SPECIFICATION

COVERED SHOOTING RANGES
STAFFORD FORGE WMA, LITTLE EGG HARBOR TWP., OCEAN COUNTY
COLLIERS MILLS WMA, JACKSON TWP., OCEAN COUNTY
PROJECT NO. P1160-01

STATE OF NEW JERSEY

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

DEPARTMENT OF THE TREASURY
Elizabeth Maher Muoio, State Treasurer

DIVISION OF PROPERTY MANAGEMENT AND CONSTRUCTION
Christopher Chianese, Director

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Catherine R. McCabe, Commissioner

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DAVID A. CLARK, R.A.
NEW JERSEY REGISTERED ARCHITECT 17149

Final Design April 6, 2020
Permit/Bid April 30,2020

TABLE OF CONTENTS

DIVISION 7 – MOISTURE PROTECTION

DIVISION 10 – SPECIALTIES

DIVISION 31 – EARTHWORK

DIVISION 32 – EXTERIOR IMPROVEMENTS

STATE OF NEW JERSEY

DEPARTMENT OF THE TREASURY

DIVISION OF PROPERTY MANAGEMENT AND CONSTRUCTION

R E V I S E D

DECEMBER 2015

INSTRUCTIONS TO BIDDERS

AND

GENERAL CONDITIONS

TABLE OF CONTENTS

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):

TRADE ESTIMATE	DOCUMENT FEE	MAILING FEE
$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, NJSA 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 silca 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 subontractor. 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 of 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.

12.4.3.1Payment 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.

12.4.3.3Materials 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

SECTION 01 11 00
SUMMARY

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SCOPE OF WORK

A. The Scope of this Project is for the construction of open covered wood-frame shooting structures and steel frame and precast concrete plank range baffles at the existing Stafford Forge and Colliers Mills Wildlife Management Area shooting ranges. At Stafford Forge WMA the shooting structure is to be approximately 605 square feet and the two baffles will be 124 square feet each. At Colliers Mills WMA the shooting structure is to be approximately 957 square feet and the two baffles will be 244 square feet each.
B. Also included is the demolition of the existing concrete 3-station shelter and wooden shooting tables at Colliers Mills, removal of existing wooden shooting tables at Stafford Forge, and provision of accessible parking, walkways, and signage at both sites.

PART 2 – MATERIALS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 CONFLICTS OR DISCREPANCIES AMONG CONTRACT DOCUMENTS

A. In the event of conflicts or discrepancies among Contract Documents, interpretations will be based on the following priorities:

1. The Agreement;
2. Bulletins, with those of later date having precedence over those of earlier date;
3. The General Conditions of the Contract for Construction; and
4. Drawings and Specifications

B. In the case of any inconsistency between Drawings and Specifications, or within either document not clarified by bulletin, the better quality or greater quantity of work shall be provided in accordance with the Architect's interpretation.

1.3 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

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

PART 2 – MATERIALS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 16
PROGRESS SCHEDULE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 CONTRACT COMPLETION

A. The work under this Contract shall be completed within one hundred and twenty (**120**) calendar days from the issuance of the Notice to Proceed.

1.3 PROJECT SCHEDULE

A. The Contractor shall submit a Project Construction Schedule meeting the requirements of the General Conditions and the applicable Bulletin within ten (10) calendar days of the Notice to Proceed for review and approval. Note that the preparation and submission of this schedule in Microsoft Project, or equivalent software is required.
B. Provide, at each bi-weekly Project meeting, a written Project Schedule analysis.
C. Provide, at each bi-weekly Project meeting, a written outline of the work completed within the past two weeks and a forecast of work projected within the next two-week period.
D. The Contractor shall provide a written *two-week look-ahead* Schedule at each bi-weekly Job Meeting. The *two-week look-ahead* shall indicate the work to be performed on each workday, in detail, for the forthcoming two weeks.
E. If the Project should fall behind schedule, prepare and submit a complete revised recovery schedule.
F. A revised current Project Schedule shall be submitted with each Application for Payment.

PART 2 – MATERIALS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 38 76
WARRANTIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WARRANTIES

A. The Contractor warrants to the State, and Architect, that materials and equipment furnished under this Contract will be good quality, new, and that the work will be free of defects in material and workmanship for a period of one (1) year from the date of final acceptance and will conform to the requirements of the Contract Documents.

B. Provide the following Manufacturer's extended warranties:

1. Roof Warranties:
    a. Manufacturer's Warranty: Provide manufacturer's warranty against defects in material, workmanship, and installation for twenty (20) years. Refer to Section 07 31 13 and 07 53 23. The wind exclusion shall not be less than the wind speed specified on Drawing T1 for each structure.
    b. Performance Agreement: The Contractor shall provide a five (5) year performance agreement on labor and material in addition to the manufacturer's warranty. The performance agreement shall include the stipulation that the Contractor shall perform all inspections and emergency repairs to all defects or leaks in the roofing system within 24 hours of receipt of notice from the owner. Repairs shall include all labor, roofing materials, flashings, etc. When weather permits, all temporary repairs shall be redone and the roof restored to the standard of the original installation.
    c. In the event that (a) the Owner notifies the Contractor of the need to correct a guaranteed condition, and (b) an emergency condition exists that requires immediate attention to prevent potential injury or damage, and (c) the Contractor cannot or does not promptly inspect and repair same, either permanently or temporarily, then the Owner may make, or cause to be made, such temporary repairs as may be essential, and the Contractor shall reimburse the Owner for the cost of such repairs. Such action shall not relieve the Contractor of his obligation to perform any necessary permanent repairs and this Guarantee shall remain in full force and effect for the remaining portion of its original term.
    d. The Contractor shall provide all equipment, labor and material required to remedy any and all guaranteed conditions, including repair and/or replacement of damage to other work resulting therefrom, and removal and replacement of other work required to access the guaranteed condition, all at the Contractor's sole expense for the full term of the Guarantee.
    e. The Contractor agrees to perform a thorough inspection of the roofing system and all other work, in the 12th and 24th months of the Guarantee period, in the presence of a manufacturer's representative and an Owner's representative. If there are any guaranteed conditions encountered at either, or both of these inspections, the Contractor shall make, or cause to be made, any necessary repairs and/or replacement to remedy the conditions under the terms of this Guarantee within thirty (30) days of the date of inspection or as otherwise agreed by the State of New Jersey even if such time extends beyond the guarantee period.

2. Sealant Warranty: Provide manufacturer's twenty (20) year limited warranty against failure of structural adhesion, staining, and weather seal.

PART 2 – MATERIALS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 41 00
QUALITY REQUIREMENTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUPERVISION

A. Provide day-to-day site supervision through a Site or Project Superintendent who is fluent in the English language. The Superintendent shall be present at the site during all construction activities, including those of any subcontractors, and shall be present to accept and review all deliveries.
B. Assure that site supervision, craftspersons, and subcontractors are knowledgeable and experienced in their portion of the work and know and understand the specified requirements and methods needed for performance of the work.

PART 2 – MATERIALS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 41 13
REGULATORY COMPLIANCE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SITE SAFETY

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

1.3 CODES, PERMITS, AND INSPECTIONS

A. Codes: The work described by these Contract Documents shall be accomplished in strict accordance with the New Jersey Uniform Construction Code and in full compliance with the following Codes and Standards as applicable:

- INTERNATIONAL BUILDING CODE, NEW JERSEY EDITION, 2015
- ICC A117.1-2009 ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES
- AMERICANS WITH DISABILITIES ACT

B. Permits: U.C.C. Construction Permits for this Project will be issued after completion of the technical sections by the Contractor.
C. Construction Code Inspections: All construction inspections will be provided by DCA and shall be coordinated through the Construction Project Manager.

END OF SECTION

SECTION 01 45 23
TESTING AND INSPECTION SERVICES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 TESTING AGENCY

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

1.3 SPECIAL TESTING AND INSPECTIONS

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

PART 2 – MATERIALS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 50 00
TEMPORARY UTILITIES AND CONTROLS

PART 1 – GENERAL

1.1 TEMPORARY UTILITIES

A. Temporary Power: There is no electrical power available on site. The Contractor shall provide portable generators as needed for the performance of the work.
B. Temporary Water: Water is not available on site. The Contractor must provide water as required for the performance of the work.

1.2 TEMPORARY SANITARY FACILITIES

A. Provision of toilet facilities for workers is the Contractor's responsibility.

1.3 SITE MAINTENANCE

A. The Ranges will be closed for public use throughout the construction period.
B. Maintain site in a clean and orderly condition. The Contractor is responsible for all debris removal and disposal on a daily basis.
C. Store construction materials and equipment only within the limits of the work site or as approved by the NJ DEP, Division of Fish and Wildlife.

1.4 SITE RESTORATION

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

1.5 FIRE PROTECTION

A. The Contractor, at all times, must maintain good housekeeping practices to reduce the risk of fire damage. All scrap materials, rubbish, and trash must be removed daily from the site and the Contractor must not permit them to be scattered on adjacent areas.
B. Suitable storage space must be provided outside the building area for storing flammable materials. Any excess flammable liquids being used on site must be kept in closed metal containers and removed from the site during unused periods.
C. A fire extinguisher must be available at each location where cutting is being performed.
D. The Contractor must provide fire extinguishers in accordance with the recommendations of NFPA Bulletins Nos. 10 and 241. However, in all cases a minimum of one fire extinguisher must be available on the job site.
E. Smoking is strictly prohibited within construction site.
F. If compressed gas bottles are utilized, they must be properly secured.

END OF SECTION

SECTION 01 61 00
PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUBMITTAL PROCEDURES

A. The Contractor shall provide all submittals required by the Specifications. The Contractor shall also supply evidence by separate submittals that materials and equipment to be supplied meet the requirements of the Specifications.
B. DPMC 12/13: This form is to be used for submission and approval of all subcontractors, materials to be utilized in the construction, manufacturers/suppliers, and for professional services. Complete the Contractor Section as follows:

1. ***Submission Type:*** The Contractor is to place a check mark in the appropriate block(s) that applies to the submission.
2. ***Trade:*** The Contractor is to place a check mark in the appropriate block that identifies the trade related to the submission.
3. ***Contractor Name:*** The Prime Contractor submitting the form inserts his company name in the space indicated.
4. ***Description of Submittal:*** The Prime Contractor is to give a brief description of the submittal matching that in the Submittal Log.
5. ***General Condition, Specification or Drawing section***: The Contractor is to identify the Article, Spec Section or Drawing that represents the submission type, i.e., "*Article 4.11.2 Sleeve & Opening Drawing", or "Specification Section 115575 Condensate Pump", or "Drawing FP2.2 Ames Backflow Preventer".*
6. ***Vendor/Manufacturer/Supplier/Subcontractor:*** The Prime Contractor is to insert the name, address, and telephone number of the vendor/manufacturer/supplier or subcontractor for which he is requesting approval. (When required, insert the license number and registration number in the space provided, attach a copy of said license and certification.)

C. The A/E will prepare and submit a submittal log identifying all required submittals and distribute the log at the Pre-construction meeting. Contractor may provide additional submittals in addition to those listed on the log. Do not send submittals to the Architect for review until after the Pre-Construction Meeting, unless authorized in advance by the Architect.
D. All submittals shall be identified by the tracking number.
E. All submittals shall be identified by the tracking number on the submittal log.
F. All submittals shall be made electronically, each in a separate email. Utilize the electronic version of the DPMC 12/13 form and add additional pages containing the submittal data or drawings in a **single** .PDF file. The file name shall contain the tracking number and the submittal name, i.e. "T0600-00 - 0301 Concrete Design Mix.pdf". Submittals shall be emailed to the A/E. To be considered as "received" by the A/E, **the Subject line of the e-mails shall contain the Project number, submittal tracking number, and submittal description.**
G. A/E approved submittals will be emailed to the Contractor and the Construction Project Manager (CPM).
H. A/E rejected copies will be emailed to the Contractor with a copy to the CPM.
I. Shop Drawings: Shop drawings and samples shall be dated and marked to show the name of the Project, Architect, Contractor, originating subcontractor, manufacturer or supplier and detailer, if pertinent. Shop drawings shall completely identify Specification section and locations at which materials or equipment is

to be installed. Reproduction of the contract drawings is acceptable as shop drawings only when specifically authorized in writing by the Architect. Submission of shop drawings, manufacturer's specifications, installation instructions, material diagrams and samples shall be accompanied by the Contractor's transmittal form and DPMC form 12/13 as outlined in paragraph B of this section. **Where printed material describes more than one product or model, clearly identify which is to be furnished**. The Contractor is responsible for obtaining and distributing required prints of shop drawings to other prime contractors, subcontractors, and material suppliers after, as well as before, final approval. Prints of reviewed shop drawings shall be made which carries the Architect's appropriate stamp.

J. Product Data:
   1. Submit only pages which are pertinent; mark each copy of standard printed data to specifically identify only pertinent products; identify each submittal by designated submittal reference number. Show standards, performance characteristics, and capacities; wiring and piping diagrams; controls; component parts; finishes; dimensions; and require clearances.
   2. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to work of this project. Delete information not applicable.

K. All submittals shall be made within thirty (30) calendar days of the Notice to Proceed.

L. Enforcement of Submittal Requirement:
   1. The Contractor will be required to provide shop drawings, testing, laboratory test reports, product samples and test installations in order to establish acceptable standards of workmanship.
   2. **The requirement for submittal and review of <u>all</u> specified shop drawings, test, product samples and test installations will be <u>rigorously enforced.</u>** General work of each section shall not commence prior to required review. All work conducted prior to the review of required submittals, including test installation, is subject to rejection by the Architect. All rejected work shall be removed and replaced by the Contractor at no additional expense to the Owner.

M. Contractor's Examination of Submittals: Prior to forwarding submittals to the Architect, the Contractor shall:
   1. Review submittals to verify quantities, field measurements, field construction criteria, assembly and installation requirements, manufacturer's catalog numbers, and conformance of submittals with requirements of Contract Documents.
   2. Review each submittal to determine that it is acceptable in terms of the means, methods, techniques, sequences and operations of construction, and in terms of safety precautions, all of which are the contractor's sole responsibility.
   3. Clearly call to the Architect's attention any submittal that varies from what the Contract Documents have called for. Notify the Architect in writing at time of submittal of any deviations from requirements of Contract Documents.
   4. <u>Clearly identify the products or product data which are pertinent to this Project. Clearly mark through or delete all information which is not applicable</u>.
   5. Stamp and sign each submittal to certify that the Contractor has checked for completeness and compliance with requirements of the contract documents and that the submittal has his/her approval.
      a. The stamp shall state: *"I certify that I have reviewed the above submittal and have verified that products, field dimensions, quantities, and field construction criteria comply with and have been coordinated with the requirements of Work and Contract Documents".*
      b. Samples or submittals which in the opinion of the Architect have clearly not been checked for compliance by the Contractor will not be reviewed and it will be the responsibility of the Contractor to arrange for return of such submittals.

   6. Do not fabricate products or begin work which requires submittal review until return of submittal with Architect's acceptance. Work begun or completed prior to the Architect's review of

required submittals is subject to rejection. Remove and replace rejected work at no additional cost to the Owner.

N. Architect's Review:
   1. Allow fourteen (14) days for Architect's review of each submittal. Daily allowance is time in possession of Architect and exclusive of delivery from and to Contractor and exclusive of resubmissions.
   2. The Architect's review is limited to aesthetics, general conformance with the project design intent, and general compliance with information contained in Contract Documents. The Architect's review is neither a verification of Contractor's examination nor a substitution of Contractor's responsibilities. Architect may inform Contractor of any conspicuous errors on a submittal without prejudice to being held harmless to Contractor's examinations and responsibilities.
   3. Upon review, any action shown by the Architect is subject to the requirements of the plans and specifications. The Architect's review does not authorize changes in contract requirements unless a separate written directive or change order is issued. The Contractor is responsible for conforming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, coordinating his or her work with that of all other trades, and performing all work in a safe and satisfactory manner.
   4. **The Architect will not review:**
      a. Any submittal which is not called for by the contract documents or not requested in writing by the Architect.
      b. Any submittal which does not bear the Contractor's stamp and signature certifying that he has checked the submittal for completeness and compliance with the contract documents and that the submittal has his/her approval.
      c. Any submittal which does not bear the project name and contract number and the contractors, subcontractors, and suppliers names, addresses, and phone numbers.
      d. Any submittal which does not clearly identify pertinent product (if more than one is shown). Clearly mark through all information which is not applicable.

   5. The Architect will not accept and will not review "faxed" submittals, submittals copied from a telefaxed transmission, or otherwise containing partially illegible documents, unless previously authorized by the Architect in the interest of the project.

O. The Contractor shall be required to make submittals, revise and resubmit as required and establish compliance with the specified requirements requested in all sections of these Technical Specifications that are a part of this Contract Document. These submittals include but are not limited to shop drawings, manufacturer's literature, samples, colors, mock-ups, inspection reports, certifications, and delivery receipts.

P. It is also the Contractor's responsibility, when so required by the Contract Documents or by written request from the State, to deliver all required proof that the materials or workmanship, or both, meet or exceed the requirements of the specifically named code or industry standard.

Q. The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of the submittal and the Architect has given approval of the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in the Shop Drawings or similar submittals by the Architect's approval thereof.

1.3 SUBSTITUTIONS

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

PART 2 – MATERIALS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 78 00
CLOSE OUT SUBMITTALS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 MAINTENANCE MANUALS

A. General Requirements: Submit two (2) bound sets of Maintenance Manuals and four (4) CD/DVD or USB drive copies as hereinafter defined.
B. General Contractor: This Maintenance Manual shall have the full Project title displayed on cover and binder edge (case and CD for CD's) and shall be divided into four (4) sections, as follows:
    1. Subcontractor, material supplier listings. The names, addresses, and telephone numbers shall be listed and indexed for each component or item incorporated into the work.
    2. Warrantees and Guarantees: All required warranties and guarantees shall be placed in this Section. Warrantees shall be fully executed, signed, and dated.
    3. Copies of approved submittals, including fully executed DPMC 12/13 forms, and any parts lists and installation instructions, shall be in this Section.
    4. Shop Drawings: Copies of approved shop drawings delineating all as-built conditions shall be set forth in this Section.

1.3 AS-BUILT DRAWINGS

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

PART 2 – MATERIALS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 02 07 00
DEMOLITION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including Instructions to Bidders and General Conditions and Division 1 Specification Sections, apply to this Section.
B. This Section includes the demolition of the existing concrete 3-station covered shooting building at Colliers mills WMA in its entirety, including foundation or footings, and miscellaneous non-building structures as indicated on the Site Plans for both sites.
C. Work Included:
    1. Building Demolition
    2. Dust Control
    3. Removal of Foundations and Footings
    4. Disposal of Materials
    5. Recycling of Materials
    6. Recovery of Materials
    7. Backfilling and grading as specified in Section 31 30 00 Earthwork.

1.2 REFERENCES

A. American National Standards Institute, Inc., ANSI A10.6-2006 (2016) Safety and Health Program for Demolition Operations.

1.3 SUBMITTALS

A. The following must be submitted and approved prior to beginning demolition operations:

    1. Demolition Plan: Submit proposed demolition and removal procedures for approval before work is started. Include procedures and detailed description of methods and equipment to be used for each operation and the sequence of operations.
    2. Materials Salvage and Recycling Management Plan: Before the start of demolition, submit for approval a Materials Salvage and Recycling Management Plan for all materials to be salvaged or recycled. The Plan shall indicate how demolition waste will be salvaged and recycled. Salvage, recycle, and recover at least 80% of demolition waste by volume. Include a list of salvage and recycling outlets, which indicates where salvageable materials will be sent. Identify materials that are not recyclable or otherwise not recoverable that must be disposed of in a landfill or other means acceptable under State and local regulations. List permitted landfills and/or other disposal means to be employed for building waste that cannot be recycled. Indicate any instances where compliance with requirements of this Specification does not appear to be possible and request resolution from the Engineer.

B. Provide the following submittals after or during the course of the demolition operations:
    1. Landfill-tipping receipts which provide volumes.
    2. Receipts for materials types, weight or volume, and revenues from salvage and recycling.
    3. An inventory of items or materials which were salvaged and recycled.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with all applicable requirements of the State of New Jersey and applicable County ordinances and regulations concerning management of demolition and disposal of debris.

B. Implementation: Designate an on-site party responsible for instructing workers and implementing the Materials Salvage and Recycling Management Plan. Distribute copies of the Materials Salvage and Recycling Management Plan to the job site foreman and each appropriate subcontractor. Provide on-site instruction on appropriate salvaging, removing, recovering, and handling procedures to be used by all subcontractors at appropriate stages of the work at the site. Also, include discussion of Materials Salvage and Recycling Management Plan in regular job meeting as long as it is appropriate to do so.

1.5 LEAD-BASED PAINT

A. An environmental assessment was conducted at the covered firing range located at the Colliers Mills Wildlife Management Area (WMA) in Jackson Township, Ocean County, New Jersey. The presence of lead-dust due to firing range operations is evident. See Appendix A.
B. Refer to Section 02 83 00 for requirements for handling and disposal of construction containing lead-dust.

1.6 REGULATORY AND SAFETY REQUIREMENTS

A. Comply with Federal, State, and County hauling and disposal regulations. In addition to these requirements, demolition operations shall conform to ANSI A10.6 Demolition Operations – Safety Requirements.
B. In the performance of the work in this Section comply with NJAC 5:17.

1.7 DUST AND DEBRIS CONTROL

A. Prevent the spread of dust and debris within adjacent public rights-of-way and adjacent properties. Avoid the creation of a nuisance or hazard in the surrounding area.
B. Limit the use of water for dust control and terminate its use if it results in hazardous or objectionable conditions such as flooding or runoff.
C. Utilize street cleaning procedures daily to remove debris from the access point to the property.
D. Sweep pavement(s) as often as necessary to control the spread of debris that may result in foreign object damage potential to person or property.

1.8 PROTECTION

A. Protect existing infrastructure which is to remain after the work in this Section is completed. Repair items, which are to remain, and which were damaged during the performance of the work to their original condition, or replace with new.

1.9 DEFINITIONS

A. Salvage is defined as the recovery or reapplication of a package or product for uses similar or identical to its originally intended application, without manufacturing or preparation processes that significantly alter the original package or product. Salvage refers to materials that are recovered for reuse off-site and sold or donated to a third party.
B. Recycling is defined as the process of collecting and preparing recyclable materials and reusing them in their original form or in manufacturing processes that do not cause the destruction of recyclable materials in a manner that precludes further use.
C. Recovery is defined as any process that reclaims materials, substances, energy, or other products contained within or derived from the waste. It includes waste-to-energy, composting, and other processes. It also includes materials, which if released into the atmosphere or disposed in landfills may cause environmental damage.

1.10 STORAGE

A. Site Storage: Remove all materials that are to be salvaged and recycled from the site daily.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.1 STRUCTURE

A. Demolish structure completely, including foundations.
B. Proceed with demolition in a systemic manner from the top of the structure to the ground. Demolish concrete and masonry in small sections.
C. Demolish structure by mechanical means. Do not use explosives or burning.

3.2 MATERIALS TO BE RECYCLED

A. Recover the following materials during demolition and take them to an approved recycling center. Comply with the Materials Salvage and Recycling Management Plan for recycled materials.
    1. Wood products
    2. Metals including wire and piping
    3. Concrete products
    4. Roofing products

3.3 DISPOSITION OF MATERIAL

A. Immediately relocate, recycle, or dispose of all other demolished material away from site.
B. Except where specified in other Sections, all materials and equipment removed and not reused, become property of the Contractor and shall be removed from the property. Title to materials, resulting from demolition, and materials and equipment to be removed, is vested in the Contractor.
C. Disposal of Rubbish and Debris: Dispose of all rubbish and debris in accordance with the requirements specified herein and in accordance with applicable laws and ordinances.
D. Except for materials scheduled for recycling, remove all debris and legally dispose of the debris at a licensed landfill.

END OF SECTION

SECTION 02 83 00
LEAD-CONTAINING DUST RELATED WORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. Introduction:
   1. An environmental assessment was conducted at the covered firing range located at the Colliers Mills Wildlife Management Area (WMA) in Jackson Township, Ocean County, New Jersey. The presence of lead-dust due to firing range operations is evident. The concrete 3-station covered shooting station building contains painted wall and roof surfaces. Testing revealed that the paint is below the USEPA threshold for lead-based paint, however, any coating with a detectable lead concentration is defined as "lead containing" material by OSHA, therefore OSHA's Lead Safe Work Practices in Construction standard applies to the demolition activity at the subject building. See Appendix A.
   2. The Owner does not intend to conduct a lead-dust abatement action. The Owner requires the renovation Contractor to protect human health and the environment during their operations as they related to lead impacts associated with the work activities as follows:
      a. The Contractor shall provide a site-specific Lead Safety Plan to address:
         i. Worker protection as required by the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), "Lead in Construction" standard (20 CFR 1926.62), and
         ii. Worksite contamination, clean-up and waste disposal as regulated by the New Jersey Department of Environmental Protection and the New Jersey Department of Health and Senior Services.

