has been hired to perform the remediation; (3) conduct the remediation without the prior approval of the department, unless directed otherwise by the department; (4) establish a remediation funding source if a remediation funding source is required pursuant to the provisions of section 25 of P.L.1993, c.139 (C.58:10B-3); (5) pay all applicable fees and oversight costs as required by the department; (6) provide access to the contaminated site to the department; (7) provide access to all applicable documents concerning the remediation to the department; (8) meet the mandatory remediation timeframes and expedited site specific timeframes established by the department pursuant to section 28 of P.L.2009, c.60 (C.58:10C-28); and (9) obtain all necessary permits.

For specific requirements, see the Administrative Requirements for the Remediation of Contaminated Sites, N.J.A.C. 7:26C *et seq.* For any additional questions regarding past remedial work at the site and registering of new fuel tanks, please contact Steve Maybury at (609) 633-1455.

RECOMMENDATIONS

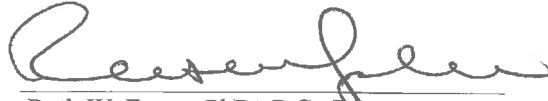
Pursuant to Section 4(c)ii of EO #215, the NJDEP recommends a conditional approval for the project, provided that any NJDEP permits and approvals that may be required for the project are obtained by the applicant prior to commencement of any activity regulated by those required permits and approvals.

Section 5 of EO #215 requires, within thirty days of receiving our recommendation, the proposing agency provide the NJDEP a written response either accepting our recommendations or setting forth those issues remaining in dispute. Acceptance of our conditional approval and recommendations would conclude the EO #215 environmental review

process. If a written response is not received in this time frame, it will be assumed that the proposing agency has accepted the NJDEP's recommendations listed above.

Thank you for giving the New Jersey Department of Environmental Protection the opportunity to comment on the Environmental Assessment for the proposed project.

Sincerely,

A handwritten signature in black ink, appearing to read 'Ruth W. Foster', written over a horizontal line.

Ruth W. Foster, PhD., P.G., Director
Permit Coordination and Environmental Review

- c. Joe Corleto, New Jersey Division of Fish and Wildlife
- Vincent Maresca, NJDEP Historic Preservation Office
- Mathew Resnick, NJDEP Division of Land Use Regulation
- Danny Wong, NJDEP Air Permitting
- Kris Dahl, NJDEP Bureau of Mobile Sources
- Eleanor Krukowski, NJDEP Stormwater
- Dwayne Kobesky, NJDEP NJPDES DSW