   3. The U.S. Environmental Protection Agency (EPA), Renovation, Repair and Painting (RRP) rules, apply to renovation, repair, painting or any other activity that disturbs lead-based painted surfaces. The Contractor shall be certified by the EPA. The certified Contractor shall be trained in lead-safe work practices through completion of an EPA-accredited course and is responsible for compliance with the EPA rules. The Contractor shall distribute a lead pamphlet before starting work.

B. Building Summary:
   1. The concrete 3-station covered shooting station building contains lead dust and painted wall and roof surfaces. Testing revealed that the paint is below the USEPA threshold for lead-based paint, however, any coating with a detectable lead concentration is defined as "lead containing" material by OSHA, therefore OSHA's Lead Safe Work Practices in Construction standard applies to the demolition activity at the subject building.

C. Requirements:
   1. Work under this Section shall be performed by or under the direction of the architect/engineer providing work under other Sections.
   2. The Contractor shall provide a site-specific Lead Safety Plan to address:
      a. Worker protection as required by the U.S. Department of Labor, Occupational Safety and Health Administration, "Lead in Construction" standard (20 CFR 1926.62), and

b. Worksite contamination, clean-up and waste disposal as regulated by the New Jersey Department of Environmental Protection and the New Jersey Department of Health and Senior Services.

3. If any surfaces or lead components are to be drilled, sanded, cut or ground, the Contractor shall provide exposure monitoring for workers as required by the U.S. Department of Labor, Occupational Safety and Health Administration for those persons whose trade will these surfaces as a result of demolition activities, paint refinishing, construction and re-construction.

1.3 RELATED DOCUMENTS

A. U.S. Department of Labor, Occupational Safety and Health Administration, "Lead in Construction" standard (20 CFR 1926.62) included by reference.
B. U.S. Environmental Protection Agency, Lead Renovation, Repair and Painting Rule.
C. Environmental Assessment, Colliers Mills Wildlife Management Area, Off Hawkins Road, Jackson Township, NJ 08527, Prepared by Environmental Connection, Inc. Revised March 22, 1019.

1.4 SUBMITTALS

A. Name, experience and training of the person to be designated the competent person, and who is capable of identifying existing and predictable lead hazards in the surroundings or working conditions and who has authorization to take prompt corrective measures to eliminate them.
B. Results of airborne exposure monitoring.
C. A copy of the medical examination results including medical and work history as required under 20 CFR 1926.62.
D. Test results for the Toxicity Characteristic Leachate Procedure (TCLP) test on paint debris.
E. Site Specific Lead Safety Plan.

PART 2 – PRODUCTS - (NOT LISTED)

PART 3 – EXECUTION

3.1 PERFORMING WORK ACTIVITIES

A. Isolate the work area with either OSHA-approved barrier tape or signs.
B. Place a 6-mil polyethylene drop cloth below the impact point.
C. All employees working in the vicinity of the area shall wear the proper personal protection equipment in accordance with OSHA regulations.
D. A local exhaust shield and a high-efficiency particulate air (HEPA) filtered vacuum cleaner shall be attached to any equipment utilized for drilling, cutting, sanding, etc.
E. Visible debris shall be cleaned up immediately with a HEPA vacuum or using a wet-wipe technique utilizing a trisodium phosphate (TSP) solution.

3.2 DISPOSAL

A. Lead Waste Disposal
1. The Contractor shall determine if any waste generated by the work is regulated as hazardous waste. The Contractor shall utilize the Toxicity Characteristic Leachate Procedure test, Test Method 1311 in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, EPA publications SW-846, as incorporated by reference in 40 CFR 260.11, and as referenced in the State of New Jersey regulations for the materials in question. Test results for the Toxicity

Characteristic Leachate Procedure test for lead shall be less than 5.0 mg/L, as per EPA Hazardous Waste Number D008, or the material is required to be treated as hazardous waste. Hazardous waste transporters shall possess a hazardous waste hauler license. Hazardous materials shall only be transported a licensed facility registered to accept hazardous materials.

B. Lead-Containing Material Recycling/Salvage
    1. Where metal salvageable materials contain or are assumed to contain lead or lead-containing materials and are transported to a recycling facility, an analytical characterization of the materials is not required.
    2. Ten (10) business days prior to recycling materials, the Contractor shall provide written notification to the recycling facility indicating:
        a. Metal salvageable materials contain lead-dust, and
        b. Origin of metal salvageable materials.

    3. Contractor shall provide a copy of the written notification as indicated in 3.2, B. 2. of this Section to the Owner's Representative.
    4. Contractor shall provide manifest or weight slips from the recycling facility indicating the materials were recycled in accordance with all applicable Federal, State and local requirements.

PART 4 – OWNER DIRECTED TESTING AND ANALYSIS

4.1 OWNER TESTING OPTIONS

A. Testing for lead can be conducted by the Owner at any time during the Contractor's activities and may contain but not be limited surface wipe and soil sampling and analysis. Samples obtained will be compared to the most stringent Federal, State, and Local standards as applicable.
B. The Contractor shall be responsible for any and all testing and analysis as indicated in the standards noted in this Section. The Owner may, at its digression, mirror testing and analysis being conducted by the Contractor.
C. If lead contamination above and beyond pre-construction levels is discovered related to the Contractor's activities, the Contractor shall rectify the contaminant issue by cleaning the area until satisfactory lead surface wipe or soil results are achieved (less than or equal to pre-construction levels) at no additional cost to the Owner. The Contractor shall be responsible for the costs associated with the cleaning in addition to the costs associated with the Owner's Representative.

END OF SECTION

SECTION 03 30 00
CAST IN PLACE CONCRETE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

C. Related Sections include the following:
   1. Division 31 Earthwork

1.3 REFERENCES

A. Codes and Standards: Comply with provisions of the latest editions of the following Codes, Specifications and standards, except where more stringent requirements are shown or specified:

   1. ASTM…….. American Society of Testing and Materials “Listed Standard”
   2. ACI 301…… "Specifications for Structural Concrete for Buildings"
   3. ACI 318…… "Building Code Requirements for Reinforced Concrete"
   4. CRSI……. Concrete Reinforcing Steel Institute, "Manual of Standard Practice"
   5. NJDOT……. New Jersey Department of Transportation “Standard Specifications”

1.4 QUALITY ASSURANCE

A. Concrete Testing Service: Employ, at Contractor's expense, a testing laboratory approved by the New Jersey Department of the Treasury, Division of Property Management and Construction (DPMC) to design concrete mixes and perform material evaluation tests related to the concrete mixes. Materials and installed work may require testing and retesting, as directed by Architect, at any time during the progress of work. Allow free access to material stockpiles and facilities. Tests, not specifically indicated to be done at Owner's expense, including retesting of rejected materials and installed work, shall be done at Contractor's expense.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, joint systems, curing compounds, and others as requested by Architect.
B. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design tests as specified.

C. Material Certificates: Provide materials certificates for cement, aggregates, admixtures, reinforcing, welded wire fabric, non-shrink grout, curing compounds and non-slip aggregates. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.
D. Concrete Mix Designs: Provide mix designs with strength tests for each class and type of concrete for review by the Architect prior to placement of concrete.
E. Reinforcement Shop Drawings: Provide reinforcement shop drawings for review and approval by the Architect prior to placement of concrete.

PART 2 – PRODUCTS

2.1 FORM MATERIALS

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

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: ANSI/ASTM A 615, Grade 60,
B. Steel Wire: ANSI/ASTM A 82, plain, cold-drawn, steel.
C. Welded Wire Fabric (WWF): ANSI/ASTM A 1064, size as specified on drawings.
D. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI recommendations, unless otherwise acceptable.

2.3 CONCRETE MATERIALS

A. Portland Cement: ANSI/ASTM C 150, Type I, Conforming to Section 914 of NJDOT Standard Specifications.
B. Use one brand of cement throughout project, unless otherwise acceptable to Architect.
C. Aggregates:
    1. Normal Weight Aggregates: ANSI/ASTM C 33, and as herein specified. Provide aggregates from a single source for exposed concrete.
    2. Local aggregates not complying with ANSI/ASTM C 33, but which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Architect.

D. Water: Potable.
E. Air-Entraining Admixture: ANSI/ASTM C 260.
F. Products: Subject to compliance with requirements, provide one of the following:
    1. "Air-Mix" or "Perma Air"; Euclid Chemical Co.
    2. "Daravair"; Grace Construction Products
    3. "MB-VR" or "MB AE 90"; Master Builders
    4. "Sika AER"; Sika Chemical Corp.
    5. Or approved equal.

G. Water-Reducing Admixture: ANSI/ASTM C 494, Type A, and contain not more than 0.05% chloride ions. Products: Subject to compliance with requirements, provide one of the following:
   1. "Eucon WR-75"; Euclid Chemical Co.
   2. "WRDA with Hycol"; Grace Construction Products
   3. "Pozzolith 220N"; "MBL-82" or "Polyheed 997"; Master Builders Inc.
   4. "Plastocrete 161"; Sika Chemical Corp.
   5. Or approved equal.

H. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F or Type G and contain not more than 0.05% chloride ions. Products: Subject to compliance with requirements, provide one of the following:
   1. "Eucon 37"; Euclid Chemical Co.
   2. "Daracem 100"; Grace Construction Products.
   3. "Rheobuild 1000" Master Builders Inc.
   4. "Sikament 86"; Sika Chemical Corp.
   5. Or approved equal.

I. Non-Corrosive, Non-Chloride Accelerator Admixture: ASTM C 494, Type C or E, and contain no more chloride ions than are present in municipal drinking water. The manufacturer must have long-term test data (at least a year), from an independent testing laboratory, concerning corrosion using an acceptable accelerated corrosion test method such as that using electrical potential measures. Products: Subject to compliance with requirements, provide one of the following:
   1. "Accelguard 80"; Euclid Chemical Co.
   2. "Daraset"; Grace Construction Products
   3. "Pozzolith NC-534" or " Pozzutec 20"; Master Builders Inc.
   4. "Plastocrete 161FL"; Sika Chemical Corp.
   5. Or approved equal.

J. Water-Reducing, Retarding Admixture: ASTM C 494, Type D, and contain not more than 0.05% chloride ions. Products: Subject to compliance with requirements, provide one of the following:
   1. "Eucon Retarder 75"; Euclid Chemical Co.
   2. "Daratard-17"; Grace Construction Products
   3. "Pozzolith 100XR", "Pozzolith 122R" or "Polyheed RI"; Master Builders Inc.
   4. "Plastiment"; Sika Chemical Co.
   5. Or approved equal.

K. Calcium chloride, or admixtures containing more than 0.05% chloride ions are not permitted. Thiocyanate-based chemical admixtures shall contribute less than 0.30% thiocyanate ions by weight of cement when the manufacturer's maximum recommended dosage is used. Certification of conformance to the above-mentioned requirements and the chloride content of the admixture will be required from the admixture manufacturer prior to review of mix design.

2.4 RELATED MATERIALS

A. Non-Shrink Grout: CRD-C-621-89a, Grade "C" (equipment grouting) or Grade "B" (Construction Grouting), Corps of Engineers Specification for Non-Shrink Grout, Type D, Non-metallic. In addition, the manufacturer shall furnish data from an independent laboratory indicating that the grout, when placed at a fluid consistency, shall achieve 95% bearing under a 4' x 4' base plate. Products: Subject to compliance with requirements, provide one of the following:
   1. "Euco NS"; The Euclid Chemical Co.
   2. "Masterflow 928" or "Set Grout"; Master Builders.
   3. "Five Star Grout"; U.S. Grout Co.
   4. "Sika Grout 212"; Sika Chemical Corp.
   5. Or approved equal.

B. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
   1. "Eucobar,"; Euclid Chemical Co.
   2. "E-Con"; L&M Construction Chemicals, Inc.
   3. "Confilm"; Master Builders, Inc.
   4. "SikaFilm"; Sika Chemical Corp.
   5. Or approved equal.

C. Liquid Membrane-Forming Curing and Sealing Compound: Water-based acrylic type, 30% solids content minimum, and have test data from an independent testing laboratory indicating a maximum moisture loss of 0.55 kg per sq m in 72 hours when applied at the coverage rate recommended by the manufacturer. Products offered by manufacturers to comply with the requirements for membrane-forming curing and compounds include the following:
   1. "Super Diamond Clear VOX"; The Euclid Chemical Corp.
   2. "Mastercure 200W"; Master Builders.
   3. "Dress & Seal #30 WB"; L&M Construction Chemicals Inc.
   4. Or approved equal.

D. Bonding and Repair Materials: Bonding Materials: Polyvinyl acetate, rewettable type. Use only in areas not subject to moisture.
   1. "Euco Weld"; Euclid Chemical Co.
   2. "Weldcrete"; Larsen Co.
   3. "Sikadur 32, Hi-Mod"; Sika Chemical Corp.
   4. Or approved equal.

E. Epoxy Adhesive: The compound shall be a two (2) component, 100% solids, 100% reactive compound suitable for use on dry or damp surfaces:
   1. "Euco Epoxy" #452MV or #620; Euclid Chemical Co.
   2. "Sikadur 32, Hi-Mod"; Sika Chemical Corp.
   3. "Concresive Liquid LPL"; Master Builders
   4. Or approved equal.

F. Polymer Patching Mortar: Free-flowing, polymer-modified cementitious coating.
   1. "Euco Thin Coat" or "Verticoat LPL"; Euclid Chemical Co.
   2. "Sikatop 121, 122, or 123"; Sika Chemical Corp.
   3. "Emaco 300, 310, or 350"; Master Builders
   4. Or approved equal.

G. Bonding Admixture: The compound shall be a latex, non-rewettable type.
   1. "SBR Latex" or "Flex-con"; Euclid Chemical Co.
   2. "Daraweld C"; W. R. Grace.
   3. "MB Primer"; Master Builders.
   4. "SikaLatex" or "SikaLatex R"; Sika Chemical Corp.
   5. Or approved equal.

H. Moisture Barrier: Provide moisture barrier cover over prepared base material where indicated. Use only materials which are resistant to decay when tested in accordance with ANSI/ASTM E 154, as follows: Polyethylene sheet not less than 8 mils thick.

I. Joint Filler for Sidewalks: Preformed asphalt impregnated expansion joint material conforming to ASTM D994, black.

J. Joint Filler for Slab Construction Joints: Closed cell flexible foam ASTM D4819, Type II, with pourable joint sealer per Section 07 92 00.

2.5 PROPORTIONING AND DESIGN OF MIXES

A. Design Mix Meeting: Prior to the preparation of any design mix containing high range water-reducing admixture, a meeting shall be held. The purpose of the meeting is to assure that all parties involved are aware of all of the requirements pertaining to the use of this type of concrete to assure that quality concrete is obtained. The meeting shall be attended by the Contractor, Concrete Subcontractor (if any), Concrete Supplier, Pumping Subcontractor (if any), Testing Laboratory preparing design mix and the Admixture Manufacturer's Representative.

B. Prepare design mixes for each type and strength of concrete by either laboratory the trial batch or field experience methods as specified in ACI 301. If trial batch method is used, use an independent testing facility acceptable to Architect. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to Architect. If trial batch mixes are used, the mix design shall achieve an average compressive strength 1,200 psi greater than the specified strength.

C. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Architect.

D. Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:

1. Concrete for Building Construction and Site Improvements: 4,000 psi 28-day compressive strength. Minimum cement content: 580 lbs/cu.yd. (no flyash or slag); Maximum Water/cement ratio: 0.44

E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.

F. Use water-reducing admixture or high range water-reducing admixture (super plasticizer) in all concrete.

G. Use non-corrosive accelerating admixture in concrete slabs placed at ambient temperatures below 50ºF (10ºC).

H. Use air-entraining admixture in exterior exposed concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having air content within following limits:

1. Concrete structures exposed to freezing and thawing or subjected to hydraulic pressure, and slabs 6% for 3/4" - 1" aggregate.
2. Other Concrete: 2% to 4% air.

I. Use admixtures for water-reducing and set-control in strict compliance with manufacturer's directions.

J. Slump Limits: Proportion and design mixes to result in concrete slump at truck as follows:

1. Ramps and sloping surfaces: Not more than 3".
2. Reinforced foundation systems: Not less than 1" and not more than 3".
3. Concrete containing HRWR admixture (super plasticizer): Not more than 8" after addition of admixture nor more than 3" prior to addition of admixture.
4. Other concrete: Not less than 1" and not more than 4".

2.6 CONCRETE MIXES

A. Ready-Mix Concrete: Comply with requirements of ANSI/ASTM C 94, and as herein specified.
B. Delete references for allowing additional water to be added to batch for material with insufficient slump. Addition of water to the batch will not be permitted.
C. Redosage with the specified high-range water reducing admixture may be done with the prior approval of the Architect regarding dosage and time periods.
D. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ANSI/ASTM C 94 may be required.
E. When air temperature is between 85^{O}F (30^{O}C) and 90^{O}F (32^{O}C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90^{O}F (32^{O}C), reduce mixing and delivery time to 60 minutes.

PART 3 – EXECUTION

3.1 FORMS

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

3.2 PLACING REINFORCEMENT

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.
B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

C. Accurately position, support and secure reinforcement (including welded wire fabric) against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.
D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and tie splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.3 JOINTS

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

3.4 INSTALLATION OF EMBEDDED ITEMS

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

3.5 PREPARATION OF FORM SURFACES

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

3.6 CONCRETE PLACEMENT

A. Pre-placement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.

B. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.
C. General: Comply with ACI 304, and as herein specified.
D. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.
E. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
F. Do not allow concrete to drop more than 5 feet in concrete which will be exposed to view. Do not allow concrete to drop more than 7 feet in concrete which will not be exposed.
G. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309 recommended practices.
H. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
I. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
J. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
K. Bring slab surfaces to correct level with straightedge and strikeoff. Use highway straightedges, bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
L. Maintain reinforcing in proper position during concrete placement operations.
M. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified. When air temperature has fallen to or is expected to fall below 40^{O}F (4^{O} C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50^{O}F (10^{O}C), and not more than 80^{O}F (27^{O}C) at point of placement. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. Only the specified non-corrosive non-chloride accelerator shall be used. Calcium chloride, thiocyanate or admixtures containing more than 0.05% chloride ions are not permitted.
N. Hot Weather Placing: When high temperatures, low humidity and dry winds create conditions suitable for plastic cracking, the evaporation retarder "Eucobar" by The Euclid Chemical Co. or "Confilm" by Master Builders may be required to be applied by spray one or more times during the finishing operation. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90^{O}F (32^{O}C). Mixing water may be chilled or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete. Wet forms thoroughly before placing concrete. Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

3.7 MONOLITHIC SLAB FINISHES

A. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified.

B. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power driven floats, or both Consolidate surface with power-driven floats, or by hand-floating is area is small or inaccessible to power units. Check and level surface plane to a tolerance of F_f20/Fl_l17. Cut down high spots and fill low spots, refloat surface to a uniform, smooth, granular texture.
C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint or other thin-film finish coating system. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation free of trowel marks, uniform in texture and appearance, and with a surface leveled to a tolerance of FF25/FL20. Surface defects which would telegraph through applied floor covering system are to be ground smooth.
D. Non-Slip Broom Finish: Apply non-slip broom finish to interior and exterior concrete slabs, platforms, walks and ramps, and elsewhere as indicated. Immediately after trowel finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.8 CONCRETE CURING AND PROTECTION

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

3.8 REMOVAL OF FORMS

A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50°F (10°C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

3.9 MISCELLANEOUS CONCRETE ITEMS

A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

B. Grout Application: All column base and leveling plates, beam bearing plates, elevator equipment and sills, equipment bases, and other locations noted on the drawings shall be grouted with the specified non-shrink grout.

C. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections and terminations slightly rounded.

3.10 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.

B. Cut out honeycomb, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar before bonding compound has dried. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

C. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spills, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry-pack mortar, or precast cement cone plugs secured in place with bonding agent.

D. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

E. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having required slope.

F. Repair finished unformed surfaces that contain defects that affect durability of concrete. Surface defects, as such, include crazing and cracks in excess of 0.01-inch-wide or that penetrate to reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with patching compound. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix

patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

G. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.
H. Repair methods not specified above may be used, subject to acceptance of Architect.

3.11 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. The Contractor shall employ a testing laboratory approved by the Division of Property Management and Construction to inspect formwork and reinforcement, test concrete and to submit test and inspection reports. All technicians used on the project shall have successfully completed the ACI concrete technician course. The testing laboratory shall certify that the technicians used on this project meet this requirement.
B. Sampling and testing for quality control during placement of concrete shall include the following for **each truck** at point of delivery:
    1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
    2. Slump: ASTM C 143; one test for each concrete truck load at point of discharge. If Super Plasticizer is used, conduct an additional slump test after Super Plasticizer is introduced and mixed.
    3. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C231 pressure for normal weight concrete; one for each set of compressive strength test specimens. Air content shall be tested for each truck.
    4. Concrete Temperature: Test hourly when air temperature is 40^{O}F (4^{O}C) and below, and when 80^{O}F (27^{O}C) and above; and each time a set of compression test specimens made
    5. Compression Test Specimen: ASTM C 31; one set of 6 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
    6. Compressive Strength Tests: ASTM C 39; one set for **each truck** load regardless of quantity, with 2 specimens tested at 7 days, 3 specimens tested at 28 days, and 1 specimen retained in reserve for later testing if required. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive by more than 500 psi.

C. Test results shall be reported in writing to the, Architect and Contractor **within 24 hours of the time that tests are made**. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete slump, air content and temperature at time of placement; compressive breaking strength and type of break for both 7-day tests and 28-day tests.
D. Inspection Results shall be reported in writing to Architect and Contractor **within 48 hours of the time that inspection is made.** Reports shall contain location, size, grade, spacing, and form clearance of reinforcing, slump, temperature of concrete, air temperature, and air content. Condition of forms shall be noted on the report. The Architect and Contractor are to be notified verbally at the time of inspection of deviations from approved drawings so that the reinforcing and mix may be corrected prior to concrete placement. Report shall note all deviations which were not corrected prior to concrete placement.
E. If specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing service shall conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.
F. Compression testing and sampling is required for all concrete and grout.
G. Testing agency shall be present throughout placement of concrete and indicate in their report the time of completion of off loading.

H. Testing agency shall compare delivery and batch tickets with design mix and indicate compliance in their report and include a copy of the delivery or batch ticket with the report.

END OF SECTION

SECTION 03 40 00
PRECAST PRESTRESSED HOLLOW CORE PLANK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section covers manufacture, transportation, and erection of precast, pre-stressed concrete hollow core plank including grouting of joints between adjacent units.
B. Related Work specified elsewhere:
    1. Structural Steel: Section 05 12 00

1.3 QUALITY ASSURANCE

A. Manufacturer Qualification: Fabricating plant shall be certified by public agency such International Accreditations Service (IAS), a division of International Code Council (ICC). The manufacturer shall retain a registered civil or structural engineer to certify that manufacturing is in accordance with design requirements.
B. Welder Qualifications: In accordance with AWS D1.1.
C. Testing: In general compliance with applicable provisions of Pre-stressed Concrete Institute MNL-116, Manual for Quality Control for Plants and Production of Precast Pre-stressed Concrete Products.
D. Requirements of Regulatory Agencies: IBC 2015 NJ Edition plus the following specifications standards and Codes are part of these specifications:
    1. ACI 318-Building Code requirements for Reinforced Concrete
    2. AWS D1.1-Structural Welding Code-Steel
    3. AWS D1.4-Structural Welding Code-Reinforcing Steel
    4. ASTM Specifications-As referred to in Part 2-Products, of this Specification

1.4 SUBMITTALS

A. Shop drawings
    1. Erection Drawings
        a. Plans locating and defining all hollow core plant furnished by the manufacturer, with all major openings shown.
        b. Sections and details showing connections, weld plates, edge conditions and support conditions of the hollow core plank units.
        c. All dead, live, and other applicable loads used in the design.
        d. Fire rating

B. Approvals
    1. Submit four (4) copies of erection drawings for approval prior to fabrication. Fabrication not to proceed prior to receipt of approved drawings.

C. Product Design Criteria
    1. Loadings for design
        a. Initial handling and erection stresses
        b. All dead and live loads as specified on the contract document.
        c. All other loads specified for hollow core plank where applicable.

2. Design calculations shall be performed by a registered engineer experienced in precast pre-stressed concrete design and submitted for approval upon request.
3. Design shall be in accordance with PCI MNL-116 and applicable codes.

D. Test Reports: Test reports on concrete and other materials shall be submitted.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C150-Type II or III
B. Admixtures: Water reducing, Retarding, Accelerating, High Range Water Reducing Admixtures: ASTM C495
C. Aggregates: ASTM C33 or C330
D. Water: Potable or free foreign materials in amounts harmful to concrete and embedded steel.
E. Reinforcing Steel:
    1. Bars
        a. Deformed Billet Steel: ASTM A615
        b. Deformed Low Alloy Steel: ASTM A706

    2. Wire: Cold Drawn Steel: ASTM A82

F. Pre-stressing Strand: Uncoated, 7-Wire, Low Lax Strand: ASTM A416 (including supplement)-Grade 270K.
G. Welded Studs: In accordance with AWS D1.1
H. Structural Steel Plates and Shapes: ASTM A36.
I. Cement grout: Grout shall me a mixture of not less than one-part Portland cement to three parts fine sand, and the consistency shall be such that joints can be completely filled but without seepage over adjacent surfaces. The grout shall achieve a minimum 28-day compressive strength of 3,000 psi.
J. Bearing Strips - Plastic: Multi-monomer plastic strips shall be non-leaching and support construction loads with no visible overall expansion.

2.2 CONCRETE MIXES

A. 28-day Compressive Strength: Minimum of 5,000 psi.
B. Release Strength: Minimum of 3,500 psi.
C. Use of calcium chloride, or admixtures containing chlorides is not permitted.

2.3 MANUFACTURE

A. Hollow core plank shall be machine cast.
B. Finishes: Bottom surface shall be flat and uniform with a block like finish as resulting from an extrusion process without major chips, spalls, and imperfections. Top surface shall be machine troweled.
C. Patching: Will be acceptable providing the structural adequacy of the hollow core unit is not impaired

PART 3 – EXECUTION

3.1 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Handling:

1. Hollow core plank shall be lifted and supported during manufacturing, stockpiling, transporting, and erection operations only at the lifting or supporting points, designated by the manufacturer.
2. Transportation, site handling, and erection shall be performed with acceptable equipment and methods, and by qualified personnel.

B. Storage:
1. Store all units off ground on firm level surfaces with dunnage placed at bearing points.
2. Place stored units so that identification marks are discernible.
3. Separate stacked units by dunnage across full width of each plank.

3.2 ERECTION

A. Installation: Installation of hollow core slab units may be performed by the manufacturer. Members shall be lifted with slings at points determined by the manufacturer. Grout keys shall be filled. Openings shall be field cut only after grout has cured, unless authorized by the manufacturer's engineer.

3.3 FIELD WELDING

A. Field welding is to be done by qualified welders using equipment and materials compatible to the base material.

3.4 ATTACHMENTS AND SMALL HOLES

A. Subject to approval of the Architect/Engineer, hollow core plank units may be drilled or "shot" provided no contact is made with the pre-stressing steel. Round holes and those less than 12 in. on any side shall be drilled or cut by the respective trades. Should spalling occur, it shall be repaired by the trade doing the drilling, shooting, or cutting.

3.5 CLEAN UP

A. Remove rubbish and debris resulting from hollow core plank work from premises upon completion.

END OF SECTION

SECTION 04 20 00
UNIT MASONRY

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Instructions to Bidders and General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. The work under this Section includes the following:
   1. Concrete unit masonry
   2. Installation and grouting

1.3 RELATED WORK

A. The following similar work is specified under other sections:

   1. Section 03 30 00 - Cast in Place Concrete.
   2. Section 04 72 00 - Architectural Cast Stone

1.4 SUBMITTALS

A. Product data for each different masonry unit, accessory, and other manufactured product indicated.
B. Shop drawings for reinforcing detailing fabrication, bending, and placement of unit masonry reinforcing bars. Comply with ACI 315 "Details and Detailing of Concrete Reinforcing" showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of masonry reinforcement.

1.5 REFERENCES

A. Codes and Standards: Comply with provisions of the latest editions of the following Codes, Specifications and Standards except where more stringent requirements are shown, or specified.
   1. ACI 531 "Building Code Requirements for Concrete Masonry"
   2. ACI 530.1/ASCE 6 "Specifications for Masonry Structures"
   3. ACI 530/ASCE 5 "Building Code Requirements for Concrete Masonry"
   4. ACI 530.1/ASCE 6 "Specifications for Masonry Structures"
   5. ACI 315 "Details and Detailing of Concrete Reinforcing"
   6. NCMA TEK No. 11A "Reinforced Hollow Unit Concrete Masonry"
   7. NCMA TEK No. 20A "Mortars for Concrete Masonry"
   8. NCMA TEK No. 23A "Grouting for Concrete Masonry Walls"
   9. NCMA TEK No. 36A "ASTM Specifications for Concrete Masonry Units"
   10. NCMA TEK No. 59 "Reinforced Concrete Masonry Construction"
   11. NCMA TEK No. 62 "Concrete Masonry Cavity Walls"
   12. NCMA TEK No. 63 "Partially Reinforced Concrete Masonry Walls"
   13. NCMA TEK No. 71 "Cold Weather Construction with Concrete Masonry"
   14. NCMA TEK No. 79 "Concrete Masonry Veneers"
   15. NCMA TEK No. 81 "Lintels for Concrete Masonry Walls"
   16. NCMA TEK No. 92 "Control and Removal of Efflorescence"
   17. BIA Technical Notes 1- All Weather Construction
   18. BIA Technical Notes 2- Glossary of Terms
   19. BIA Technical Notes 3a- Material Properties
   20. BIA Technical Notes 3b Section Properties

21. BIA Technical Notes 7a- Water Resistance – Materials
22. BIA Technical Notes 7a- Water Resistance – Construction
23. BIA Technical Notes 9a- Manufacturing, Classification of Brick
24. BIA Technical Notes 7a- Water Resistance – Materials
25. BIA Technical Notes 11a- thru e- Guide Specs
26. BIA Technical Notes 31b- Structural Steel Lintels
27. BIA Technical Notes 36- Details, Sills and Soffits
28. BIA Technical Notes 36a- Details, Caps Copings, Corbels and Racking
29. BIA Technical Notes 44- Anchor Bolts
30. BIA Technical Notes 44a- Fasteners
31. BIA Technical Notes 44b- Wall Ties

1.6 QUALITY ASSURANCE

A. Single-Source Responsibility
   1. Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.
   2. Mortar Materials: Obtain mortar ingredients of uniform quality, including color to exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

B. Performance Requirements
   1. 28-day compressive strength of concrete masonry, f'm: 1,500 psi

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry materials to project in undamaged condition.
B. Store and handle masonry units off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in an air-dried condition.
C. Store cementitious materials off the ground, under cover, and in dry location.
D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
E. Store masonry accessories including metal items to prevent corrosion and accumulation of dirt and oil.

1.8 PROJECT CONDITIONS

A. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
   2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Remove immediately any grout, mortar, and soil that comes in contact with such masonry.
   1. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
   2. Protect sills, ledges, and projections from mortar droppings.
   3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes from mortar droppings.

D. Cold-Weather Construction: Comply with referenced unit masonry standard for cold-weather construction and the following:
   1. Do not lay masonry units that are wet or frozen.
   2. No frozen work shall be built upon and no masonry unit having a film of water or frost on its surface shall be laid.
   3. Cease installation of masonry work during continuous rain. Protect fresh masonry work from rain by protective coverings.
   4. The mortar shall properly harden without freezing and no damage from frost shall occur. No anti-freezing ingredient shall be mixed with the mortar. In freezing weather all recently built work shall be protected. Any completed work found to be affected by the frost shall be taken down and rebuilt by the Contractor without cost to the Owner. No materials which are frozen or covered with ice and snow shall be used in construction.

E. Hot-Weather Construction: Comply with referenced unit masonry standard.

PART 2 – PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. General: Concrete Masonry Units shall be manufactured to specified dimensions of 3/8 inch less than nominal widths by nominal heights by nominal lengths indicated on drawings. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
B. Hollow Load-Bearing Concrete Masonry Units:
   1. Exterior Walls: Medium weight units, ASTM C-90, Grade N-1, with a minimum average net area compressive strength of 1,900 psi. All exposed faces shall be smooth without pattern or scoring.

C. Solid Load-Bearing Concrete Masonry Units: ASTM C 90, Grade N, with minimum average net area compressive strength of 1,800 psi.

2.2 MORTAR AND GROUT MATERIALS AND MIXES

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce required mortar color. For colored aggregate mortars use masonry cement of natural color or white, as required to produce mortar color indicated.
B. Hydrated Lime: ASTM C 207, Type S.
C. Aggregate for Mortar: ASTM C 144, except for joints less than 1/4 inch use aggregate graded with 100 percent passing the No. 16 sieve. White Mortar Aggregates. Natural White sand or ground white stone.
D. Water: Clean and Potable.
E. General: Do not add admixture including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated. **Do not use calcium chloride in mortar or grout**.
F. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar specified. Use type M mortar for all foundation walls and below grade construction. Use Type S mortar for all above grade construction.
G. Grout for Unit Masonry: Course Grout complying with ASTM C 476 and referenced unit masonry standard for cavities with a minimum of 4" horizontal dimension, fine grout complying with ASTM C 476 for cavities less than 4" and 3000 psi concrete with maximum 1" aggregate for space greater than 6".

2.3 REINFORCING STEEL

A. General: Provide reinforcing steel complying with requirements of referenced unit masonry standard and this Section.
B. Steel Reinforcing Bars: Material and grade shall be billet steel complying with ASTM A 615, Grade 60.

C. Deformed Reinforcing Wire: ASTM A 496.
D. Plain Welded Wire Fabric: ASTM A 185
E. Deformed Welded Wire Fabric: ASTM A 497.

2.4 MASONRY CLEANERS

A. Job-Mixed Detergent Solution: Solution of trisodium phosphate (1/2-cup dry measure) and laundry detergent (1/2-cup dry measure) dissolved in one gallon of water.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Comply with referenced unit masonry standard and other requirements indicated applicable to each type of installation included in Project.
B. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness indicated.
C. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting where possible.

3.2 CONSTRUCTION TOLERANCES

A. Comply with construction tolerances of referenced unit masonry standard.

3.3 LAYING MASONRY WALLS

A. Lay out walls (piers) in advance for accurate spacing of surface bond patterns with uniform joint widths.
B. Lay up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.
C. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly (if required), and remove loose masonry units and mortar prior to laying fresh masonry.

3.4 MORTAR BEDDING AND JOINTING

A. Lay hollow concrete masonry units as follows:
    1. With full mortar coverage on horizontal and vertical face shells.
    2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.

B. Strike exterior joints on exterior faces flush.

3.5 GROUTING

A. Grouting shall be NCMA low lift. Filling voids in block as each course goes up, will not be acceptable.

3.6 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units and in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Jointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings, and adjacent construction to provide a neat, uniform appearance, prepared for application of sealants.

C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
   3. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.

3.7 REINFORCING

A. Install reinforcement as shown on plans. Lap splices in wall reinforcement shall be a minimum of 50 bar diameters.
B. All reinforcement is to be installed straight and be located centered in the cells unless shown or noted otherwise. Reinforcement is to be clean and free of any deleterious matter.

END OF SECTION

SECTION 04 72 00
ARCHITECTURAL CAST STONE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Architectural Cast Stone.

1.2 RELATED SECTIONS

A. Section 04 20 00 - Unit Masonry.

1.3 REFERENCES

A. ACI 318 - Building Code Requirements for Reinforced Concrete.
B. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Reinforced Concrete.
C. ASTM C 33 - Standard Specification for Concrete Aggregates.
D. ASTM C 150 - Standard Specification for Portland Cement.
E. ASTM C 595 - Blended Cement
F. ASTM C 1157 - Hydraulic Cement
G. ASTM C 173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volume Method.
H. ASTM C 231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
I. ASTM C 260 - Standard Specification for Air-Entrained Admixtures for Concrete.
J. ASTM C 426 - Standard Test Method for Linear Shrinkage of Concrete Masonry Units.
K. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete.
L. ASTM C 666 - Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
M. ASTM C 979 - Standard Specification for Coloring Pigments for Integrally Pigmented Concrete.
N. ASTM C 1194 - Standard Test Method for Compressive Strength of Architectural Cast Stone.
O. ASTM C 1195 - Standard Test Method for Absorption of Architectural Cast Stone.
P. ASTM C 1364 - Standard Specification for Architectural Cast Stone.
Q. ASTM D 2244 - Standard Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

1.4 DEFINITIONS

A. Cast Stone: Refined architectural concrete building unit manufactured to simulate natural cut stone, used in Division 4 Masonry applications.
B. Dry Cast: Manufactured from zero slump concrete.
C. Vibrant Dry Tamp (VDT) Casting Method: Vibratory ramming of earth moist, zero-slump concrete against a rigid mold until it is densely compacted.
D. Machine casting method: Manufactured from earth moist, zero-slump concrete compacted by machinery using vibration and pressure against a mold until it is densely consolidated.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 61 00 - Product Requirements.
B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.

3. Installation instructions.

C. Shop Drawings: Include profiles, cross-sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, annotation of stone types and their location.
D. Test Results: Submit manufacturer's representative test results of Cast Stone made by the manufacturer. Certify products provided meet or exceed specified requirements.
E. Closeout Submittals:
   1. Provide Cast Stone Institute Member Limited Warranty
   2. Provide manufacturer's maintenance instructions that include recommendations for cleaning and maintenance.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Member of the Cast Stone Institute.
   2. Cast Stone produced in a plant certified by the Cast Stone Institute.
   3. Sufficient plant facilities to produce the shapes, quantities, and size of Cast Stone required in accordance with the project schedule.

B. Mock-Up: Provide a mock-up in size of single table top, including backup construction, anchors, attachments and accessories for evaluation of aesthetic effects and quality standards for fabrication and application workmanship.
   1. Finish areas designated by Architect.
   2. Include each type of unit color and finish selected for the Project.
   3. Do not proceed with remaining work until aesthetic effects and application workmanship are approved by Architect.
   4. Refinish mock-up area as required to produce acceptable work.
   5. Perform test of cleaner on small area for each type and color of cast stone used. Let test area dry 4 to 5 days before inspection and obtain Architects approval of cleaned surfaces.
   6. Keep test area for future comparison.
   7. Approved mockup may remain as part of the Work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver cast stone units secured to shipping pallets and protected from damage and discoloration.
B. Store products off the ground and under cover in manufacturer's unopened packaging until ready for installation.
C. Mark production units with the identification marks as shown on the shop drawings.
D. Protect units from staining or damage during shipping and storage.
E. Provide an itemized list of products to support the bill of lading.
F. Protect cast stone units, including corners and edges, during storage, handling, and installation to prevent chipping, cracking, staining, or other damage.

1.8 SEQUENCING

A. Ensure that locating templates and other information required for installation of products of this section are available to prevent interruption of construction progress.
B. Ensure that products of this section are supplied in time to prevent interruption of construction progress.

1.9 PROJECT 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.

1.10 WARRANTY

A. Provide a 10-year Limited Product Warranty for the Cast Stone supplied.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL CAST STONE

A. Unit Sizes and Shapes: Provide Architectural Cast Stone in the sizes and shapes indicated on the Drawing. Architectural cast stone shall comply with the requirements of ASTM C 1364 and be provided with the following physical properties:
   1. Compressive Strength ASTM C 1194: 6,500 psi minimum at 28 days.
   2. Absorption ASTM C 1195: 6 percent maximum by the cold water method, or 10 percent maximum by the boiling method at 28 days.
   3. Air Content ASTM C 173 or C 231: For wet cast product 4 to 8 percent for units exposed to freeze-thaw environments. Air entrainment is not required for VDT products.
   4. Freeze-thaw ASTM C 1364: CPWL shall be less than 5 percent after 300 freeze/ thaw cycles.
   5. Linear Shrinkage ASTM C 426: Not exceed 0.065 percent.

B. Cast Stone Materials: Materials shall match those required to product results matching the physical properties specified, the colors and finishes of the Architects file sample and the following:
   1. Portland cement: Type I or Type III, white and/or grey, ASTM C 150.
   2. Coarse aggregates: Granite, quartz, or limestone, ASTM C 33, except for gradation.
   3. Fine aggregates: Manufactured or natural sands, ASTM C 33, except for gradation.
   4. Colors: Inorganic iron oxide pigments, ASTM C 979 except that carbon black pigments shall not be used.
   5. Admixtures: Comply with the following:
      a. ASTM C 260 for air-entraining admixtures.
      b. ASTM C 494/C 495M Types A - G for water reducing, retarding, accelerating and high range admixtures.
      c. Other admixtures: Integral water repellents and other chemicals, for which no ASTM Standard exists, shall be previously established as suitable for use in concrete by proven field performance or through laboratory testing.
      d. ASTM C 618 mineral admixtures of dark and variable colors shall not be used in surfaces intended to be exposed to view.
      e. ASTM C 989 granulated blast furnace slag may be used to improve physical properties. Tests are required to verify these features
   6. Water: Potable.
   7. Reinforcing Bars: ASTM A 615/A 615M: Grade 40 or 60 steel galvanized or epoxy coated when cover is less than 1.5 inches.
   8. Anchors, dowels and other anchoring devices and shims shall be standard building stone anchors commercially available in stainless steel Type 304. Nylon threaded inserts are acceptable.

C. Related Products:
   1. Anchors: Type 304 stainless steel, sized for conditions.
   2. Mortar: Type N, ASTM C 270

2.2 FABRICATION

A. Cast Stone Shapes: Unless otherwise indicated on Drawings, provide:
   1. 4” thick cast stone table and bench tops as detailed on the drawings.

2. Provide 1/4" x 1/4" chamfered edge around entire perimeter of table and bench tops.

B. Color and Finish:
1. Color shall be natural concrete to match the color of the concrete masonry support piers.
2. Surfaces intended to be exposed to view shall have a fine-grained texture similar to natural stone, with no air voids in excess of 1/32 inch and the density of such voids shall be less than 3 occurrences per any 1 square inch area and not obvious under direct daylight illumination at a 5 foot distance.
3. Units shall exhibit a texture approximately equal to the approved sample when viewed under direct daylight illumination at a 10-foot distance.
4. ASTM D 2244 permissible variation in color between units of comparable age subjected to similar weathering exposure.
   a. Total color difference - not greater than 6 units.
   b. Total hue difference - not greater than 2 units.
5. Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under direct daylight illumination from a 20-ft distance.
6. Remove cement film, if required, from exposed surfaces prior to packaging for shipment.

C. Reinforcing:
1. Reinforce the units as required by the Drawings and as recommended by the manufacturer for safe handling and structural stress.
2. Minimum reinforcing shall be 0.25 percent of the cross-section area but not less than No.3 reinforcing bars at 12” on center maximum.
3. Reinforcement shall be noncorrosive where faces exposed to weather are covered with less than 1.5 inches of concrete material. All reinforcement shall have minimum coverage of twice the diameter of the bars.
4. Panels greater than 24 inches in one direction shall be reinforced in that direction. Units less than 24 inches in one dimension shall be non-reinforced in that direction unless otherwise specified.
5. Welded wire fabric reinforcing shall not be used in dry cast products.

D. Curing:
1. Cure in a warm curing chamber approximately 100 degrees F at 95 percent relative humidity for approximately 12 hours, or cure in a 95 percent moist environment at a minimum 70 degrees F for 16 hours after casting.
2. Additional yard curing at 95 percent relative humidity shall be 350 degree days (i.e. 7 days @ 50 degrees F or 5 days @ 70 degrees F) prior to shipping.
3. Form cured units shall be protected from moisture evaporation with curing blankets or curing compounds after casting.

E. Production Tolerances:
1. Cross section dimensions shall not deviate by more than +/- 1/8 inch from approved dimensions.
2. Length of units shall not deviate by more than length/ 360 or +/- 1/8 inch, whichever is greater, not to exceed +/- 1/8 inch.
3. Maximum length of any unit shall not exceed 15 times the average thickness of such unit unless otherwise agreed by the Architect.
4. Warp, bow or twist of units shall not exceed length / 360 or +/- 1/8 inch, whichever is greater.
5. Location of dowel holes, anchor slots, flashing grooves, false joints and similar features; on formed sides of unit, 1/8 inch, on unformed sides of unit, 3/8 inch maximum deviation.

2.3 SOURCE QUALITY CONTROL

A. Test compressive strength and absorption from specimens taken from every 500 cubic feet of product produced.
B. Perform tests in accordance ASTM C 1194 and C 1195.
C. Have tests performed by an independent testing laboratory every six months.
D. New and existing mix designs shall be tested for strength and absorption compliance prior to producing units.
E. Retain copies of all test reports for a minimum of two years.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions, ACI 530.1 and approved submittals.
   1. Check Cast Stone materials for fit and finish prior to installation. Unacceptable units shall not be set.
   2. Set units in full bed of mortar, unless otherwise indicated on the Drawings. It is not necessary to rake joints for later tuckpointing; standard full mortar application with tooling.
   3. Joints:
      a. Width: 3/8 inch wide; unless otherwise indicated on the Drawings or elsewhere in the specifications.
      b. Mortar joints should have a slight concave profile; unless otherwise indicated on the Drawings or elsewhere in the specifications.
   4. Remove excess mortar immediately; remove mortar fins and smears before tooling joints.
   5. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
   6. Cover wainscot for protection and bond separation with plastic, felt paper or other approved products.
   7. Cover freshly installed masonry products as required to assist with the curing process.

B. Inspection:
   1. Inspect finished installation according to Cast Stone Institute Technical Bulletin #36.
   2. Do not field apply sealer water repellent until repair, cleaning, inspection is completed.

3.4 TOLERANCES

A. Comply with Cast Stone Institute Technical Manual and the following.
   1. Variation from Plumb: Do not exceed 1/8 inch in 5 feet or 1/4 inch in 20 feet or more.
   2. Variation from Level: Do not exceed 1/8 inch in 5 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.
   3. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch or 1/4 of nominal joint width, whichever is greater.

4. Variation in Plane Between Adjacent Surfaces: Do not exceed 1/8 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.5 REPAIR AND CLEANING

A. Repair chips with touchup materials furnished by manufacturer.
B. Clean exposed units after mortar is thoroughly set and cured.
C. Areas with heavy soiling use a wood block or non-metallic scraper.
D. Apply approved cleaner to units in accordance with manufacturer's instructions.

3.6 WATER REPELLENT

A. Apply water repellant for weatherproofing in accordance with water repellant manufacturer's instructions, after installation, cleaning, repair, inspection, and acceptance of units are completed.

3.7 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

DIVISION 5 - STRUCTURAL STEEL

SECTION 05 12 00
STRUCTURAL STEEL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Instructions to Bidders and General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Extent of structural steel work is shown on drawings, including schedules, notes and details to show size and location of members, typical connections and type of steel required.
B. Products furnished but not installed under this section:
   1. Anchor bolts for installation into concrete.
   2. Loose base plates and bearing plates set on concrete.
   3. Steel Sheet: ASTM A 653 grade 40 galvanized G90 coating.

1.3 RELATED SPECIFICATION SECTIONS

A. The following Sections contain requirements that relate to this Section:
   1. Section 03 30 00 - Cast in Place Concrete
   2. Section 06 10 00 – Rough Carpentry. For installation of steel sheet over roof sheathing.

1.4 SUBMITTALS

A. Submit the following for formal review and approval by the Architect according to Conditions of the Contract and Division 1 Specification Sections:

   1. Product Data: Submit manufacturer's specifications and installation instructions for the following products:
      a. High-strength bolts (each type), including nuts and washers.
      b. Structural steel primer paint
      c. Shrink resistant non-metallic grout

   2. Shop Drawings:
      a. Prepared under direct supervision of registered professional engineer, including:
         1) Complete erection drawings, details and schedules for fabrication and shop assembly of members.
         2) Details, schedules, procedures, and diagrams showing sequence of erection.

      b. Indicate profiles, spacing and locations of members, including:
         1) Fabrication details
         2) Size and weight of members
         3) Location of shop and field connections
         4) Locations and details of anchors, base/bearing plates and leveling plates

5) Details of holes, cuts, camber and splices
6) Layout and location of composite shear studs
7) Identify high-strength bolted slip-critical, direct-tension, or tensioned shear/bearing connections.

c. Indicate welds by standard AWS A2.1 and A2.4 symbols distinguishing between shop and field welds; and show size, length and type of each weld.
d. Provide setting drawings, templates and directions for installation of anchor bolts and other anchorage to be installed as work by other sections.

1.5 PERFORMANCE REQUIREMENTS

A. Interface with other systems:
1. Coordinate primer with finish paint.
2. Provide templates and instructions for installing anchors in other Work.

B. Structural Performance: Engineer structural steel connections required by the Contract Documents to be selected or completed by the fabricator to withstand design loadings indicated.

1.6 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the latest editions of the following, except as otherwise indicated:
1. AISC Steel Construction Manual - Thirteenth including the AISC "Code of Standard Practice for Steel Buildings and Bridges."
2. AISC "Allowable Stress Design Specification for the Design, Fabrication and Erection of Structural Steel for Buildings", including "Commentary" and Supplements thereto as issued.
3. AISC "Specifications for Architecturally Exposed Structural Steel".
4. AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation.
5. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel".
6. ASTM A6 “General Requirements for Delivery of Rolled Steel Plates, Shapes, sheet Piling and Bars for Structural Use”.
7. Hot-dip galvanizing fabrication practices: Conform to the requirements of ASTM A143, A384 and A385 unless otherwise specified.
8. SSPC “Steel Structures Painting Manual”.

1.7 CONNECTION DESIGN AND MEMBER DETAILING

A. Design connections as “Framed Beam Connections: in accordance with Part 4 of the AISC Manual, except as otherwise indicated.
1. For noncomposite beams, reaction shall be end reaction on member, as defined in the AISC “Uniform Loaded Beam Tables”, or reaction shown on the Drawings, whichever is greater.
2. For composite beams, use reaction shown on the Drawings.
3. Single sided connections for spandrel beams are not acceptable.
4. Bolts: A325 or A490. Connections may be designed using Type N Bolts, except at hanger connections and where other slip-critical connections (designated as SC) are indicated on the Drawings; design slip-critical connections using Type SC bolts.

B. Shop and Field Connections:

1. Shop connections are to be welded unless indicated otherwise on the Drawings.
2. Bolt field connections with high-strength bolts except where welded connections or other connections are indicated.
3. Bolts: 3/4 inch diameter minimum
4. Fillet welds: 1/4 inch minimum, unless otherwise noted

C. Except where seated connections are shown or required, frame beams and girders into columns. Reinforce beam webs at seated connections for stability and to prevent buckling.

D. Moment Connections:

1. Where a moment connection is noted on plans, provide a moment connecton at the beam to column connection or supporting beam to beam framing connection.
2. Unless noted otherwise or as a wind moment connection, the moment connection is to develop the full strength of the beam in bending. Use plates, top and bottom of the beam, to accomplish development.
3. Cantilevers require full moment connections “thru” column or supporting beam, unless beam rides over supporting member or column.
4. For moment connections “thru” columns, add beam stiffener plates minimum 3/8 inches thick. When the beam is parallel to the column web, the stiffener plates are to be equal to the flange thickness of the column and installed in line with the column flanges. When the beam is perpendicular to the column web, the stiffener plates are to be equal to the web thickness and installed in line with the column web. In addition, when beam is perpendicular to the column web, install column cap plate stiffeners equal to the column web thickness. The cap plate stiffeners are to be installed on both sides of the column web in line with the beam web.
5. Where a moment connection is indicated at a beam to beam connection, the supporting beam is to be continuous and a full moment and shear connection provided for the terminated beam.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site at such intervals to insure uninterrupted progress of work. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.

B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry or attached to other construction, in ample time to not delay work.

C. Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

D. Do not store materials on the structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.9 TEMPORARY BRACING

A. The steel erector/contractor is responsible for the design, strength, adequacy, safety and means and methods of construction of shoring and temporary bracing of Structural Steel Work at all stages of erection, until such time that permanent members and construction are in place and final connections are completed.

DIVISION 5 - STRUCTURAL STEEL

1.10 PROJECT CONDITIONS

A. Field verify all existing measurements and elevations prior to beginning fabrication process. Architect will not review or take responsibility for any existing dimensions.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Metal Surfaces, General: For fabrication of work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names and roughness in accordance with the AISC "Specifications for Architecturally Exposed Structural Steel". Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.
B. Structural Steel Shapes, Plates, and Bars: ASTM A36
C. Structural Steel Tubing:
   1. Cold-Formed: ASTM A500, Grade B
   2. Hot-Formed: ASTM A501

D. Steel Sheet: ASTM A 653 grade 40 galvanized G90 coating.
E. Bolts, Nuts, and Washers:
   1. Unheaded Rods: ASTM A 36 (ASTM A 36M)
   2. Unheaded Rods: ASTM A 572, Grade 50 (ASTM A 572M, Grade 345)
   3. Anchor bolts: ASTM A307, nonheaded type unless otherwise indicated
   4. Standard threaded fasteners:
      a. Plain washers: ANSI B27.2, Type A
      b. Beveled washers: ANSI B27.4
      c. Nuts and bolts: ASTM A307, Grade A

   5. High-Strength Threaded Fasteners: Quenched and tempered medium-carbon steel.
      a. Bolts: Heavy hexagon ASTM A325
      b. Nuts: Heavy hexagon ASTM A563, Grade DH
      c. Washers: Hardened ASTM F436

   6. Direct Tension Indicator Fasteners: Load indicator washers to conform to ASTM F959, or tension control bolts may be used.

F. Electrodes for Welding: Comply with AWS Code. Welding Materials: AWS D1.1; type required for materials being welded.
G. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds and repair painting galvanized steel, complying with Military Specifications DOD-P-21035 (Ships) or SSPC-Paint-20.
H. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404, Size No. 2. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
J. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and

water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and a 30-minute working time.

1. Pre-mixed compound consisting of non-metallic aggregate, cement, water reducing, and plasticizing additives.
2. Acceptable products:
   a. Euco N.S. by Euclid Chemical Co.
   b. Five Star Grout by Five Star Grout Corp.
   c. Masterflow 713 by Master Builders
   d. Or approved equal

2.2 FABRICATION

A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final approved shop drawings. Provide camber in structural members where indicated.

B. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.

C. Where finishing is required, complete structural steel assemblies, including welding of units, before starting shop-priming of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs and other defects.

D. Fabricate architecturally exposed structural steel with exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.
   1. Remove blemishes by filling, grinding, or by welding and grinding, prior to cleaning, treating, and shop priming.
   2. Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.

E. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible. Plane thermally cut edges to be welded.

F. Finishing: Accurately mill ends of columns and other members trnasmitting loads in bearing.

G. Shear Connectors: Perpare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's printed instructions.

H. Connections:
   1. Welded Connections: Comply with AWS D1.1 Code for procedures, appearance and quality of welds and methods used in correcting welding work.
      a. Join members with continuous welds, except where bolted connections are indicated.
      b. Stress relieve welded assemblies by heat treatment.
      c. Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.
      d. Grind welds smooth.

   2. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch and larger. Grind flush butt welds. Dress exposed welds.

3. Bolted connections: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints Using ASTM A325 or A490 Bolts" (RCRBSJ).
   a. Shear-bearing connections: Bolts in connections not within slip-critical category, nor subject to tension loads, nor required to be fully tensioned bearing type connections shall be installed in properly aligned holes, tightened to snug-tight condition. Snug-tight condition is defined as tightness that exists when all plies in a joint are in firm contact. This may be attained by a few impacts of an impact wrench or full effort of a man using an ordinary spud wrench.
   b. Slip-critical Connections: Connections subject to direct tension, and fully pretensioned bearing connections, fasteners, together with washers of size and quality specified, shall be installed in properly aligned holes and tightened by one of methods described in Subsections 8(d) (1) through 8(d) (4), of referenced standard, to at least minimum tension specified when all fasteners are tight.

I. Bolt field connections, except where welded connections or other connections are indicated.
   1. Provide high-strength threaded fasteners for all bolted connections, except where unfinished bolts are indicated.

J. Holes for Bolted Connections and Other Work:
   1. Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on final shop drawings.
   2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning.
   3. Drill holes in bearing plates.
   4. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.

2.3 GALVANIZING

A. All Steel shall have a Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel indicated for galvanizing according to ASTM A 123.
B. Fabricate structural steel in accordance with Class I, II, or III guidelines as described in AGA's Recommended Details for Galvanized Structures.
C. Use fabrication practices for products in accordance with applicable portions of ASTM A143, A384 and A385, except as specified herein. Avoid fabrication techniques which could cause distortion or embrittlement of steel.
D. Consult Architect regarding potential warpage problems or potential handling problems during the galvanizing process which may require modification of design before fabrication proceeds.
E. Remove welding slag and burrs prior to delivery for galvanizing.
F. Provide holes and/or lifting lugs to facilitate handling during the galvanizing process that are suitable to Architect and fabricator.
G. Remove, by blast cleaning or other methods, surface contaminants and coatings which would not be removable by normal chemical cleaning process in galvanizing operation.
H. Application of Coating:
   1. All exterior exposed structural steel shall be galvanized.
   2. Steel members, fabrications and assemblies: Comply with ASTM A123.
   3. Bolts, nuts and washers and iron and steel hardware components: Comply with ASTM A153.
   4. Coating weight: Conform with paragraph 5.1 or ASTM A123 or Table 1 of ASTM A153, as appropriate.

5. Provide post-galvanizing treatments as recommended by AGA for conditions applicable to Work.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Before erection proceeds, and with the steel erector present, verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Temporary Shoring and Bracing:
   1. The steel structure is a self-supporting steel frame and is dependent upon diaphragm action of the metal roof deck and an attachment to a series of moment frames for stability and for resistance to wind and seismic forces.
   2. Provide temporary supports required for stability and for resistance to wind and seismic forces until these elements are complete and are capable of providing this support.
   3. Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads.
   4. Do not remove temporary members and connections until permanent members are in place, final connections are made and concrete slabs are cured.
   5. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

B. Setting Base and Leveling/Bearing Plates:
   1. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces.
   2. Clean bottom surface of base and bearing plates.
   3. Set loose and attached base plates and bearing plates for structural members on wedges, shims, or setting nuts, or other adjusting devices.
   4. Tighten anchor bolts after supported members are positioned and plumbed.
   5. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or leveling/bearing plate prior to packing with grout.
   6. Pack non-shrink grout solidly between bearing surfaces and bases or plates so that no voids remain. Comply with grout manufacturer's instructions.

3.3 ERECTION

A. Field Assembly:
   1. Set structural frames accurately to lines and elevations indicated.
   2. Align and adjust various members forming part of complete frame or structure before permanently fastening.
   3. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly.
   4. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
   5. Level and plumb individual members of structure within specified AISC tolerances.

6. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
7. Splice members only where indicated and accepted on final approved shop drawings.
8. Complete field connections prior to loading member.
9. On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces.
10. Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
11. Gas Cutting: Do not use gas thermal cutting torches in field during erection for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members which are not under stress, as acceptable to the Architect. Finish gas-cut sections equal to a sheared appearance when permitted.
12. Direct Tension Indicator: Bolts shall be installed in all holes of the connection and brought to snug tight condition. All fasteners shall then be tightened, progressing systematically from the most rigid part of the connection to the free edges in a manner that will minimize relaxation of previously tightened fasteners prior to final twist-off or yielding of the control or indicator element of the individual devices. Proper tensioning of the bolts may require more than a single cycle of systematic tightening.

B. Comply with AISC Specifications for bearing, adequacy of temporary connections, alighment and removal of paint on surfaces adjacent to field welds.

C. Touch-Up Galvanizing: Clean field welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

END OF SECTION

SECTION 06 05 73
WOOD TREATMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Instructions to Bidders and General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Structural Framing Lumber
B. PSL Beams
C. Signage Posts

1.3 RELATED SECTIONS

A. Section 06 09 00 – Metal Connectors
B. Section 06 10 00 – Rough Carpentry

1.4 REFERENCES

A. American Wood Protection Association (AWPA):
    1. Standard U1, Wood treated with preservative system
    2. Standard T1, Use Category System
    3. Standard A, Analytical
    4. Standard M, Quality Control

B. National Institute of Standards and Technology (NIST):
    1. PS 1, U.S. Product Standard for Construction and Industrial Plywood.
    2. PS 20, American Softwood Lumber Standard.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping:
    1. Provide waterproof covers for preservative treated wood during shipment.

B. Storage and Protection:
    1. Store preservative treated wood off the ground and protected from the weather.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Lumber for preservative treatment must conform to the following specifications.
B. Lumber: In accordance with NIST PS 20 and as follows:
    1. Grade: No. 2 Dense or better
    2. Species: Southern pine
    3. Surfacing: S4S

2.2 PRESERVATIVE TREATMENT

A. UC2 - INTERIOR/DAMP: Wood and wood-based materials used for interior construction that are not in contact with ground but may be subject to dampness. These products are continuously protected from the weather but may be exposed to occasional sources of moisture. Examples are interior beams, timbers, flooring, framing, millwork and sill plates.
B. UC4A – GROUND CONTACT: Wood and wood-based materials used in contact with ground, fresh water, or other situations favorable to deterioration or above ground but are difficult to maintain, repair or replace and are critical to the performance and safety of the entire system/construction.

2.3 SOURCE QUALITY CONTROL

A. Inspection:
1. Untreated Material:
a. Lumber: Provide lumber that has been inspected and graded by an ALSC recognized grading agency.
b. Plywood: Provide plywood that has been inspected and graded before treatment by a code-recognized inspection and testing agency.

2. Treated Material: Provide treated material that bears the Natural Select trademark and the quality mark of an ALSC-recognized agency which maintains supervision, testing, and inspection of the quality of the product. Quality marks shall be affixed to each piece and include the following:
a. Identification of the inspection agency
b. Identification of the standard to which the material was treated
c. Identification of the treating facility
d. Identification of the preservative and retention
e. Identification of the end use for which the product is suitable

2.4 MISCELLANEOUS MATERIALS

A. Fasteners and Anchorages: Provide size, type material and finish as indicated and as recommended by applicable standards, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommending nails. Provide stainless steel fasteners and anchorages or a hot-dip galvanized coating meeting ASTM A153, ASTM Standard A653 (Class G-185)

PART 3 – EXECUTION

3.1 INSTALLATION

A. Surface Treatment of Field Cuts: Treat field cuts on members that provide structural support to a permanent structure in accordance with AWPA Standard M4.

TABLE 1 - SCHEDULE OF USE

Member	Treatment
Framing Lumber	UC2
PSL Beams	UC4A
Posts	UC4A

END OF SECTION

DIVISION 6 - WOOD AND PLASTIC

SECTION 06 09 00
METAL CONNECTORS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Pre-engineered metal connectors used to support a wood or composite wood member(s) from a wood, or composite wood supporting member(s).

1.3 RELATED SECTIONS

A. Section 06 05 73 – Wood Preservative Treatment
B. Section 06 10 00 – Rough Carpentry – Wood supported by fastenings or providing support or anchorage.

1.4 REFERENCES

A. ASTM A36 – Carbon Structural Steel
B. ASTM A167 – Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
C. ASTM A193-B7 – Alloy Steel and Stainless-Steel Bolting Materials for High Temperature
D. Service
E. ASTM A307 – Carbon Steel Bolts and Studs
F. ASTM A1011 – Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
G. ASTM F1667 – Driven Fasteners: Nails, Spikes, and Staples
H. ASTM D1761 – Standard Test Methods for Mechanical Fasteners in Wood
I. ICBO AC13 – Acceptance Criteria for Joist Hangers and Similar Devices
J. ICBO AC95 – Acceptance Criteria to Determine Bending Yield Moment for Nails
K. ICBO AC120 – Acceptance Criteria for Wood Screws
L. AISI 2004 – Cold-Formed Steel Specification
M. NDS 2015 – National Design Specification
N. ASTM A500 – Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
O. ASTM A625 – Tin Mill Products, Black Plate, Single Reduced
P. ASTM A653 – Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
Q. ASTM A706 – Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
R. ASTM A924/A 924M – General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

1.5 STORAGE AND HANDLING

A. Deliver products to job site in manufacturer's or distributor's packaging undamaged, complete with installation instructions.
B. Protect and handle materials in accordance with manufacturer's recommendations to prevent damage or deterioration.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
   1. Simpson Strong-Tie Co., Inc.
   2. USP Structural
   3. Teco MiTec
   4. Or approved equal

2.2 MATERIALS

A. Steel:
   1. Sheet: ASTM A625, ASTM A653, ASTM A1011
   2. Fasteners: ASTM F1667, SAE C1022 (SDS Screws)

B. Stainless Steel:
   1. Sheet: ASTM A167

C. Finishes:
   1. Hot-dipped galvanized or electro-plated galvanized: G185 (ZMAX)

2.3 FABRICATION

A. Shop assembly to occur per the manufacturer's approved production drawings.
B. Fabrication tolerances per manufacturer
C. Fabrication requiring welding shall be performed in accordance with the current American Welding Society's standards.
D. The manufacturer's identification shall be stamped into the metal part and/or a label may be attached to the part with adhesive.

2.4 TESTING

A. Allowable loads published in manufacturer's catalog to be determined using the minimum load from static and/or cyclic analysis and one or more of the following test methods:
   1. Static load tests in wood assemblies
   2. Static load tests in steel jigs
   3. Static load tests of products embedded in concrete or masonry
   4. Cyclic or static load tests in wood assemblies (Anchor Tiedown System)

B. Testing to determine allowable loads shall be performed as per ICBO Acceptance Criteria 13 (AC13) and/or ASTM D1761.
C. Allowable loads for hangers are determined by a static load test resulting in not more than a 1/8" deflection of the joist relative to the header, or the lowest test ultimate load divided by 3, or the fastener allowable load as determined by the NDS, whichever is lower.
D. Testing shall be conducted under the supervision of an independent laboratory.
E. Manufacturer to provide code testing data on all products that have been code tested upon request.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Unless otherwise noted in the manufacturer's catalog, allowable loads are for Douglas Fir-Larch under continuously dry conditions. Allowable loads for other species or conditions must be adjusted according to the code. See manufacturer's catalog for additional notes and requirements.

B. Built-up lumber (multiple members) must be fastened together to act as one unit to resist the applied load.
C. Verify that the dimensions of the supporting member are sufficient to receive the specified fasteners.

3.2 INSTALLATION

A. Unless otherwise noted in the manufacturer's catalog, bolts and nails shall not be combined.
B. All nails shall be common unless otherwise noted in the manufacturer's catalog or substituted, by the engineer of record, with a reduction taken.
C. Unless otherwise noted in the manufacturer's catalog, bending steel in the field may cause fractures at the bend line. Fractured steel will not carry load and must be replaced. When bending is allowed or required in the catalog, the connector shall be allowed one cycle bend, one time only.
D. Galvanized connectors should not be placed in contact with treated wood unless the treated wood is adequately verified to be suitable for such contact. Some wood treatments may accelerate metal deterioration. See wood material supplier for specific recommendations.
E. A fastener that splits the wood will not take the design load. Evaluate splits to determine if the connection will perform as required. Dry wood may split more easily and should be evaluated as required. If wood tends to split, consider pre-boring holes with diameters not exceeding 0.75 of the nail diameter.
F. Wood shrinkage shall be taken into account when designing and installing connections.
G. Built-up lumber (multiple members) must be fastened together to act as one unit to resist the applied load.
H. Top flange hangers may cause unevenness. Possible remedies should be evaluated by a professional and include using a face mount hanger, routering the beam, or cutting the subfloor to accommodate the top flange thickness.
I. Do not overload by exceeding the manufacturer's catalog allowable load values.
J. Unless otherwise noted in the manufacturer's catalog, fill all fastener holes with fastener types as specified in the manufacturer's catalog.
K. All specified fasteners must be installed according to the instructions in the manufacturer's catalog.
L. Bolt holes shall be a minimum of 1/32" and a maximum of 1/16" larger than the bolt diameter.
M. Install all specified fasteners before loading the connection.
N. Use proper safety equipment.
O. Welding shall be in accordance with the American Welding Society (AWS) standards.
P. Welding galvanized steel may produce harmful fumes, follow proper welding procedures and safety precautions.
Q. Nail tools with hole-location mechanisms may be used to install connectors, provided the correct quantity and type of nails are properly installed in the nail holes.
R. Joist shall bear completely on the connector seat, and the gap between the joist end and the header shall not exceed 1/8".
S. Installer of ATS system to cut rods to length as required.
T. Modifications to products or changes in installation procedures should only be made by a qualified designer. The performance of such modified products or an altered installation procedure is the sole responsibility of the designer.

3.3 FIELD QUALITY CONTROL

A. Determine that the proper part is being used in the correct application and has been fabricated by the approved manufacturer by observation of the stamp into the metal part and/or the adhesive label on the product denoting part and manufacturer name.
B. Before substituting another brand, confirm load capacity based on published testing data and calculations. The engineer/designer of record shall evaluate and give written approval for substitution prior to installation.

Table 1
Schedule of Materials

Wood Preservative Treatment	Material
Borate Treated lumber	Stainless Steel[1]
Copper Azole	Stainless Steel[2]

[1] Use galvanized G185 if connector is not manufactured in stainless steel
[2] Use galvanized G185 if connector is not manufactured in stainless steel

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes:
   1. Structural Wood Framing
   2. Installation of Steel Sheet Over Plywood Sheathing

1.3 RELATED WORK

A. Wood preservative treated lumber is specified in Section 06 05 73
B. Pre-engineered Metal Connectors are specified in Section 06 09 00
C. Plastic sheet air barrier is specified in Section 07 27 19
D. Steel Sheet is specified in section 05 12 00

1.4 REFERENCES

A. National Forest Products Assoc. (NFPA)
B. American Wood Council: National Design Specification for Wood Construction and Wood Frame Construction Manual.
C. Lumber Standards: Comply with PS 20 and with applicable rules of the respective grading and inspecting agencies for species and products indicated.
D. Southern Forest Products Association (SFPA): Southern Forest Products Association Guide to Southern Pine Lumber Grades
E. American Institute of Timber Construction (AITC): Timber Construction Manual
F. American Wood-Preservers Association (AWPA): AWPA C22-96
G. National Evaluation Report (NES): NER-508
H. Plywood Product Standards: Comply with PS 1 (ANSI A 199.1) or, for products not manufactured under PS 1 provisions, with applicable APA Performance Standard for type of panel indicated.
I. American Plywood Association - APA Design/Construction Guide Residential and Commercial

1.5 PRODUCT HANDLING

A. Delivery and Storage: Keep materials dry at all times. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber and plywood, and provide air circulation within stacks.

1.6 JOB CONDITIONS

A. Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow proper attachment of other work.

PART 2 – PRODUCTS

2.1 LUMBER

A. Factory mark each piece of lumber with type, grade, mill, and grading agency.
B. Lumber Standard: Manufacture lumber to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of National Design Specification for Wood Construction.
C. All dimensional lumber, engineered lumber, and laminated beams shall be preservative treated in accordance with Section 06 05 73.
D. Inspection Agencies: Inspection agencies and the abbreviations used to reference them to lumber grades and species include the following:
   NLGA - National Lumber Grades Authority (Canadian)
   SPIB - Southern Pine Inspection Bureau
   WCLIB - West Coast Lumber Inspection Bureau
   WWPA - Western Wood Products Association

E. Nominal sizes are indicated, except as shown by detail dimensions.
F. Provide dressed lumber, S4S, manufactured to actual sizes required by PS 20 to comply with minimum requirements indicated below:
G. Moisture Content: Seasoned or kiln dried with 19 percent maximum moisture content at time of dressing and shipment for sizes 2 inches or less in nominal thickness, unless otherwise indicated.
H. Framing Lumber: #2 Southern Pine Treated
I. Engineered Lumber: Products shall be proven by testing and evaluation in accordance with the provisions of ASTM D5456 and ESR-1387.
   Pressure Treated Parallam Beams: (AWPA Use Category UC4A)
   1. Parallel Stand Lumber Beams (PSL) shall comply with ASTM D5456 (PS 2, AC124 and ASTM D7672, where applicable)
   2. Prior to treatment, beam application material = 2.0E/2900 Fb Parallam PSL
   3. E = $1.660x10_6$ PSI, Fb = 2117 PSI, Fc (parallel) = 2030 PSI, Fc (perp) = 480 PSI, Fv = 241 PSI, Ft = 1519 PSI.
   4. Product shall bear third-party quality marks verify that the product was
   5. manufactured in accordance with ASTM D5456, as referenced in ESR-1387, and treated in accordance with AWPA U1 for the specified use category.
   6. Treated beams shall be manufactured and guaranteed via warranty by the manufacturer and preservative chemical supplier. Treated with an AWPA approved preservative treatment.
   7. End Seal per the Manufacturer's Instructions on all field cuts.

2.2 PLYWOOD

A. Wall and Roof Sheathing: APA RATED SHEATHING for Exterior Use.
   1. Exposure Durability Classification: EXTERIOR
   2. Span Rating: 32/16
   3. Type: C-C
   4. Thickness: Nominal 1/2"

2.3 MISCELLANEOUS MATERIALS

A. Fasteners: Fasteners shall be Type 304 or Type 316 stainless steel
B. Powder Actuated Fasteners: Hilti, Rawl, Powers, or approved equal

PART 3 – EXECUTION

3.1 ROUGH FRAMING

A. General: Fit framing lumber and other rough carpentry, set accurately to the required lines and levels, and secure in place in a rigid manner. Do not splice framing members between bearing points. Set rafters and beams with their crown edge up. Frame members for the passage of pipes, conduits and ducts Provide as necessary for the proper completion of the work all framing members not indicated or specified. Spikes, nails and bolts shall be drawn up tight. Do not use shimming on wood or metal bearings. Do not notch in middle third of joists or rafters; limit notches to 1/6-depth of joist, 1/3 at ends. Do not bore holes larger than 1/3-depth of joist or locate closer than 2" from top or bottom.

B. Nailing: Fasten all members in accordance with the IBC fastener schedule, WFCM Nailing Schedule or as specified.

C. Wall Framing: Select studs for straightness and set plumb, true, and in alignment. In walls and partitions more than eight feet tall, provide horizontal bridging at not more than eight feet on center using nominal 2 inch material of the same width at the studs; install the bridging flat. Sizes and spacing of studs shall be as indicated. Install triple studs at corners to form corner posts. Frame corner posts to receive sheathing.

D. Plates: Anchor plates as indicated. Provide plates cut for the passage of pipes or ducts with a steel angle as a tie for the plate and bearing for joist.

E. Wall Sheathing: Apply horizontally and stagger vertical end joints. Abut sheathing edges over centerlines of supports. Allow 1/8” spacing at panel ends and 1/4” at panel edges.

F. Rafters: Set accurately and form a true plane. Rafters shall be notched and have full bearing on plates.

G. Joists: Size as indicated and set accurately and in alignment. Toenail joists to all plates with not less than (3) 10d nails, frame openings in ceilings with headers and trimmers.

H. Plates: Anchor plates as indicated.

I. Roof Sheathing: Install plywood with the grain of the outer plies or long dimension at right angles to supports. Stagger end joints and locate over the centerlines of supports. Allow 1/8" spacing at panel ends and 1/4" spacing at panel edges. Nail panels with 8 penny common or 6 penny annular ring or screw-type nails spaced 6" on center at supported edges and 12" on center at intermediate bearing.

J. Steel Sheet: <u>For down-range side of shooting shelter</u>. Install steel roof sheet over plywood roof sheathing with joints aligned over supports. Tack in place with No.12 screws to plywood sheathing (not at rafter locations) as required secure in preparation for installation of furring and upper sheathing.

K. Wood Roof Furring: <u>For down-range side of shooting shelter</u>. Install wood furring at 24” on center over the steel sheet and located aligned over the rafters below and oriented in same direction as the rafters. Secure with No.12 screws 1 1/2" long in pre-drilled holes at 24” on center and 6” maximum from each end.

L. Roof Sheathing Over Furring: <u>For down-range side of shooting shelter</u>. Install plywood with the grain of the outer plies or long dimension at right angles to supports. Stagger end joints and locate over the centerlines of supports. Allow 1/8" spacing at panel ends and 1/4" spacing at panel edges. Fasten panels with No.12 screws 2 1/2” long spaced 6" on center at supported edges and 12" on center, at intermediate bearing, all in pre-drilled holes,

3.2 CLEAN-UP

A. General: Keep premises in a neat, safe and orderly condition at all times during execution of the work, free from accumulation of sawdust, cut ends and debris.

B. Sweeping: At the end of each working day, more often if necessary thoroughly sweep all surfaces where refuse from this portion of the work has settled. Remove the refuse to the area of the job site designated for its storage.

C. Final Clean-Up: Upon completion of the work of this section, thoroughly broom clean all surfaces.

END OF SECTION

SECTION 06 65 00
SIMULATED WOOD TRIM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. This Section includes custom fabrications and trim fabricated from cellular polyvinyl chloride including:
   1. Exterior Trim

1.3 REFERENCES

A. ASTM D792 - Density and Specific Gravity of Plastics by Displacement
B. ASTM D570 - Water Absorption of Plastics
C. ASTM D638 - Tensile Properties of Plastics
D. ASTM D790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
E. ASTM D1761 - Mechanical Fasteners in Wood
F. ASTM D5420 - Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by means of a Striker Impacted by a Falling Weight
G. ASTM D256 - Determining the Pendulum Impact Resistance of Plastics
H. ASTM D696 - Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer
I. ASTM D635 - Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
J. ASTM E84 - Surface Burning Characteristics of Building Materials
K. ASTM D648 - Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
L. ASTM D3679 - Standard Specification for Rigid Poly Vinyl Chloride (PVC) Siding

1.4 SUBMITTALS

A. General: Submit listed submittals in accordance with Condition of the Contract and Division 1 Submittal Procedures Section.
B. Product Data: Submit product data, manufacturer's catalogs, and product sheet for specified products.
C. Shop Drawings: Submit complete shop drawings of all items supplied under this Section.

1.5 QUALITY ASSURANCE

A. Allowable Tolerances:
   Variation in component length: -0.00 / +1.00"
   Variation in component width: ± 1/16"
   Variation in component thickness: ± 1/16"
   Variation in component edge cut: ± 2°
   Variation in Density: -0% + 10%

B. Workmanship, Finish, and Appearance: Free foam cellular PVC that is homogenous and free of voids, holes, cracks, foreign inclusions, and other defects. Edges must be square, and top and bottom surfaces shall be flat with no convex or concave deviation. Uniform surface free from cupping, warping, and twisting.

1.6 DELIVERY, STORAGE AND HANDLING

A. Trim materials should be stored on a flat and level surface on a full shipping pallet. Handle materials to prevent damage to product edges and corners. Store materials under a protective covering to prevent jobsite dirt and residue from collecting on the boards.

1.7 WARRANTY

A. Provide manufacturer's twenty-five (25) year warranty against defects in manufacturing that cause the products to rot, corrode, delaminate, or excessively swell from moisture.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Material: Free foam cellular PVC material with a small-cell microstructure and density of grams/cm3
B. Performance and physical characteristic requirements:

PROPERTY UNITS VALUE ASTM METHOD PHYSICAL	
Density	g/cm3 0.55 D 792
Water Absorption %	0.15 D 570
Tensile Strength psi	2256 D 638
Tensile Modulus psi	144,000 D 638
Flexural Strength psi	3329 D 790
Flexural Modulus psi	144,219 D 790
Nail Hold lbf/in of penetration	35 D 1761
Screw Hold lbf/in of penetration	680 D 1761
Staple Hold lbf/in of penetration	180 D 1761
Gardner Impact in-lbs	103 D 5420
Charpy Impact (@23°C) ft-lbs	4.5 D 256
Coefficient of Linear Expansion in/in/°F	3.2 x 10-5 D 696
Burning Rate in/min No burn when flame removed D.	635
Flame Spread Index	25 E 84
Heat Deflection Temp 264 psi °F	150 D 648
Oil Canning (@140°F) °F	Passed D 648

C. Provide material in the size and thickness as delineated on the drawings.

2.2 ACCESSORY PRODUCTS

A. Fasteners:
1. 5/8" through 5/4" trim shall be fastened using Cortex hidden fastening system and be glued.
2. Use fasteners designed for wood trim and wood siding (thinner shank, blunt point, full round head).
3. Use a highly durable stainless steel fasteners.
4. Staples, small brads, and wire nails must NOT be used as fastening members.

5. The fasteners should be long enough to penetrate the solid wood substrate a minimum of 1 1/2".
6. Use two (2) fasteners per every framing member for trim board applications. Trim boards 12" or wider, as well as sheets, will require additional fasteners.
7. Fasteners must be installed no more than 2" from the end of the board.
8. Fasten into a flat, solid substrate. Fastening into hollow or uneven areas must be avoided.
9. Sheet products shall be glued to a substrate and mechanically fastened.

B. Adhesives:
   1. Glue all joints with a cellular PVC cement, to prevent joint separation.
   2. The glue joint should be secured with a fastener and/or fastened on each side of the joint to allow adequate bonding time.
   3. Surfaces to be glued should be smooth, clean and in complete contact with each other.

C. Sealants: Use urethane, polyurethane, or acrylic based sealants without silicone.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's product catalog installation instructions and product technical bulletin instructions.
B. Provide locking miter joints at all trim.
C. Glue all trim to substrates.
D. Rabbet sides of all trim to create a J- Pocket to receive siding.
E. At corners, wrap a piece of flexible flashing over building paper extending 6" beyond trim.
F. Provide expansion joints in trim as detailed or provide 1/4" wide sealant joints at 18' intervals

END OF SECTION

SECTION 07 27 19
PLASTIC SHEET AIR BARRIERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Scope of Work: Furnish and install a weather-resistive membrane over sheathing prior to siding installation.

1.3 RELATED SECTIONS

A. To include and/or coordinate with related work specified elsewhere:
   1. Section 07 45 60 - Cementitious Siding
   2. Section 07 92 00 - Joint Sealers

1.4 REFERENCES

A. American Association of Textile Chemists & Colorists **(AATCC)**
   AATCC-127 Water Resistance: Hydrostatic Pressure Test
B. American Society for Testing & Materials **(ASTM)**
   ASTM D1117 Methods of Testing Non-woven Fabrics
   ASTM D374 Standard Test Method for Thickness of Solid Electrical Insulation
   ASTM D882 Standard Test Method for Tensile Properties of Thin Plastic Sheeting
   ASTM E84a Standard Test Method for Surface Burning Characteristics of Building Materials
   ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials

PART 2 – PRODUCTS

2.1 MATERIALS

A. Building Paper: "Commercial Wrap" 100 percent flash spun-bond high density polyethylene fibers bonded by heat and pressure into sheet.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Attach membrane to sheathing with large head plastic washers with roofing nails.
B. Beginning at the corner of the building, leave approximately 6" – 12" of material extended beyond the corner edge to overlap later. Hold the roll vertically and unroll for a short distance. Make sure that the roll is plumb and the bottom edge runs along the line of the curb.
C. Continue to unroll a few feet at a time being careful to follow the line of the curb. Secure the material at approximately every 12" – 18".
D. Tape all horizontal seams and repair or tape any damaged areas. Tape any vertical breaks or overlaps.

END OF SECTION

SECTION 07 31 00
ASPHALT SHINGLE ROOFING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Asphalt-fiberglass roofing shingles
B. Leak barrier and roof deck protection
C. Metal flashing associated with shingle roofing

1.3 SUMMARY

A. The work under this Section includes the supply and installation of roof shingles, underlayments, and accessories.

1.4 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry: Framing and roof sheathing.
B. Section 07 62 00 - Flashing and Sheet Metal
C. Section 07 92 00 - Joint Sealants

1.5 REFERENCES

A. American Society for Testing and Materials (ASTM) - Annual Book of ASTM Standards
    1. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
    2. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
    3. ASTM B 370 - Standard Specification for Copper Sheet and Strip for Building Construction
    4. ASTM D 3018 - Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules
    5. ASTM D 3161 - Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method)
    6. ASTM D 3462 – Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules
    7. ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
    8. ASTM D 7158 - Standard Test Method for Wind-Resistance of Sealed Asphalt Shingles (Uplift Force/Uplift Resistance Method)

B. ASTM E 903 – Standard Test Method for Solar Absorptance, Reflectance, and Transmission of Materials Using Integrating Spheres.
C. ASTM E 903 – Standard Test Method for Solar Absorptance, Reflectance, and Transmission of Materials Using Integrating Spheres
D. Underwriters Laboratories (UL) - Roofing Systems and Materials Guide (TFWZ.R21)
    1. UL 790 - Tests for Fire Resistance of Roof Covering Materials
    2. UL 997 - Wind Resistance of Prepared Roof Covering Materials
    3. UL 2218 – Impact Resistance of Prepared Roof Coverings Materials

E. Asphalt Roofing Manufacturers Association (ARMA)

F. Sheet Metal and Air Conditioning Contractors National Association, 1nc. (SMACNA) - Architectural Sheet Metal Manual.
G. National Roofing Contractors Association (NRCA)

1.6 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D1079 and the glossary of the National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual for definitions of roofing terms related to this section.

1.7 SUBMITTALS

A. Product Data: Submit technical product data, installation instructions and recommendations from shingle manufacturer, including data that materials comply with requirements.
B. Samples: Submit full range of samples for color and texture selection.
C. Maintenance Stock: 2% of each type/color/texture shingle used in the work.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide all primary roofing products, including shingles, underlayment, leak barrier, and ventilation, must be produced by a single manufacturer.
B. Installer Qualifications: Installer must be approved by the roofing manufacturer for installation of all roofing products to be installed under this section.

1.9 REGULATORY REQUIREMENTS

A. Provide a roofing system achieving an Underwriters Laboratories (UL) Class A fire classification.
B. Install all roofing products in accordance with all federal, state and local building codes.
C. All work shall be performed in a manner consistent with current OSHA guidelines.

1.10 PREINSTALLATION MEETING

A. A pre-installation meeting is required prior to installation of the roofing system.
B. Attendees: Meeting's mandatory attendees shall include the General Contractor, certified roofing contractor, manufacturer's representative, and the project Architect.
C. Topics: Certified Contractor and manufacturer's representative shall review all pertinent requirements for the project, including but not limited to, scheduling, weather considerations, project duration, and requirements for the specified warranty.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Store all products in manufacturer's unopened, labeled packaging until they are ready for installation.
B. Store products in a covered, ventilated area, at temperature not more than 110 degrees F (43 degrees do not store in direct sunlight.
C. Store bundles on a flat surface. Maximum stacking height shall not exceed Manufacturers. recommendations. Store all rolls on end.
D. Store and dispose of solvent-based materials in accordance with all federal, state and local regulations.

1.12 WEATHER CONDITIONS

A. Proceed with work only when existing and forecasted weather conditions will permit work to be performed in accordance with Manufacturer's recommendations.
B. Follow Manufacturer's Canadian cold weather installation procedures for installations from September 1st to April 1st.

1.13 WARRANTY

A. Provide, to the Owner, the manufacturer's warranty. The wind exclusion shall not be less than the windspeed rating specified on Drawing T1 (117 MPH for Colliers Mills WMA and 124 MPH for Stafford Forge WMA).
B. Material defects Warranty shall provide 100% coverage for materials and labor for the first 20 years, then prorated thereafter.
C. Workmanship (installation) Errors: Warranty shall provide 100% coverage for workmanship / installation errors for the first 20 years.
D. Installer must register and pay for the warranty.
E. Refer to Section 01 38 76 for additional warranty requirements.

1.14 MANUFACTURER'S SERVICES

A. Contractor shall schedule at start-up, at least one interim inspection and final inspection with the Manufacturer's Technical Representative.

PART 2 – PRODUCTS

2.1 SHINGLES

A. Lifetime self-sealing, granule surfaced, asphalt shingle with a strong fiberglass reinforced micro weave core and stain guard protection, which prevents pronounced discoloration from blue-green algae through formulation/unique blends of granules. Architectural laminate styling to provide a wood shake appearance with a 5 5/8-inch exposure with high definition color blend and enhanced shadow effect. UL 790 Class A rated with UL 997 Wind Resistance Label; ASTM D 7158, Class H; ASTM D 3161, Type 1, Class F (110 mph wind test); ASTM D 3018, Type 1; ASTM D 3462; AC438; CSA A123.5-98;, ICC-ES Report Approval. Roof shingle assembly shall be warranted to a minimum windspeed listed in Item 1.13 above. Shingle Color shall be Pewter Gray.

2.2 RIDGE SHINGLES

A. High profile self-sealing hip and ridge cap shingle matching the color of selected roof shingle.

2.3 STARTER STRIP

A. Self-sealing starter shingle designed for premium roof shingles.

2.4 LEAK BARRIER

A. Self-adhering, self-sealing, bituminous leak barrier surfaced with fine, skid-resistant granules. Approved by UL, Dade County, ICC, State of Florida and Texas Department of Insurance.

2.5 SHINGLE UNDERLAYMENT

A. Premium, water repellant, breather type non-asphaltic underlayment. UV stabilized polypropylene construction. Meets or exceeds ASTM D226 and D4869. Approved by Dade Country, Florida Building Code, and ICC.

2.6 ROOFING CEMENT

A. Asphalt Plastic Roofing Cement meeting the requirements of ASTM D 4586, Type I or II

B. Roof Cement: ASTM D 4586, 203 Plastic Roof Cement
C. Roof Cement: ASTM D 4586, 204 Wet/Dry Roof Cement

2.7 NAILS

A. Nails: Series 300 stainless steel, Aluminum or hot-dip galvanized (ASTM A641) steel 11or 12-gage sharp pointed conventional roofing nails with barbed shanks, minimum 3/8" diameter head, and of sufficient length to penetrate minimum 3/4" into solid decking or to penetrate through plywood sheathing a minimum of 1/8". Use only stainless-steel nails where nailing penetrates metal flashings.

2.8 COIL NAILS

A. Type 304 or 316 Stainless Steel.

2.9 METAL FLASHING

A. Flashing material associated with asphalt shingle roofing is specified in Section 07 62 00.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until the roof deck has been properly prepared.
B. If roof deck preparation is the responsibility of another installer, notify the Architect or building Owner of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Verify that the deck is dry, sound, clean and smooth. It shall be free of any depressions, waves, and projections. Cover with sheet metal, all holes over 1 inch in diameter, cracks over 1/2 inch (12mm) in width, loose knots and excessively resinous areas.
B. Clean deck surfaces thoroughly prior to installation of eave protection membrane and underlayment.

3.3 INSTALLATION OF UNDERLAYMENTS

A. General: Install using methods recommended by the roofing manufacturer, in accordance with International Building Codes.
B. Eaves:
    1. Install eave edge metal flashing tight with fascia boards; lap joints 2 inches and seal with plastic cement; nail at the top of the flange.
    2. Install leak barrier up the slope from eave edge a full 36 inches or to at least 24 inches beyond the interior "warm wall". Lap ends 6 inches and bond.

C. Hips and Ridges:
    1. Install leak barrier along entire lengths. If ridge vents are to be installed, position the leak barrier so that the ridge slots will not be covered.

D. Roof Deck:
    1. Install two layers of underlayment horizontally over the entire area shingle style over lapping not protected by leak barrier at the eaves. Install sheets horizontally so water sheds and nail in place.
    2. Lap horizontal edges at least 19 inches and at least 19 inches over eaves protection membrane.
    3. Lap ends at least 4 inches. Stagger end laps of each layer at least 36 inches.
    4. Rake Edges: Install metal edge flashing over eave protection membrane and roof deck underlayment; set tight to rake boards; lap joints at least 2 inches and seal with plastic cement; secure with nails.

3.4 INSTALLATION OF SHINGLES

A. General:
   1. Install in strict accordance with Manufacturer's installation instructions. Minimize breakage of shingles by avoiding dropping bundles on edge, by separating shingles carefully (not by "breaking" over ridge or bundles), and by taking extra precautions in temperatures below 40 degrees F.
   1. Handle carefully in hot weather to avoid scuffing the surfacing or damaging the shingle edges.
   2. Build-in flashings as shingle work progresses.
   3. Comply with instructions and recommendations of shingle manufacturer, except to extent more stringent requirements are indicated.
   4. Flashing: Install metal flashing as shown and in accordance with details and recommendations of the NRCA Steep Roofing Manual.
   5. Eave Metal:
      a Install eave metal flashing before protective underlayment. Place eave metal flashings tight with fascia and roof sheathing. Weather lap joints 2 inches secure flange with nails spaced 4 inches on center.
   6. Seal rake edge shingles to underlayment and drip edge with a four inch wide strip of roofing cement.

B. Placement and Nailing:

   1. Beginning with the starter strip, trim shingles so that they "nest" within the shingle located beneath it. This procedure will yield a first course that is typically 3" to 4" rather than a fully exposed shingle.
   2. For maximum wind resistance along rakes, install starter strip containing sealant or cement shingles to underlayment and each other in a 4" width of asphalt plastic roof cement.
   3. Offset the new shingles from the existing keyways, to avoid waves or depressions caused by excessive dips in the roofing materials.
   4. Using the bottom of the tab on existing shingles, align subsequent courses.
   5. Secure with **6 nails per shingle**.
   6. Consult the application instructions for proper nail placement.
   7. Nails must be driven flush with the shingle surface. Do not overdrive or under drive the nails.
   8. Consult the application instructions for the specified shingle offsets.

C. Penetrations
   1. All Penetrations are to be flashed according to ARMA and NRCA application instructions and construction details.

3.5 PROTECTION

A. Protect installed products from foot traffic until completion of the Project.
B. Any roof areas that are not completed by the end of the workday are to be protected from moisture and contaminants.

END OF SECTION

SECTION 07 45 60
CEMENTITIOUS LAP SIDING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. The work under this section includes the installation of cement fiber siding.

1.3 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations
   2. Storage and handling requirements and recommendations
   3. Installation methods

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.
B. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.
C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
D. Contractor shall educate workers on the proper handling, cutting and installation of this product to minimize health risks and environmental impacts.

1.5 WARRANTY

A. Product Warranty: 50-year limited product warranty against manufacturing defects.
B. Workmanship Warranty: Application limited warranty for 2 years.

PART 2 – PRODUCTS

2.1 SIDING

A. Code Compliance Requirement for Materials:
   1. National Evaluation Report No. NER 405 (BOCA, ICBO, SBCCI)
   2. Non-asbestos fiber-cement siding to be non-combustible when tested in accordance with ASTM E136.

B. Type: Smooth 7-1/4 inches with 6 inches exposure.

2.2 FASTENERS

A. Siding to Sheathing: 8d box ring common type 304 or type 316 stainless steel nails.

2.3 FINISHES

A. Factory Finish: Color shall be Night Gray.
   1. Factory applied finish by fiber cement manufacturer in a controlled environment within the fiber cement manufacturer's own facility utilizing a multi-coat, heat cured finish within one manufacturing process.
   2. Finish color must have documented color match to delta E of 0.5 or better between product lines, manufacturing lots or production runs as measured by photospectrometer and verified by third party.
   3. Protection: Factory applied finish protection such as plastic laminate that is removed once siding is installed
   4. Accessories: Complete finishing system includes pre-packaged touch-up kit provided by fiber cement manufacturer. Provide quantities as recommended by manufacturer.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.
   1. Install weather-resistive barriers and claddings to dry surfaces.
   2. Repair any punctures or tears in the weather-resistive barrier prior to the installation of the siding.
   3. Protect siding from other trades.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 SIDING INSTALLATION

A. Do not begin installation until substrates have been properly prepared.
B. Install water-resistive barriers and claddings to dry surfaces.
C. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
D. Protect siding from other trades.
E. Install materials in strict accordance with manufacturer's installation instructions.
F. Install 6” wide 26-gauge stainless steel joint flashing at all siding butt joints.
G. Fasten with blind nailing and pin backs at butt joints.
H. Allow 1/4-inch gap between trim and siding.
I. Allow 1/8-inch gap at but joints.
J. Seal joints with specified backer rod and sealant per Section 07 92 00.

3.4 FINISHING

A. Finish of unfinished edges with a minimum one coat high quality, alkali resistant primer and one coat of either, 100 percent acrylic or latex or oil based, exterior grade topcoats or two coats high quality alkali resistant 100 percent acrylic or latex, exterior grade topcoat within 90 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

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

SECTION 07 53 23
EPDM ROOFING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. EPDM membrane roofing and rigid insulation system for waterproof membrane over range baffles.

1.3 SUMMARY

A. The work under this Section includes the supply and installation of black EPDM roofing fully adhered over 1/2" high-density rigid insulation, over concrete plank deck. roof shingles, underlayments, and accessories. Provide all labor, material, tools, equipment, and supervision necessary to complete the installation of a 60-mil thick EPDM membrane Fully Adhered Roofing System including flashings and insulation as specified herein and as indicated on the drawings in accordance with the manufacturer's most current specifications and details.

1.4 RELATED SECTIONS

A. Section 03 40 00 - Precast Prestressed hollow core plank concrete roof deck
B. Section 07 62 00 - Flashing and Sheet Metal
C. Section 07 92 00 - Joint Sealants

1.5 REFERENCES

A. American Society for Testing and Materials (ASTM) - Annual Book of ASTM Standards
B. Underwriters Laboratories (UL) - Roofing Systems and Materials Guide (TFWZ.R21)
    1. UL 790 - Tests for Fire Resistance of Roof Covering Materials
    2. UL 997 - Wind Resistance of Prepared Roof Covering Materials
    3. UL 2218 – Impact Resistance of Prepared Roof Coverings Materials

C. Sheet Metal and Air Conditioning Contractors National Association, 1nc. (SMACNA) - Architectural Sheet Metal Manual.
D. National Roofing Contractors Association (NRCA)

1.6 SUBMITTALS

A. Product Data: Submit technical product data, installation instructions and recommendations from shingle manufacturer, including data that materials comply with requirements.
B. Samples: Submit full range of samples for color and texture selection.
C. Shop drawings showing layout, details of construction and identification of materials.
D. Sample of the manufacturer's Total Systems Warranty covering all components of the roofing system.
E. Submit a letter of certification from the manufacturer which certifies the roofing contractor is authorized to install the manufacturer's roofing system.
F. Certification of the manufacturer's warranty reserve.
G. Upon completion of the installed work, submit copies of the manufacturer's final inspection report to the specifier prior to the issuance of the manufacturer's warranty.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide all primary roofing products, including shingles, underlayment, leak barrier, and ventilation, by a single manufacturer.
B. Installer Qualifications: Installer must be approved by the roofing manufacturer for installation of all roofing products to be installed under this section.

1.8 REGULATORY REQUIREMENTS

A. Provide a roofing system achieving an Underwriters Laboratories (UL) Class A fire classification.
B. Install all roofing products in accordance with all federal, state, and local building codes.
C. All work shall be performed in a manner consistent with current OSHA guidelines.

1.9 PREINSTALLATION MEETING

A. A pre-installation meeting is required prior to installation of the roofing system.
B. Attendees: Meeting's mandatory attendees shall include the General Contractor, certified roofing contractor, manufacturer's representative, and the project Architect.
C. Topics: Certified Contractor and manufacturer's representative shall review all pertinent requirements for the project, including but not limited to, scheduling, weather considerations, project duration, and requirements for the specified warranty.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, unopened containers or wrappings with the manufacturer's name, brand name and installation instructions intact and legible. Deliver in sufficient quantity to permit work to continue without interruption.
B. Comply with the manufacturer's written instructions for proper material storage.
C. Store materials between 60°F and 80°F in dry areas protected from water and direct sunlight. If exposed to lower temperature, restore to 60°F minimum temperature before using.
D. Store materials containing solvents in dry, well ventilated spaces with proper fire and safety precautions. Keep lids on tight. Use before expiration of their shelf life. Store and dispose of solvent-based materials in accordance with all federal, state and local regulations.
E. Insulation and underlayment products must be on pallets, off the ground, and tightly covered with waterproof materials. Manufacturer's wrap does not provide sufficient waterproofing. Insulation and underlayment products that become wet or saturated are to be discarded.
F. Any materials which are found to be damaged shall be removed and replaced at the contractor's expense.

1.11 WEATHER CONDITIONS

A. Proceed with work only when existing and forecasted weather conditions will permit work to be performed in accordance with Manufacturer's recommendations.

1.12 WORK SEQUENCE

A. Schedule and execute work to prevent leaks and excessive traffic on completed roof sections. Care should be exercised to provide protection for the underside of the canopy and to ensure water does not flow beneath any completed sections of the membrane system.

1.13 WARRANTY

A. Provide, to the Owner, the manufacturer's warranty. The wind exclusion shall not be less than the windspeed of 107 MPH for Colliers Mills WMA baffles and 113 MPH for the Stafford Forge WMA baffles, with no reductions
B. Installer must register and pay for the warranty.
C. Refer to Section 01 38 76 for additional warranty requirements.
D. Provide manufacturer's 20-year Total System Warranty covering both labor and all materials with no dollar limitation.
E. Certification is required with roofing submittal indicating the manufacturer has reviewed and agreed to such wind coverage.

1.14 MANUFACTURER'S SERVICES

A. Contractor shall schedule at start-up, at least one interim inspection and final inspection with the Manufacturer's Technical Representative.

PART 2 – PRODUCTS

2.1 MEMBRANE

A. Furnish 60-mil thick EPDM (Ethylene, Propylene, Diene Terpolymer) in the largest sheet possible with 3" or 6" factory applied Quick Applied Tape. The membrane shall conform to the minimum physical properties of ASTM D4637. When a 10 foot wide membrane is to be used, the membrane shall be manufactured in a single panel with no factory splices to reduce splice intersections.

2.2 INSULATION/UNDERLAYMENT

A. 1/2" thick cover board insulation, designed for direct application, composed of a high-density (109 psi max), closed-cell polyisocyanurate foam core laminated to coated-glass fiber-mat facer. Panels shall achieves a UL 790 Class A combustible deck assembly rating without the need for fire-rated slip sheets or thermal barrier products. 1/2" thick 4' x 8' panel weight 11 lbs with an R-value of 2.5.

2.3 ADHESIVE FOR FASTENING INSULATION

A. DASH Adhesive: A two component insulating urethane adhesive used to attach insulation. Packaging formats include 50 and 15 gallon drums as well as Dual Tanks, Dual Cartridges and 5 gallon Jug formats.

2.4 ADHESIVES, CLEANERS, AND SEALANTS

A. Substrate Adhesive: A high-strength, yellow colored, synthetic rubber adhesive used for bonding EPDM (Black or White) EPDM membranes to various surfaces. Available in 5 gallon pails.
B. EPDM x-23 Low-VOC Bonding Adhesive: A Low-VOC (volatile organic compound) bonding adhesive (less than 250 grams/liter) used for bonding Sure-Seal/Sure-White EPDM membranes to various surfaces. Adhesive is available in 5 gallon pails.
C. Weathered Membrane Cleaner: A clear, solvent-based cleaner used to loosen and remove dirt and other contaminants from the surface of exposed EPDM membrane (for repairs, etc.) prior to applying EPDM Primer. Weathered Membrane Cleaner can also be used when applying Splicing Cement. Available in 1 and 5-gallon pails.
D. Black Quick Applied Seam Tape (Factory Applied): A 3" or 6" wide by 100' long splice tape used for splicing adjoining sections of EPDM membrane. Complies with the South Coast Air Quality Management District Rule 1168.

E. EPDM Primer: A solvent-based primer used to prepare the surface of EPDM membrane for

application of Splice Tape or Quick Applied products. Available in 1 gallon pails.

F. Lap Sealant: Manufacturer's heavy-bodied black lap sealant material used to seal the exposed edges of a membrane splice.
G. Water Cut-Off Mastic: A one-component, low viscosity, self wetting, Butyl blend mastic used to achieve a compression seal between the EPDM membrane or Uncured EPDM Flashing and applicable substrates. Available in tubes.
H. Pourable Sealer: A black, two-component, solvent-free, polyurethane based product used for tie-ins and as a sealant around hard-to-flash membrane penetrating objects such as clusters of pipes and for a daily seal when the completion of flashings and terminations cannot be completed by the end of each work day.
I. One-Part Pourable Sealer: Available in black or white, a one-component, moisture curing, elastomeric polyether sealant used for attaching lightning rod bases and ground cable clips to the membrane surface and as a sealant around hard-to-flash penetrations such as clusters of pipes.
J. Primer (Low VOC): A single component, solvent based, high-tack primer used to provide maximum adhesion between VapAir Seal 725TR Air and Vapor Barrier and an approved substrate. Applied by spray or long nap roller with a coverage rating ranging from approximately 300 to 350 square feet per gallon on smooth finishes (i.e., concrete) to 75 square feet per gallon on porous surfaces. Available in 5-gallon containers.

2.5 METAL FLASHING

A. Flashing material associated with EPDM roofing is specified in Section 07 62 00.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until the roof deck has been properly prepared.
B. If roof deck preparation is the responsibility of another installer, notify the Architect or building Owner of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Verify that the deck is dry, sound, clean and smooth. It shall be free of any depressions, waves, and projections. Patch, with concrete patching mortar, all holes over 1 inch in diameter, cracks over 1/2 inch in width.
B. Clean deck surfaces thoroughly prior to installation of insulation.

3.3 INSTALLATION

A. General: Install using methods recommended by the roofing manufacturer, in accordance with International Building Codes.
B. Comply with the manufacturer's published instructions for the installation of the membrane roofing system including proper substrate preparation, jobsite considerations and weather restrictions.
C. Position sheets to accommodate contours of the roof deck and shingle splices to avoid bucking water.
D. Install insulation or membrane underlayment over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch. Stagger joints both horizontally and vertically if multiple layers are provided.
E. Secure insulation to the substrate with the required insulation adhesive in accordance with the manufacturer's specifications.
F. Unroll and position membrane without stretching. Allow the membrane to relax for approximately 1/2 hour before bonding. Fold the sheet back onto itself so half the underside of the membrane is exposed.
G. Apply the Bonding Adhesive in accordance with the manufacturer's published instructions and coverage rates, to both the underside of the membrane and the substrate. Allow the adhesive to dry until it is tacky but will not string or stick to a dry finger touch.

H. Roll the coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded half of the membrane sheet with a soft bristle push broom to achieve maximum contact.
I. Fold back the unbonded half of the membrane sheet and repeat the bonding procedure.
J. Install adjoining membrane sheets in the same manner, overlapping edges approximately 4 inches. Do not apply bonding adhesive to the splice area.
K. Position membrane sheet to allow for required splice overlap. Mark the bottom sheets with an indelible marker approximately 1/4" to 1/2" from the top sheet edge. The pre-marked line on the membrane edge can also be used as a guide for positioning splice tape.
L. When the membrane is contaminated with dirt, fold the top sheet back and clean the dry splice area (minimum 3" wide) of both membrane sheets by scrubbing with clean natural fiber rags saturated with Weathered Membrane Cleaner.
M. Apply EPDM Primer Primer to splice area and permit to flash off.
N. When adhering Factory applied Quick Applied Seam Tape, pull the poly backing from QAT beneath the top sheet and allow the top sheet to fall freely onto the exposed primed surface. Press top sheet on to the bottom sheet using firm even hand pressure across the splice towards the splice edge
O. For end laps, apply 3" or 6" Quick Applied Seam Tape to the primed membrane surface in accordance with the manufacturer's specifications. Remove the poly backing and roll the top sheet onto the mating surface.
P. Tape splices must be a minimum of 2-1/2" wide using 3" wide Seam Tape extending 1/8" minimum to 1/2" maximum beyond the splice edge. Field splices at roof drains must be located outside the drain sump.
Q. Immediately roll the splice using positive pressure when using a 2" wide steel roller. Roll across the splice edge, not parallel to it. When QAT is used, a Stand-Up Seam Roller can be used to roll parallel to the splice edge.
R. At all field splice intersections, apply Lap Sealant along the edge of the membrane splice to cover the exposed Quick Applied Seam Tape 2" in each direction from the splice intersection. Install Quick Applied "T" Joint Covers or a 6" wide section (with rounded corners) of Quick Applied Uncured Flashing over the field splice intersection.
S. when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed.

3.4 CLEAN-UP

A. Perform daily clean-up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.
B. Prior to the manufacturer's inspection for warranty, the contractor must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Scope: The work under this Section includes the supply and installation of metal flashing and trim as detailed on the drawings and specified herein.

1.3 RELATED WORK

The following related work is specified in other sections:

1. Section 07 31 13 - Asphalt shingles
2. Section 07 45 60 - Cementitious Siding
3. Section 07 92 00 - Joint Sealers

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product specifications, installation instructions and general recommendations for each specified sheet material and fabricated product.
B. Samples: Submit a 12" square samples of specified sheet materials to be utilized, for approval.
C. Shop Drawings: Submit shop drawings showing layout, joining, profiles, and anchorages of fabricated work, including flashing, counter flashing, trim, fascia, expansion joint details and layouts at 1/4" scale with details at 3" scale.

1.5 JOB CONDITIONS

A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of the work and protect of materials and finishes.

1.6 REFERENCES

A. ASTM - Listed Standards
B. SMACNA - Architectural Sheet Metal Manual
C. NRCA – Roofing and Waterproofing Manual

PART 2 – PRODUCTS

2.1 MATERIALS

A. Furnish sheet metal items in 8 to 10-foot lengths. Single pieces less than 8 feet long may be used to connect to factory-fabricated inside and outside corners, and at ends of runs. Provide accessories and other items essential to complete the sheet metal installation. These accessories shall be made of the same materials as the items to which they are applied. Fabricate sheet metal items of the materials specified below and to the gage, thickness, or weight shown in Table I at the end of this Section.

B. Stainless Steel Flashings: ASTM A167, Type 304
C. Soldering Flux: ASTM B284, Rosin or 0-F506 where necessary.
D. Solder: ASTM B32
E. Bituminous Plastic Cement: ASTM D2822, Type I; ASTM D4022
F. Asphalt Primer: ASTM D41
G. Nails, screws, bolts, expansion shields, and other fastening shall be of the same material as sheet metal to be secured or shall be durable and compatible material which are regularly recommended for extended use by the manufacturer of the sheet metal. Nails shall be # 10 gauge (.1019 inch diameter) or larger, needle point of length enough to penetrate wood one inch. Rivets shall be 1/8" in diameter.
H. Aluminum: 3005-H25 Aluminum thickness as noted.
I. Aluminum trim shall have the exterior side finished with an extended life, fluoropolymer coating utilizing Kynar 500 Resin. Surfaces shall be properly prepared and primed, then coated and oven-baked to cure. Top coating system shall have a dry film thickness of 0.75 - .90 mils on the exterior surface. Specular Gloss at 60º viewing angle shall be 35 ± 5%. The interior side of these panels shall be protected by a back coat system of .60± .05 mils thickness. Panels shall be coated prior to roll forming.

2.2 FABRICATED UNITS

A. Eave and Rake Flashing for Shooting Stations: Eave and rake flashings shall be constructed as detailed of 26 gauge stainless steel.
B. Eave and Rake Flashing for Baffles: Eave and rake flashings shall be constructed as detailed of .050" prefinished aluminum.

PART 3 – EXECUTION

3.1 JOINTING

A. Expansion and Contraction: Provide expansion and contraction joints at not more than 32-foot intervals for aluminum and at not more than 40-foot intervals for other metals. Where the distance between the last expansion joint and the end of the continuous run is more than half the required interval, an additional joint shall be provided. Space joints evenly.
B. Soldering: Where soldering is specified, it shall apply to stainless steel, and zinc-coated steel. Pre-tin edges of sheet metals before soldering. Slowly solder with well-heated soldering items so as to thoroughly heat the seams and completely sweat the solder through the full width of the seam. Scrape or wire-brush the edges of lead-coated material to be soldered to produce a bright surface. Flux brush the seams in before soldering. Treat with soldering acid flux, the edges of stainless steel to be pre-tinned. Solder immediately after application of the flux. Upon completion of soldering, the acid flux residue shall be thoroughly cleaned from the sheet metal with a solution of washing soda in water and rinsed with clean water.
C. Lock seam Joints: Fabricate sheet metal with either single or double lock seam flat-lock seams.
D. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with industry standards.

3.2 FLASHING INSTALLATION

A. Requirements: Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry, and free of defects and projections, which might affect the application. For installation of items not shown in detail or not covered by specifications, conform to the applicable requirements of SMACNA ASMM, Architectural Sheet Metal Manual. Provide sheet metal flashings in the angles formed where roof decks abut vertical surfaces and wherever indicated and necessary to make the work watertight. Join sheet metal items together as shown in Table II.

B. Workmanship: Make lines, arises, and angles sharp and true. Free exposed surfaces from visible wave, warp and buckle, and tool marks. Fold back exposed edges neatly to form a 1/2-inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.
C. Nailing: Confine nailing of sheet metal generally to sheet metal having a maximum width of 18 inches. Confine nailing or flashing to one edge only. Space nails evenly not over 3 inches on centers and approximately 1/2-inch from edge unless otherwise specified or indicated. Face nailing will not be permitted. Where sheet metal is applied to other than wood surfaces, include in shop drawings, the locations for sleepers and nailing strips required to secure the work.
D. Bolts, Rivets, and Screws: Install bolts, rivets, and screws where indicated or required.
E. Provide compatible washers where required to protect surface of sheet metal and to provide a water-tight connection.
F. Cleaning: Clean exposed sheet metal work at completion of installation. Remove grease and oil films, handling marks, contamination from steel wool, fittings and drilling debris, and scrub clean. Free the exposed metal surfaces of dents, creases, waves, scratch marks, and solder or weld marks.
G. Repairs to Finish: Scratches, abrasions, and minor surface defects of finish may be repaired in accordance with the manufacturer's printed instructions and as approved. Repair damaged caused by scratches, blemishes, and variations of color and surface texture. Replace items which cannot be repaired.
H. Edge and rake flashing: Nail drip edge along bottom edge of eave or rake.

TABLE I
SHEET METAL WEIGHTS THICKNESS AND GAUGES

FLASHING	**MATERIAL**	**THICKNESS AND GAUGES**
Eave and Rake Flashing – Shooting Stations	Stainless Steel	26 gauge
Eave and Rake Flashing – Baffles	Prefinished Aluminum	.050”

TABLE II
SHEET METAL JOINTS

Metal flashing:	Lap Seam Sealant Joint

END OF SECTION

SECTION 07 92 00
JOINT SEALERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section Includes:
   1. Provision and installation of sealants and backing rods at roof and siding construction.
   2. Provision and installation of sealants and for construction and expansion joints in slabs.

B. Scope: Provide all materials, labor, equipment, and appliances required to complete work of this Section, including, but not necessarily limited to, the following:
   1. Cleaning and priming of joints as required by Manufacturer's installation instructions.

1.3 REFERENCES

A. ASTM C 321 - Standard Test Method for Bond Strength of Chemical-Resistant Mortars.
B. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.
C. FS (Federal Specification) TT-S-00227E (COM-NBS) - Interim Federal Specification for Sealing Compound: Elastomeric Type, Multi-Component (for Caulking, Sealing, and Glazing in Buildings and Other Structures.
D. FS (Federal Specification) TT-S-00230C - Interim Federal Specification for Sealing Compound: Elastomeric Type, Single Component (for Caulking, Sealing, and Glazing in Buildings and Other Structures.
E. FS (Federal Specification) TT-S-001543 (COM-NBS) - Interim Federal Specification for Sealing Compound: Silicone Rubber Base (for Caulking, Sealing, and Glazing in Buildings and Other Structures.

1.4 QUALITY ASSURANCE

A. Performance: Except as otherwise indicated, joint sealers are required to establish and maintain airtight and waterproof continuous seals on a permanent basis, within recognized limitations of wear and aging as indicated for each application. Failures of installed sealers to comply with this requirement will be recognized as failures of materials and workmanship.
B. Pre-Installation Compatibility and Adhesion Tests: Contractor shall be responsible for verifying with sealant manufacturer that all sealants to be used are compatible with and will satisfactorily adhere to all substrates. Tests shall be conducted in the field and witnessed by the Architect or Inspection Agency.
C. Adhesion Test: During installation, in the presence of, and when and where directed by the Architect or Inspection Agency, conduct pull test on each joint type. Test is to be performed by slicing across the joint and then cutting both sides of the joint two inches, separating the sealant from the adjoining material. The sealant shall then be pulled in the direction of the joint. The sealant should break rather than separate from the adjoining material.

1.5 SUBMITTALS

A. Submit under provisions of Division 1.
B. Manufacturer's Technical Data, Guides, and Application Procedures
C. Submit samples illustrating colors.
D. Submit laboratory tests or data validating product compliance with performance criteria specified.
E. Submit a copy of the Manufacturer's warranty.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in original factory packaging bearing identification of product, manufacturer, and batch number. Provide Material Safety Data Sheets for each product.
B. Store products in a location protected from freezing, damage, construction activity, precipitation, and direct sunlight in strict accordance with manufacturer's recommendations.
C. Condition products to approximately 60 to 70 degrees F for use in accordance with manufacturer's recommendations.
D. Handle all products with appropriate precautions and care as stated on Material Safety Data Sheet.

1.7 PROJECT CONDITIONS

A. Do not use products under conditions of precipitation or freezing weather. Use appropriate measures for protection and supplementary heating to ensure proper curing conditions in accordance with manufacturer's recommendations if application during inclement weather occurs.
B. Ensure substrate is dry.
C. Protect adjacent work from contamination or damage.

1.8 WARRANTY

A. Provide manufacturer's twenty-year limited warranty against failure of structural adhesion, staining, and weatherseal.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Single Source: All materials, including joint sealers, cleaners, and primers shall be of a single source manufacturer.
B. Acceptable Manufacturers:
    1. Dow Corning
    2. Sika
    3. Tremco
    4. Pecora
    5. Or Approved Equal

2.2 MATERIALS

A. One-part, low modulus, elastomeric sealant: *DOW CORNING* 790 Silicone Building Sealant, *SIKA* Sikasil WS 290, or *TREMCO* Spectrem 1, Conforming to ASTM C920, Type S, Class 100/50, Use NT, M, G, A, and O.
B. Poured Flexible Epoxy Joint Filler: two component 100 percent solids epoxy joint filler with flexible, pourable, self-leveling properties.
    1. Shore A Hardness: 85 plus or minus 5.
    2. Shore D Hardness: 34.
    3. Elongation: 75 percent.
    4. Tensile Strength: 655 pounds per square inch plus or minus 10 pounds per square inch.
    5. Mixing Ratio: 1 to 1 by volume.
    6. Pot Life: 40 to 55 minutes at 75 degrees F.

2.3 ACCESSORIES

A. Primer: As required by sealant manufacturer.
B. Joint Cleaner: Non-corrosive and non-staining type recommended by sealant manufacturer and compatible with joint forming materials.
C. Backer Rod: Open, closed, or bi-cell polyethylene rod designed for use with cold-applied joint sealants for on-grade or below-grade applications.
    1. Comply with ASTM C 1330.
    2. Size required for joint design.

D. Bond Breaker: Pressure-sensitive tape polyethylene or Teflon recommended by sealant manufacturer.
E. Masking Tape: Pressure-sensitive paper tape.

2.4 COLOR

A. Sealant Colors: Selected by Architect from manufacturer's master color system.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Inspect all areas involved in work to establish extent of work, access, and need for protection of surrounding construction and public spaces.
B. Conduct pre-application inspection of site verification with an authorized manufacturer's representative.

3.2 PREPARATION

A. Remove loose materials and foreign matter which impair adhesion of joint filler.
B. Clean joints by grinding, sandblasting, or wire brushing to expose a sound surface free of contamination and laitance.
C. Ensure structurally sound surfaces, dry, clean, free of dirt, moisture, loose particles, oil, grease, asphalt, tar, paint, wax, rust, waterproofing, curing and parting compounds, membrane materials, and other foreign matter.
D. Prime the bond line using Prime Coat where required by the sealant manufacturer installation instructions or as required for proper adhesion, allowing a minimum of one hour drying and cure time before installing sealant. Primer should be within shelf life and poured from containers onto rags, or into applicator bottles that can be poured onto rags. If brushes are used, primer should be poured a small amount at a time into another open container to avoid contaminating primer and to minimize primer being exposed too long. Pour out no more than can be applied in 30 minutes. If primer becomes cloudy or contaminated, discard. Prime no more substrate than can be sealed in one day or shift.
E. Where the possibility of joint filler staining of adjacent areas or materials exists, mask joints prior to application.
    1. Do not remove masking tape before joints have been tooled and initial cure of joint filler has taken place.
    2. Work stained due to failure of proper masking precautions will not be accepted.

3.3 INSTALLATION

A. Solvent clean aluminum and any other non-porous surfaces with recommended solvent using the “Two Cloth Cleaning Method”.
B. Apply primer according to manufacturer’s instructions.

C. Back-Up Material:
   1. Install backer rod using blunt or rounded tools to assure uniform depth (+/- 1/8") without puncturing or twisting. Closed cell rod shall be a minimum 20% oversized. Open cell rod shall be a minimum 50% oversized. Install bond breaker tape in shallow joints.
   2. Install specified joint filler in joints wider than 1/4 inch to back-up material per manufacturer's recommendations.

D. Bond Breaker: Install bond-breaker strip in joint to be sealed on top of back-up material to prevent adhesion of sealant to back-up material; install per manufacturer's recommendations.

E. Sealant:
   1. Mask or protect adjacent areas that are not to receive sealant.
   2. Apply sealant in joints using a pressure gun with nozzle cut to appropriate size. Deposit sealant in a uniform and continuous bead with no gaps or air pockets.
   3. Tool joints to require configuration with a blunt instrument as soon as possible after installation, but before sealant begins to skin over. Remove all masking materials immediately after tooling.
   4. Apply materials only within manufacturer's specified application life period. Discard sealant after application life is expired or if prescribed application period has elapsed.

F. Joints shall have a minimum width to depth ratio of 2:1. Finished joint cross section shall have an hourglass shape.

3.4 CLEANING

A. Remove uncured sealant and joint filler with Reducer 990, xylene, toluene, or MEK. Remove cured sealant and joint filler by razor, scraping, or mechanically.
B. Remove all debris related to application of sealants from job site in accordance with all applicable regulations for hazardous waste disposal.

3.5 SCHEDULE OF JOINT SEALERS

A. General-Purpose Interior and Exterior Applications:
   1. Sealant: One Part Silicone Building Sealant
   2. Applications:
      a. Joints between underside of flashings and building construction.
      b. Roof sealants

   3. Sealant: Pourable Flexible Epoxy Joint Filler
   4. Applications:
      a. Concrete expansion and construction joints.

END OF SECTION

SECTION 10 14 19
SPECIALTY SIGNS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Instructions to Bidders and General Conditions, and Division 1 Specification Section, apply to this Section.

1.2 SUMMARY

A. The work under this section includes the supply and installation of Traffic Control Signage.

1.3 SUBMITTALS

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

PART 2 – PRODUCTS

2.1 MATERIALS

A. Traffic Control Signs: Traffic control signs shall be pole mounted extruded aluminum. Sign panels paints and installation shall be per NJ DOT Standard Specification Section 614.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General:
    1. Locate sign units and accessories where shown or scheduled. Bottom edge of lowest sign on post shall be mounted at 60" above adjacent grade.
    2. Mount signage on 4” x 4” preservative treated wood posts, plumb and level. Secure to construction with tamperproof stainless-steel screws.

3.2 CLEANING AND PROTECTION

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

END OF SECTION

SECTION 31 10 00
SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This work shall consist of:
   1. Clearing of the site
   2. Removal of poles, posts, and other such objects
   3. Removal of traffic signs
   4. Removal of fences
   5. Removal of miscellaneous existing site improvements that interfere with new construction.

B. Related work:
   1. Excavation and Fill is specified in Section 31 10 00
   2. Grading is specified in Section 31 22 00
   3. Soil Erosion Controls is specified in Section 31 25 00

1.3 STANDARD SPECIFICATIONS

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

PART 2 – PRODUCTS – (NOT USED)

PART 3 - EXECUTION

3.1 CONSTRUCTION

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

END OF SECTION

DIVISION 31 – EARTHWORK

SECTION 31 22 00
GRADING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 RELATED WORK

A. The following similar work is specified under other Sections:
   1. Earthwork Methods is specified in Section 31 30 00
   2. Site Clearing is specified in Section 31 10 00
   3. Soil Erosion Controls is specified in Section 31 25 00

1.4 QUALITY ASSURANCE TESTING

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

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 GRADING

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

3.2 EXCESS MATERIAL

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

3.3 FINAL CLEANUP

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

END OF SECTION

DIVISION 31 – EARTHWORK

SECTION 31 23 00

EXCAVATION AND FILL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. The work under this Section includes the following:
   1. Onsite underground utility survey
   2. Building excavation
   3. Excavation for site improvements
   4. Filling, backfilling, and compaction
   5. Compaction testing
   6. Disposition of excess excavated materials and debris
   7. Final cleanup

1.3 RELATED WORK

A. The following similar work is specified under other Sections:

   1. Site Clearing is specified in Section 31 10 00
   2. Grading is specified in Section 31 22 00
   3. Soil Erosion Controls is specified in Section 31 25 00

1.4 SUBMITTALS

A. If excess excavated material is to be used for structural fill, provide Certificate from testing agency, approved by Architect, that the fill material meets the Specifications for structural fill.

1.5 REFERENCES

A.	ASTM C 136	Method for Sieve Analysis of Fine and Course Aggregates
B.	ASTM C 136	Test Method for Particle Size Analysis of Soils
C.	ASTM D 698	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 Pound Rammer and 12-inch Drop
D.	ASTM D 1556	Test Method for Density of Soil in Place by the Sand-Cone Method
E.	ASTM D 2167	Test Method for Density and Unit Weight of Soil In-Place by the Rubber Balloon Method
F.	ASTM D 2487	Classification of Soils for Engineering Purposes (Unified Soil Classification System)
G.	ASTM D 2922	Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
H.	ASTM D 3017	Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
I.	ASTM D 4318	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
J.	ASTM D-1557	ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3(2,700 kN-m/m3))

1.6 QUALITY ASSURANCE TESTING

A. Backfilling/compaction operations shall be controlled by testing. Compaction shall be determined by ASTM D-2922. The Contractor shall engage and pay for, a testing agency approved by DPMC, to control filling operations.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Reuse of On-Site Soils: In situ soils may be used for fill if meeting the specifications for load bearing fill or imported granular fill, under observation and testing by the Testing Laboratory.
B. Load Bearing Fill: Controlled fill should consist of inorganic, readily compactable, predominantly well-graded granular soils with no more than 15% fines (material passing the No. 200 sieve). Fragments having a maximum dimension greater than 3 inches are excluded from the fill. The moisture content of the fill materials shall be controlled to within tolerable limits of the optimum by wetting, aeration or blending to facilitate compaction. The field moisture-density relationship of materials being used will be as per ASTM D-1557 and monitored by the Testing Agency during fill placement activities.
C. Controlled fill: Controlled fill shall be placed in loose horizontal lifts with a maximum thickness of 8". Controlled fill within the construction area shall be compacted to at least 95% of the maximum dry density as determined by the Modified Proctor Test (ASTM D 1557). Fills shall be stable without significant movement under construction traffic, as judged by the Testing Agency and Architect. Quality control testing of in-place fill densities shall be conducted throughout the entire earthwork operation, load bearing fills and areas where pavement and structures are proposed.
D. Imported granular fill material, if required, shall be well-graded and should conform to the following material gradation requirements. Alternate material submission such as dense graded aggregate and recycled concrete aggregates may be made to the Architect for approval.

ALLOWABLE GRADATION ENVELOPE
IMPORTED GRANULAR FILL

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

E. Samples and analysis of all imported materials to be submitted in accordance with Division 1 Specifications.
F. Under Slab Fill: 6" layer of 3/4" clean crushed stone, AASHTO No.57 aggregate, shall be placed beneath all grade slabs and compact.
G. Geotextile Filter Fabric: TC Mirafi N-Series type 140N, as manufactured by TC Mirafi, 363 South Holland Drive, Pendergrass, Georgia, 30567, or an equal manufactured by Amoco Fabrics and Fibers, or SI Geosolutions, or Approved Equal.

PART 3 – EXECUTION

DIVISION 31 – EARTHWORK

3.1 SITE PREPARATION

A. Remove pavements, trees, shrubs, vines, roots and other vegetation, from the building site. Any topsoil shall be stripped from the site surface and removed from within structural areas to be developed. Stockpile topsoil for reuse in lawn areas.
B. Following stripping operations, proper site grading for drainage should be provided and the length of time that subgrades remain exposed to weather conditions should be kept to a minimum so as to not generate more unsuitable material removal. If earthwork operations are performed during inclement weather (wet or freezing), unacceptable softening of the subgrade soils should be anticipated and can be significant which would require additional subgrade preparations.

3.2 EXCAVATION

A. Excavation shall be carried to the limits required by the construction. Material shall be removed to the lines and depth to allow construction of the various portions of the project.
B. All excavation shall be unclassified, and all material of whatever character encountered shall be removed, including bituminous and concrete pavements, footings and foundations, whether shown on the plan, or as may be encountered during the course of construction.
C. Strip building site of all pavement and unclassified material. Excavate to depth required for footings and precast retaining structures. Compact excavations as herein after specified.
D. Excavate to the limits shown on the drawings or as required for building and site improvements.

3.3 BUILDING SLAB PREPARATION

A. Strip the building area delineated for construction of the first 6" to remove surface materials, including top soils, grass, shrubs, pavement, concrete and unclassified material. Stockpile topsoil for use in final grading operations.
B. Colliers Mills WMA Site: The upper 4 feet of existing granular material is in loose condition. It is recommended that the existing soil be proofrolled and compacted utilizing four passes by a ten-ton vibratory roller. Any weak or soft zones evidenced during proofrolling and compaction shall be removed and replaced with structural fill.
C. Stafford Forge WMA Site: The existing soft and loose surface soil is not suitable for the support of the slab-at-grade without prior site preparation. The upper root mat and one foot of existing soil shall be excavated from within the proposed building extending three (3) feet in all directions. The exposed subgrade shall be proofrolled and compacted with a vibratory roller in the static mode. Any week or soft zone encountered during proofrolling and compaction shall be excavated and replaced with controlled structural fill. After proper site preparation, the site subgrade shall be raised to proposed grades utilizing structural fill.
D. Cut site to required elevation for construction. Conduct compaction tests on the prepared subgrade as specified under Section 3.8 of these specifications to 95% maximum dry density.
E. Install a 6” layer of 3/4” clean crushed stone shall be placed beneath all grade slabs and compact.

3.4 FOOTING EXCAVATION

A. After excavations are completed, compact subgrade using a “jumping jack” or other trench compactor prior to placement of formwork or reinforcing.
B. The Contractor shall exercise extreme caution not to disturb the subgrade soils. Should the footing subgrade be disturbed, the loosened soil shall be compacted in-place. Backfilling against footings and under floor slabs should be accomplished using structural fill placed and compacted as confirmed by testing.
C. Any water that accumulates in the bottom of the excavation should be removed within 24 hours.
D. Conduct soil bearing and density testing on subgrade. Subgrade shall have a density of 95% maximum dry density and a bearing capacity as listed on the Drawing Title Sheet.

3.5 EXCESS MATERIAL

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

3.6 DEWATERING

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

3.7 FILL PLACEMENT

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

3.8 TESTING

A. The Contractor shall employ a testing laboratory prequalified by New Jersey Department of Treasury, Division of Property Management and Construction and approved by the Architect to perform all testing required under this section. . Inspection Results shall be reported in writing to Architect and Contractor within 24 hours of the time that that inspections are made. Reports shall contain location and density. The Architect and Contractor are to be notified verbally at the time of inspection of any deviations from the

construction documents. Report shall note all deviations that were not corrected prior to continued operations.

B. Backfilling/compaction operations shall be controlled by testing. Compaction shall be determined by ASTM D-1557 and meet the following:

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

C. Soil bearing capacity testing shall be performed at slab and footings to confirm minimum soil bearing capacity of 2,000 PSF at Colliers Mills WMA and 3,000 PSF at Stafford Forge WMA.

D. Inspection results shall be reported in writing to Architect and Contractor on same day that inspections are made. Reports shall contain location, depth of fill, depth of lift, thickness of aggregate base course. The Architect and Contractor are to be notified verbally at the time of inspection of any deviations from the construction documents. Report shall note all deviations that were not corrected prior to continued operations.

E. Fill placed at densities lower than that specified, or at moisture contents outside the specified acceptable range, or otherwise not in conformance with the requirements of this specification, must be re-worked to meet those requirements, or removed and replaced with acceptable material, placed in accordance with all of the requirements of this specification, and at no additional cost to the Owner.

3.9 FINAL CLEANUP

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

END OF SECTION

SECTION 31 25 00
EROSION AND SEDIMENTATION CONTROLS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Instructions to Bidders and General Conditions, and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Construction of temporary and permanent measures to control soil erosion and sedimentation including, but not limited to, vegetative cover, mulching, tree protection, grading, diversions, sediment basins, slope protection, conduit outlet protection, siltation barriers, dust control, and other such methods and materials necessary or directed by the Architect to control soil erosion and sedimentation during construction.

B. Related work:
   1. Section 31 00 00 - Earthwork

C. Standards:
   1. All work shall conform to the Soil Erosion and Sediment Control Plan and Details and shall be in accordance with the latest edition of "Standards for Soil Erosion and Sediment Control in New Jersey," as published by The NJ State Soil Conservation Committee, NJ Department of Agriculture.

1.3 SUBMITTALS

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

PART 2 – PRODUCTS

2.1 GENERAL

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

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

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

PART 3 – EXECUTION

3.1 INSTALLATION

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

END OF SECTION

SECTION 32 17 23
PAVEMENT MARKINGS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This work shall consist of the construction of pavement markings on pavement for traffic delineation, including Painted Lines and Painted Markings.
B. Related Work:
    1. Section 03 30 00 - Cast-in-Place Concrete, for concrete parking area slab.

1.3 STANDARDS

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

PART 2 – PRODUCTS

2.1 TRAFFIC STRIPES AND MARKINGS

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

D. Manufacturers; Traffic Markings:
    1. Swarco Traffic, Tennessee
    2. Sherwin-Williams, Georgia
    3. Ennis Paint, Texas
    4. Or Approved Equal

PART 3 – EXECUTION

3.1 TRAFFIC LINES

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

3.2 TRAFFIC MARKINGS

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

END OF SECTION

APPENDIX "A"

Environmental Assessment
Colliers Mills Wildlife Management Area
Prepared by Environmental Connection, Inc. Revised March 22, 2019

ENVIRONMENTAL CONNECTION INC
A Vertical Technologies Corporation

REPORT

Environmental Assessment
Colliers Mills Wildlife Management Area
Off Hawkins Road
Jackson Township, New Jersey 08527

Prepared For:

Ronald A Sebring Associates, LLC
405 Richmond Avenue
Point Pleasant Beach, New Jersey 08742

Prepared By:

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120 North Warren Street
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April 18, 2018
Revised March 22, 2019

EC Project #: 18050-01

TABLE OF CONTENTS

SECTION 1.0 EXECUTIVE SUMMARY

Environmental Connection, Inc., (EC) was contracted by Sebring Associates, LLC to perform an environmental assessment of the covered firing range located at the Colliers Mills Wildlife Management Area (WMA) in Jackson Township, New Jersey. The survey included the identification and sampling of suspect asbestos containing materials (ACMs), lead-based paint chip sampling, and lead dust wipe sampling. The purpose of the survey was to identify environmental hazards that may be impacted by upcoming renovation activities. The environmental assessment was conducted by one (1) of EC's United States Environmental Protection Agency (USEPA) accredited Asbestos Building Inspector and State of New Jersey licensed Lead Based Paint Inspector on March 27, 2018.

During the inspection, EC collected four (4) samples of two (2) suspect asbestos containing materials. Laboratory analysis revealed that none of the materials sampled contained asbestos in concentrations greater that 1% by weight.

Chips of suspect lead-based paint were collected and analyzed for lead content. Laboratory analysis revealed that none of the paints sampled contain lead content greater than 5% by weight, the threshold set by the USEPA for classification as lead-based paint. EC also collected a lead dust wipe sample to identify the extent of lead dust contamination due to firing range operations. Analytical results of the dust wipe sampling revealed lead dust contamination. The following sections detail the findings of the environmental assessment.

SECTION 2.0 ASBESTOS CONTAINING MATERIAL INSPECTION

Asbestos is a naturally occurring mineral categorized into two (2) groups, Serpentine and Amphibole. It was utilized in more than 3,600 products for its fire resistance, tensile strength, inertness, and chemical binding properties. The Serpentine group is comprised of Chrysotile asbestos, while the Amphibole group consists of Amosite, Crocidolite, Tremolite, Anthophyllite, and other forms of asbestos.

The survey for asbestos containing materials was performed in accordance with 40 CFR, Part 763, AHERA/ASHARA, and encompassed accessible spaces likely to be impacted by proposed renovation activities. Samples were collected in sufficient quantity as mandated by 40 CFR, Part 763.87(a).

Samples were submitted to EMSL Analytical, Inc., located in Cinnaminson, New Jersey. EMSL Analytical, Inc., is accredited by the American Industrial Hygiene Association (AIHA) and participates in the National Voluntary Laboratory Accreditation Program (NVLAP). Samples were analyzed utilizing Polarized Light Microscopy (PLM) via EPA Method 600/R-93/116.

Sample analysis was also performed in accordance with the Emergency Regulatory Adoptions to New Jersey Administrative Codes (N.J.A.C.) 8:60 and 12:120, Volume 38, Issue 11, dated June 5, 2006. The regulatory adoptions require the analysis of non-friable organically bound (NOB) suspect asbestos containing materials by Transmission Electron Microscopy (TEM) analysis when PLM analysis yields results of less than 1% asbestos by weight or "None Detected". TEM analysis can differentiate between asbestos and non-asbestos containing fibers at a higher magnification using electron imaging. None of the suspect materials identified were non-friable organically bound and therefore did not require analysis via TEM.

Results for are reported in percentage by weight. According to the USEPA, materials containing greater than 1% asbestos by weight are classified as asbestos containing materials. The following table summarizes the analytical results:

Table 1 – Asbestos Sampling Analytical Results
Colliers Mills Wildlife Management Area
Jackson Township, New Jersey 08527

ID #	Material	PLM Results	TEM Results
01	Wall Edge Patch Material	None Detected	N/A
02	Shooting Stall Composite Tops	None Detected	N/A

| N/A – Not Applicable

No asbestos containing materials were identified during the assessment.

SECTION 3.0 LEAD BASED PAINT INSPECTION

Lead based paint (LBP) was used extensively before 1960 because it was more durable than other paints available at the time. Due to the potential hazards of lead in paint, especially to children, lead-based paint was banned in 1977.

The United States Department of Housing and Urban Development (HUD) and the USEPA define lead-based paint as a coating which contains greater than 0.5% lead by weight or greater than or equal to 1.0 milligrams per square centimeter (mg/cm^2). Demolition and other construction related work impacting lead-based paint is governed by the United States Department of Labor, Occupational Safety and Health Administration, (OSHA). Under OSHA's regulation, 29 CFR, Part 1926.62, "Lead in Construction Standard", construction work is defined as work for alteration and/or repair, including demolition or salvage of structures, removal or encapsulation of materials containing lead. The disturbance or dislocation of lead-based paint or lead containing paint from building materials may cause lead dust to be released into the building`s atmosphere, thereby creating a potential health hazard to workers and/or building occupants.

The USEPA Department of Housing and Urban Development (HUD) and New Jersey Administrative Code (N.J.A.C.) 5:17, define any paint film which contains greater than 1.0 milligram of lead per square centimeter (mg/cm^2) or greater than 0.5% lead content by weight as lead-based paint. EC performed paint chip sampling to determine if any coatings are lead-based paint (LBP). The results of the Lead-Based Paint Inspection are summarized in Table 2 below.

Table 2 – Lead-Based Paint Chip Sampling Analytical Results
Colliers Mills Wildlife Management Area
Jackson Township, New Jersey 08527

Location	Material	Lead Concentration
Concrete Walls	Paint Film	0.031% by weight
Concrete Roof	Paint Film	0.018% by weight

Paint chip sample analysis did not reveal lead-based paint at the site. All surfaces evaluated were found to contain lead concentrations below the established threshold value rendering these surfaces non-lead-based paint per the USEPA. The United States Department of Labor, Occupational Safety and Health Administration, (OSHA), however, does not establish a threshold for lead containing material, meaning any surface coating with a detectable lead concentration is defined as a "lead containing" material by OSHA. OSHA's "Lead Safe Work Practices in Construction" standard applies to any renovation activities that may impact materials classified as "lead containing".

SECTION 4.0 SURFACE WIPE SAMPLING FOR LEAD DUST

Due to its high-density, lead is commonly used as the projectile in ammunition. As a result, gun ranges can be contaminated with high levels of lead dust due to shrapnel. EC performed lead dust wipe sampling to determine the extent of lead dust contamination. The sample was collected and analyzed in accordance with EPA method SW 846-7420.

EC collected samples from one (1) location, the Range Building Center Floor. Sample collection consisted of wiping a one square foot surface area with a laboratory prepared wipe medium. The sample was placed into a labeled vial and delivered to EMSL Analytical, Inc., of Cinnaminson, N.J., a national laboratory accredited by the American Industrial Hygiene Association (AIHA) and a member of the Environmental Lead Laboratory Accreditation Program (ELLAP).

EC utilized the existing lead dust standards established by the United States Department of Housing and Urban Development (HUD) to assess the extent of lead dust contamination in the facility. The HUD standards were developed to regulate lead dust in public housing but also serve as a benchmark for the evaluation of lead dust in other types of buildings. The HUD standard is as follows: 40 micrograms per square foot ($\mu g/ft^2$) for a floor surface, 250 $\mu g/ft^2$ for a window sill and 400 $\mu g/ft^2$ for a window trough.

Results indicated concentrations that exceed the referenced HUD criteria. Reported lead in dust levels were detected at 1,300 $\mu g/ft^2$, confirming the existence of lead dust contamination in the facility.

SECTION 5.0 PROJECT LIMITATIONS/ DISCLAIMERS

The Client should be aware that this survey did not incorporate destructive demolition to access hidden or obscured ACM. Concealed asbestos-containing materials, such as vinyl asbestos floor tile which has been overlaid with plywood, insulated piping lines in wall cavities, asbestos "nailcrete" below tongue and groove flooring, ACM on pipes buried in concrete slabs and other potential ACM which is inaccessible for sample extraction due to the physical coverage of the material were not sampled. EC does assure, however, that due diligence was observed in performing sampling by generally recognized industry sampling practices. The Client should also be advised that quantities referenced herein are estimates/approximations.

SECTION 6.0 RECOMMENDATIONS

The environmental assessment performed at the Collier Mills WMA Firing Range on March 27, 2018, revealed no asbestos containing materials and no lead-based paint coated building components. Lead dust

contamination was detected in the facility. Based on the results of our assessment, EC offers the following recommendations.

- Prior to demolition, utilize a New Jersey Department of Community Affairs (NJDCA) licensed Lead Contractor to remediate lead dust. This work is not governed by the NJDCA as a lead hazard abatement, based on current building use. Please note that this is a pre-cautionary measure that, although recommended, is not required by regulatory statute(s). At a minimum, the demolition Contractor must comply with 29 CFR, Part 1926.62, the OSHA Lead in Construction Standard.

Should you have any questions or require additional information, please contact the undersigned at your convenience.

Respectfully Submitted:
ENVIRONMENTAL CONNECTION, INC.

Jordan Reed
Project Manager

APPENDIX I

ASBESTOS ANALYTICAL REPORTS AND CHAIN-OF-CUSTODY RECORDS

EMSL Analytical, Inc.

1056 Stelton Road Piscataway, NJ 08854

Tel/Fax: (732) 981-0550 / (732) 981-0551

http://www.EMSL.com / piscatawaylab@emsl.com

EMSL Order:	051801273
Customer ID:	ENVI65
Customer PO:	
Project ID:	

Attention:	Dominick Dercole	**Phone:**	(609) 462-3218
	Environmental Connection, Inc.	**Fax:**	
	120 North Warren Street	**Received Date:**	03/27/2018 6:30 PM
	Trenton, NJ 08608	**Analysis Date:**	03/28/2018
		Collected Date:	03/27/2018

Project: 18050-01/Sebring Associates, ACM Inspection, Collier Park Shooting Range

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
01DD032718 *051801273-0001*	Wall - Wall Edge Patch	Gray Non-Fibrous Homogeneous	<1% Cellulose HA: 01	40% Quartz 42% Ca Carbonate 18% Non-fibrous (Other)	None Detected
02DD032718 *051801273-0002*	Wall - Wall Edge Patch	Gray Fibrous Homogeneous	<1% Cellulose HA: 01	42% Quartz 42% Ca Carbonate 16% Non-fibrous (Other)	None Detected
03DD032718 *051801273-0003*	Shooting Stall - Composite Tops	Gray Non-Fibrous Homogeneous	20% Cellulose HA: 02	20% Ca Carbonate 60% Non-fibrous (Other)	None Detected
04DD032718 *051801273-0004*	Shooting Stall - Composite Tops	Gray Non-Fibrous Homogeneous	20% Cellulose HA: 02	20% Ca Carbonate 60% Non-fibrous (Other)	None Detected

Analyst(s)

Susan Pollack (4)

Chaiyut Sae Lao, Laboratory Manager
or Other Approved Signatory

Initial report from: 03/29/2018 08:07:43

OrderID: 051801273

051801273

ENVIRONMENTAL CONNECTION INC

A Vertical Technologies Corporation

Survey Form 04

CLIENT	: Sebring Associates	**DATE**	: 3/27/18
PROJECT	: ACM Inspection	**TECHNICIAN**	: P. DORCOLE
BUILDING	: Collier 2 PART SHOOTING RANGE	**PROJECT #**	: 18050-01

ASBESTOS ANALYSIS OF BULK MATERIALS via EPA600/R-93/116 USING PLM

MATERIAL DESCRIPTION	SAMPLE #	HOMO. AREA ID	ROOM NUMBER	PLM OR TEM NOB
Wall Edge Patch	01DD032718	01	Wall	PLM
↓	02DD032718	01	↓	PLM
Composite Tops	03DD032718	02	Shooting Stall	PLM
↓	04DD032718	02	↓	PLM

RECEIVED
MAR 2[illegible] 2018
6:30 PM WI
BY
EMSL PISCATAWAY

CHECK EACH BOX THAT APPLIES

- ☐ Point Count Sample if <10% Asbestos by Weight
- ☒ NOB's - TEM if Sample(s) are None Detected or <1%
- ☒ Stop at First Positive Homo. Area ID Code
- ☐ 6 hr. TAT
- ☐ 24 hr TAT
- ☒ 48 hr TAT
- ☐ Other_____

CHAIN OF CUSTODY RECORD (CCR)

RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR CCR
	3/27/18					

COMMENTS:

120 North Warren Street • Trenton, New Jersey 08608 • tel: 609-392-4200 • fax: 609-392-1216
5 Penn Plaza, Suite 1972 • New York, New York 10001 • tel: 212-952-7300

APPENDIX II

LEAD BASED PAINT FIELD INSPECTION DATA SHEETS

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856) 303-2500 / (856) 786-5974
http://www.EMSL.com cinnaminsonleadlab@emsl.com

EMSL Order:	201803151
CustomerID:	ENVI65
CustomerPO:	
ProjectID:	

Attn: **Dom Dercole**
Environmental Connection, Inc.
120 North Warren Street
Trenton, NJ 08608

Phone:	(609) 392-4200
Fax:	
Received:	03/28/18 9:00 AM
Collected:	3/27/2018

Project: **Sebring Associates / ACM Inspection / Collier Park - Shooting Range / Project No. 18050-01**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Lead Concentration*
PC1DD032718	*201803151-0001*	3/27/2018	3/28/2018	0.031 % wt
	Site: Walls			
PC2DD032718	*201803151-0002*	3/27/2018	3/28/2018	0.018 % wt
	Site: Roof			

Phillip Worby, Lead Laboratory Manager
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements unless specifically indicated otherwise. Definitions of modifications are available upon request.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NELAP Certifications: NJ 03036, NY 10872, PA 68-00367, AIHA-LAP, LLC ELLAP 100194, A2LA 2845.01

Initial report from 03/30/2018 09:36:07

OrderID: 201803151

201803151

ENVIRONMENTAL CONNECTION INC

A Vertical Technologies Corporation

CLIENT : Sebring Associates
PROJECT : ACM Inspection
BUILDING : Collier PSDH- Shooting Range

DATE : 3/27/18
TECHNICIAN: D. Debonte
PROJECT # : 18050-01

LEAD ANALYSIS OF PAINT CHIPS via AOAC5.009(974.02) USING FLAME AA

SAMPLE # LAB #	LOCATION	SURFACE	QUANTITY	% LEAD
PC1 D1803211B	WALLS	CONCRETE		
PC2 D1803211B	ROOF	CONCRETE		

CHECK EACH BOX THAT APPLIES

☐ 3 hr. TAT ☐ 6 hr. TAT ☒ 48 hr. TAT ☐ Other _____

CHAIN OF CUSTODY RECORD (CCR)

RELINQUISHED BY	DATE	TIME	RECEIVED BY:	DATE	TIME	REASON FOR CCR
	3/27/18		courier	3/27/18	8am	

COMMENTS: _____

ZR#

120 North Warren Street • Trenton, New Jersey 08608 • tel: 609-392-4200
5 Penn Plaza, Suite 1972 • New York, New York 10001 • tel: 212-952-7300

APPENDIX III

LEAD DUST WIPE SAMPLE ANALYTICAL REPORTS AND CHAIN OF CUSTODY RECORDS

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856) 303-2500 / (856) 786-5974
http://www.EMSL.com cinnaminsonleadlab@emsl.com

EMSL Order:	201803152
CustomerID:	ENVI65
CustomerPO:	
ProjectID:	

Attn: **Dom Dercole**
Environmental Connection, Inc.
120 North Warren Street
Trenton, NJ 08608

Phone:	(609) 392-4200
Fax:	
Received:	03/28/18 9:00 AM
Collected:	3/27/2018

Project: **Sebring Associates / ACM Inspection / Collier Park Shooting Range / Project No. 18050-01**

Test Report: Lead in Dust by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Area Sampled*	*Lead Concentration*
W1DD032718	*201803152-0001*	3/27/2018	3/28/2018	144 in²	1300 µg/ft²
	Site: Range Bldg Center Floor				

Phillip Worby, Lead Laboratory Manager
or other approved signatory

*Analysis following Lead in Dust by EMSL SOP/ Determination of Environmental Lead by FLAA. Reporting limit is 10 ug/wipe. ug/wipe = ug/ft2 x area sampled in ft2. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities (such as volume sampled) or analytical method limitations. Samples received in good condition unless otherwise noted. The lab is not responsible for data reported in µg/ft² which is dependent on the area provided by non-lab personnel. The test results contained within this report meet the requirements of NELAC unless otherwise noted. "<" (less than) results signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements unless specifically indicated otherwise. Definitions of modifications are available upon request.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NELAP Certifications: NJ 03036, NY 10872, PA 68-00367, AIHA-LAP, LLC ELLAP 100194, A2LA 2845.01

Initial report from 03/30/2018 09:37:25

OrderID: 201803152

201803152

ENVIRONMENTAL CONNECTION INC

A Vertical Technologies Corporation

CLIENT : Sebring Associates
PROJECT : ACM Inspection
BUILDING : College Park Shooting Range

DATE : 3/27/18
TECHNICIAN: D. DeRosa
PROJECT # : 18050-01

LEAD SURFACE WIPE SAMPLING - METHOD SW846-7420

SAMPLE # LAB #	LOCATION	SURFACE TYPE	SURFACE AREA	ug/sf
WIPP032718	Range Bldg center FLOOR - [redacted]	Concrete		
	[redacted]			

CHAIN OF CUSTODY RECORD (CCR)

RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME	TURN AROUND TIME
	3/21/18.	CPCourier	3/27/18 BP	48 Hours

COMMENTS:

OrderID: 201803152

201803152

ENVIRONMENTAL CONNECTION INC

A Vertical Technologies Corporation

CLIENT : Sebring Associates
PROJECT : ACM Inspection
BUILDING : Collier Park Shooting Range

DATE : 3/27/18
TECHNICIAN: D. DeBlasio
PROJECT # : 18050-01

LEAD SURFACE WIPE SAMPLING - METHOD SW846-7420

SAMPLE # LAB #	LOCATION	SURFACE TYPE	SURFACE AREA	ug/sf
W1803272018	Range Bldg center FLOOR - [redacted]	Concrete		
	[redacted]			

CHAIN OF CUSTODY RECORD (CCR)

RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME	TURN AROUND TIME
	3/21/18.	CRCouris	3/27/18 SP	48 Hours

COMMENTS:

3/28/18 - emailed client for area measurement - wiped. / 1:53p per Dom's email - 1 FT² LV 3/28/18

120 North Warren Street • Trenton, New Jersey 08608 • tel: 609-392-4200
5 Penn Plaza, Suite 1972 • New York, New York 10001 • tel: 212-952-7300

APPENDIX IV

CERTIFICATIONS/ACCREDITATIONS

50906

National Asbestos & Environmental Training Institute

CERTIFICATE OF COMPLETION

AHERA/EPA Accredited Per 40 CFR Part 763
Asbestos Accreditation under TSCA Title II

This is to certify that

Dominick Dercole

Successfully completed the course entitled

1/2-Day New York State/EPA/AHERA Asbestos Building Inspector Annual Refresher on December 5, 2017

Examination Passed on December 5, 2017 *Expiration Date on December 5, 2018*

Doris L. Adler
President, NAETI

Per 10 NYCRR Part 73.2 (L) (1), DOH 2832 Certificate of Completion of Asbestos Safety Training is the only official record of training for N.Y.S. students.

Language: English ABIH 1/2 CM POINT

3321 Doris Avenue, Building B, Ocean, NJ 07712 Phone (732) 531-5571 Fax (732) 531-5956 www.naeti.com

Lead Identification Permit

New Jersey Department of Health

DOMINICK M DERCOLE

Permit No.: 031709

ID No.: 028808

Expires: 10/15/2018

Authorization Signature:

Christina Tan, MD, M.P.H., Assistant Commissioner

Inspector/Risk Assessor

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101048-2

EMSL Analytical, Inc.

Piscataway, NJ

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Asbestos Fiber Analysis

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2017-07-01 through 2018-06-30

Effective Dates

DEPARTMENT OF COMMERCE * UNITED STATES OF AMERICA *

For the National Voluntary Laboratory Accreditation Program

NVLAP® National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

EMSL Analytical, Inc.
1056 Stelton Rd.
Piscataway, NJ 08854
Ms. Chaiyut S. Lao
Phone: 732-981-0550 Fax: 732-981-0551
Email: csaelao@emsl.com
http://www.emsl.com

ASBESTOS FIBER ANALYSIS — NVLAP LAB CODE 101048-2

Bulk Asbestos Analysis

Code	*Description*
18/A01	EPA -- Appendix E to Subpart E of Part 763 -- Interim Method of the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

Airborne Asbestos Analysis

Code	*Description*
18/A02	U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.

For the National Voluntary Laboratory Accreditation Program

AIHA Laboratory Accreditation Programs, LLC

acknowledges that

EMSL Analytical, Inc.

200 Route 130 North, Cinnaminson, NJ 08077

Laboratory ID: 100194

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC accreditation to the ISO/IEC 17025:2005 international standard, *General Requirements for the Competence of Testing and Calibration Laboratories* in the following:

LABORATORY ACCREDITATION PROGRAMS

✓	**INDUSTRIAL HYGIENE**	Accreditation Expires: September 01, 2018
✓	**ENVIRONMENTAL LEAD**	Accreditation Expires: September 01, 2018
✓	**ENVIRONMENTAL MICROBIOLOGY**	Accreditation Expires: September 01, 2018
☐	**FOOD**	Accreditation Expires:
☐	**UNIQUE SCOPES**	Accreditation Expires:

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached **Scope of Accreditation**. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2005 and AIHA-LAP, LLC requirements. This certificate is not valid without the attached **Scope of Accreditation**. Please review the AIHA-LAP, LLC website (www.aihaaccreditedlabs.org) for the most current Scope.

William Walsh, CIH
Chairperson, Analytical Accreditation Board

Cheryl O. Morton
Managing Director, AIHA Laboratory Accreditation Programs, LLC

Revision 15: 03/30/2016

Date Issued: 08/31/2016

APPENDIX "B"

Geotechnical Exploration Report
Stafford Forge WMA Range
Prepared by Maser Consulting, P.A.
May 8, 2018

Addendum, dated July 31, 2018

Geotechnical Exploration Report
Colliers Mills WMA Range
Prepared by Maser Consulting, P.A.
May 8, 2018

Addendum, dated July 31, 2018

Engineers Planners Surveyors Landscape Architects Environmental Scientists

MASER CONSULTING P. A.

GEOTECHNICAL EXPLORATION REPORT

FOR

Proposed Covered Shooting Ranges

Colliers Mills WMA Shooting Range
Township of Jackson, Ocean County, New Jersey

May 8, 2018

Prepared For

Ronald A. Sebring Associates, LLC
405 Richmond Avenue
Point Pleasant Beach, NJ 08742

Prepared By

Maser Consulting P.A.
Corporate Headquarters
331 Newman Springs Road, Suite 203
Red Bank, NJ 07701
732.383.1950

Moustafa A. Gouda, P.E., D. GE, F.ASCE, Senior Consultant
Professional Engineer
New Jersey License No. 20848

MC Project No. 17006864A

TABLE OF CONTENTS

1. INTRODUCTION

In accordance with project requirements, Maser Consulting P. A. completed a geotechnical exploration program for the construction of the proposed covered shooting range at the existing Colliers Mills WMA Shooting Range located off Hawkin Road in the Township of Jackson, Ocean County, New Jersey.

The exploration program was undertaken to evaluate the existing subsurface conditions at the project site, and develop related recommendations for foundation support and site development. This report provides our geotechnical design recommendations and construction considerations for the project.

2. AVAILABLE INFORMATION

a. Report titled " Scope of Work Covered Shooting Ranges" by New Jersey Department of the Treasury, dated May 9, 2017 and revised on August 31, 2017.

3. SITE AND PROJECT DESCRIPTION

The project site is located within the existing Colliers Mills WMA Shooting Range, Township of Jackson, New Jersey (N 40.080201, W 74.429602). The site is bounded by an undeveloped densly wooded areas towards the north, east, south, and west directions.

The existing shooting range structure does not comply with the "No Blue Sky" Concept. In the interest of public safety, the project aims to limit firing lines and control projectiles in compliance with the "No Blue Sky" Concept. Therefore, the project comprises the construction of a new roof supported by columns along with the construction of a concrete slab at grade.

4. SCOPE OF SERVICES

To evaluate the subsurface conditions within the area influenced by the proposed construction, and provide geotechnical consultation regarding foundation recommendations, we performed the following Scope of Services:

a) Retained drilling contractor to perform the test boring exploration of subsurface soil, rock and groundwater conditions;

b) Provided full-time technical observation of the work of the drilling contractor;

c) Obtained representative soil samples encountered within the zone of influence of the proposed construction;

d) Prepared test boring logs showing the types of soils encountered and depth to encountered groundwater;

e) Prepared this Geotechnical Exploration Report, presenting the results of our subsurface exploration, engineering evaluation, and subsequent foundation support and site earthwork recommendations.

5. SUBSURFACE EXPLORATION

Maser Consulting performed a subsurface exploration program consisting of two (2) test borings, TB-01 and TB-02, drilled within the footprint of the proposed structures. The corresponding locations are shown on Figure 1.

The test borings were performed by Allied Well Drilling of Annanapolis, MD, on March 27, 2018 under the full-time technical observation of Maser Consulting. The test borings were advanced to depths of 25 feet below the existing grade using standard hollow-stem auger drilling technique. Split spoon sampling was performed in accordance with ASTM D-1586 (Standard Method for Penetration Test and Split-Barrel Sampling of Soils). The number of blows required to drive the split spoon every six (6) inches into the soil were recorded and are shown on the logs. The sum of blows for the middle foot is the N value. The SPT N-value indicates the soil resistance encountered at each layer. Sampling was performed continuously from the ground surface to a depth of 10 feet then at five (5)-foot intervals to the completion depth in each boring.

Soils encountered were classified in the field in accordance with the Burmister Soil Classification System. Appendix A presents logs of the test borings.

6. SUBSURFACE CONDITIONS

Regional Geology

The surficial geology is presented within the New Egypt Quadrangle in Ocean County, which indicates the overlying soils are part of the Cohansey Formation. This deposit consists mainly of light brown, dark-yellowish-orange, yellowish gray, light gray coarse to fine sand, with varying amounts of coarse to fine gravel and silt. This formation has a maximum thickness of 100 feet.

Subsurface Description

Detailed description of soils encountered below the existing grade are shown on the attached test boring logs and are summarized below in order of occurrence with depth:

Stratum S: Sand

Stratum S was encountered in all test borings and extended to their termination depths. This stratum consists of very loose to dense yellow-brown, light brown medium to fine sand, trace to little silt, trace fine gravel. The SPT-N values for this stratum ranged between 3 blows per foot (bpf) and 34 blows per foot (bpf).

Groundwater Conditions

Groundwater was encountered in both test borings at depths of 20 ft and 21 ft, respectively below the ground surface.

Note that groundwater levels can fluctuate with locations, seasonal changes, precipitation, nearby construction activities, leakage into and out of utilities, and other factors.

7. DESIGN RECOMMENDATIONS

The following recommendations are based upon our review and interpretation of the geotechnical conditions below the site:

Site Preparation

The upper 4 feet of existing granular material is in loose condition. It is recommended that the existing soil be proofrolled and compacted utilizing four passes by a ten ton vibratory roller under the direction of the geotechnical engineer. Any weak or soft zones evidenced during proofrolling and compaction shall be removed and replaced with structural fill.

Foundations

Test boring data revealed that the subsurface conditions are favorable for support of the proposed construction. Based on engineering analysis of the test boring logs, the proposed building may be supported on shallow footings provided that the site preparation listed above is completed prior to foundations and slab installation.

Conventional spread and strip footings may be designed for a maximum net allowable soil bearing pressure of 2,000 psf (1 tsf). Footings may be supported on Stratum S or compacted structural fill. Loose soil is not considered suitable for foundation support and if encountered, should be excavated and replaced with structural fill. See the Structural Fill section of this report for further details.

Footings may be stepped up or down at 2H:1V to achieve any necessary grade changes. Actual footing grades should be evaluated in the field based on observation and probing by the Geotechnical Engineer.

Wall and column footing widths should not be less than 1.5 and 3.0 feet, respectively, or less than applicable code requirements, whichever is greater. Exterior footings should be founded at a minimum depth of 3.0 feet beneath the outside finished grades for frost protection. All footing subgrades should be compacted using a "Jumping Jack" or similar compactor upon completion of footing excavation.

To confirm the design allowable soil bearing pressure, a qualified geotechnical engineer prior to the placement of concrete must inspect the footing subgrade. The contractor should exercise extreme caution not to disturb the subgrade soils. Should the footing subgrade be disturbed, the loosened soil should be compacted in-place. Backfilling against footings and under floor slabs should be accomplished using structural fill placed and compacted under engineering inspection. Any water that accumulates in the bottom of the excavation should be removed within 24 hours.

Settlement

It is estimated that maximum post-construction footing settlement of the proposed building will be less than 1 inch and the differential settlement between adjacent columns will be less than ½ inch. This value is generally within tolerable limits for this type of structure.

Protection of Subsurface Utilities

We recommend that the shallow foundations be established in a zone bounded by a plane that extends outward and upward at a one (1) horizontal to one (1) vertical slope from the bottom of any proposed or existing adjacent utilities.

Slab-at-Grade

The slab-at-grade shall be designed utilizing a 100 pounds per cubic inch modulus of subgrade reaction. Proposed mesh reinforced concrete floor slabs can be uniformly supported on-grade and simply supported at the wall to allow unrestricted rotation or vertical movement of slab edges. Saw joints or construction joints should isolate each bay to control shrinkage cracks. A minimum of six inches of ¾-inch clean, crushed stone or a 12-inch thick layer (minimum) of well-graded sand and gravel with no more than 12% non-plastic fines, is recommended below the slab to assure uniform curing conditions. A 6-mil PVC vapor retarder may be placed between the slab and base course, as directed by the Architect, to minimize moisture migration to the surface. All structural fill supporting the floor slab should be compacted to 95% of the maximum dry density (ASTM D 1557).

Groundwater

Foundations design shall consider a minimum depth to groundwater of 15 feet to account for seasonal variations.

Lateral Earth Pressures

Lateral earth pressures acting on exterior walls that are restrained from lateral movement should be designed considering the following:

- Compute lateral earth pressures using a total unit weight for soils of 120 pounds per cubic foot and an internal friction angle of 30 degrees. Foundation elements restrained from movement should be designed considering at-rest earth pressures. Consider the buoyant unit weight for zones below the groundwater table.

- Surcharge loads from streets, construction equipment, and nearby structures should be added to the lateral earth pressures. We recommend using a coefficient of 0.50 times the vertical surcharge loads to determine the horizontal surcharge load.

Lateral Resistance

Lateral loads on shallow foundations will be resisted by passive pressures on the vertical sides of the foundations, and by frictional sliding resistance on the bases of foundations:

- *Passive Resistance to Lateral Loads*
    - Compute ultimate passive resistance using a total unit weight for soils of 120 pounds per cubic foot and an internal friction angle of 30 degrees. Consider the buoyant unit weight for zones below the groundwater table.
    - Use a factor of safety of 1.5 on the passive ultimate resistance when working loads are used.
    - Spacing between adjacent footings needs to be considered to verify that a full passive "wedge" can be developed.

- *Frictional Resistance to Lateral Loads:*
    - Compute ultimate frictional resistance using a coefficient of friction of 0.35 on the horizontal base of foundations.

Seismic Design

Based on the subsurface conditions encountered at the site and considering the foundation level will be within Stratum S, the seismic design shall consider Site Class D. The following represents the seismic design parameters (See also Appendix B):

Seismic Site Class: D
Site Coefficient F_a: 1.6
Site Coefficient F_v: 2.4

Spectral Response Accelerations:

S_{MS} (g):	0.332
S_{M1} (g):	0.146

Design Spectral Accelerations:

SDS (g):	0.221
SD1 (g):	0.097

Based on the nature of the site soils encountered within the test boring, the site soils are not susceptible to liquefaction.

8. CONSTRUCTION CONSIDERATIONS

Excavation

We anticipate excavations for the proposed foundations to extend to relatively shallow depths not exceeding 5 ft. below grade. The subsurface conditions encountered within the test borings suggest conventional dozers and excavators appear practical to remove these materials.

Excavation Support

All construction excavations should be sloped and/or shored in accordance with OSHA excavation regulations or stricter local governing safety codes.

All excavation support systems, and earth slopes must be designed by a qualified engineer, licensed in the State of New Jersey. Lateral pressures presented earlier in this report shall be employed in the design of such systems. Appropriate live loads, building loads, and surcharges for sidewalk, vehicular and construction loads shall also be considered in the design.

Structural Fill/Backfill

All fill/backfill proposed to support the building and site features that will be adversely affected by settlement is considered structural fill. Materials used as structural fill should consist of visually stable, inorganic, readily compactable materials that are free of trash, debris, organic inclusions, frozen material, or excess moisture. On-site materials with an organic content of less than 5 percent may be included in structural fill, provided they are well blended with other inorganic fill materials.

The existing on-site materials may be re-used as structural fill provided they are sufficiently dry, and any organic and other deleterious material, as well as fragments larger than four (4) inches, are removed. If additional materials are required to establish the proposed site grades, we recommend using imported fill consisting of granular soils with no more than

10 percent fines.

Structural fill should be placed in essentially horizontal lifts with a maximum loose thickness of eight (8) inches. The optimum loose lift thickness of the structural fill material shall be established by the contractor in the field via an earthwork test pad. In addition to meeting the compaction criteria, the compacted material shall maintain visual stability beneath the compaction equipment and be observed and documented by the Geotechnical Engineer.

Each lift should be compacted to at least 95 percent of the maximum dry density for building or floor slab support, and 92 percent of the maximum dry density for pavement construction and utility trench backfill, as determined by the modified Proctor test (ASTM D 1557). Compaction should be achieved using as large a vibratory compactor as practical. Moisture contents shall be maintained within 2 to 3 percent of the optimum moisture content during compaction procedures.

Asphalt millings may be utilized as load-bearing fill outside the building footprint, plus a 5-foot perimeter zone, provided they are blended to conform to a dense-graded aggregate (DGA). In addition, asphalt millings should be restricted to less than 12 inches in total thickness throughout the fill profile.

Subgrade Preparation

Subsurface Utilities

The natural soils and new structural fill materials are suitable for support of subsurface utilities. However, should cobbles, boulders, loose and/or unstable soils be encountered at the utility invert levels, the subgrade should be over-excavated a minimum depth of 6 inches and backfilled with granular material, such as AASHTO No. 57 aggregate, to provide uniform support. Utility excavations should be backfilled using structural fill in accordance with the "Structural Fill" section of this report.

Other Subgrade Considerations

Any possible fill or natural subgrade soils that are determined to be soft, loose, wet, or otherwise unstable should be selectively excavated and replaced with structural fill, placed and compacted in accordance with the recommendations mentioned above.

Unless foundation construction proceeds within 24 hours of foundation subgrade preparation, including approval by the geotechnical engineer, subgrades should be protected from the elements to reduce exposure and potential weakening of the subgrade materials, particularly if precipitation or freezing temperatures are expected prior to foundation construction. Preventative measures such as placing a minimum 4-inch thick lean concrete "mud mat" on the subgrade, or providing suitable cover for the excavations

may be considered appropriate, depending on the prevailing weather conditions. Foundation excavations should be protected from frost and water infiltration until the foundations have been constructed and backfilled.

Site Drainage and Surface Water Control

Adequate temporary and permanent control of surface water runoff and subsurface seepage will be required to maintain stable conditions during construction. Excavation, filling, and subgrade preparation should be performed in a manner and sequence that will provide positive drainage at all times, as well as proper control of erosion.

Exposed surfaces should be graded to drain or otherwise protected from water infiltration before and during construction of the building pad and pavements. These measures may include seal-rolling the exposed subgrade surfaces and creating temporary areas to collect stormwater. Exposed soil surfaces will also have to be repaired after rain events (i.e. removal of the wet material) or permitted to dry sufficiently prior to resuming construction activities. Standing surface water should be pumped or drained to provide a suitable working platform. Any water accumulating in an open excavation should be removed within 24 hours.

The foundation subgrade should be visually inspected by a qualified Geotechnical Engineer and approved prior to foundation placement.

Existing Utilities

Underground utilities that are to be reused should be evaluated by the Civil Engineer, and utility trench backfill should be evaluated by the geotechnical engineer, to determine their suitability for support of the planned construction. If any existing utilities are to be preserved, grading operations must be carefully performed so as not to disturb or damage the existing utility.

9. CLOSING

The conclusions and recommendations presented in this report are based, on available test boring information obtained during this investigation. It is recommended that we be provided the opportunity for general review of the project plans and specifications when they become available, to confirm that the recommendations and design considerations presented in this report have been properly interpreted and implemented into the project design package.

This report serves as a guidance document for the entity it is addressed to. As such, we emphasize that this report and/or the included recommendations should not be made available in the bid documents to prospective bidders, in lieu of or as part of the project specification. We do, however, recommend that the test boring logs be made a part of the

specifications for the project along with a reference to the plan sheets that contain the test boring locations for informational purposes. Should the data not be adequate for the Contractor's purposes, the Contractor may make, prior to bidding, his own explorations, tests, and analyses.

10. LIMITATIONS

This geotechnical study has been performed in accordance with generally accepted engineering practice and any applicable design standards as referenced herein. This report and all supporting documentation have been prepared exclusively for the use of **Ronald A. Sebring Associates, LLC** pursuant to the Agreement between Maser Consulting P.A. and **Ronald A. Sebring Associates, LLC**. All provisions set forth in the Agreement and the General Terms and Conditions attached thereto are incorporated herein by reference. No warranty, express or implied, is made herein.

The findings, conclusions, and recommendations contained in this report are based on data revealed by limited exploration of the subsurface reportedly performed at the site by Maser Consulting, P.A. The explorations indicate subsurface conditions at the specific locations, depths, and times explored. Should deviations from the described subsurface conditions be encountered at any time prior to or during construction, Maser Consulting should be notified to determine whether the findings necessitate modification of our recommendations.

This report is applicable only to the contemplated site design described herein; any changes in the design should be brought to our attention so that we may evaluate whether our recommendations will be affected. Maser Consulting is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or reuse of the subsurface data or engineering analysis without the expressed written authorization of Maser Consulting. As such, the conclusions and recommendations contained in this report are pending our review of final plans and specifications, and verification of subsurface conditions by direct observation at the time of construction.

This report and supporting documentation are instruments of service. The subject matter of this report is limited to the facts and matters stated herein.

The scope of this geotechnical study did not include investigation or evaluation of any environmental issues, such as wetlands, or hazardous or toxic materials on, below, or in the vicinity of the subject site. Any statements in this report or supporting documentation regarding odors or unusual or suspicious items or conditions observed are strictly for the information of our Client.

GENERAL NOTES

1. SURVEY BASED ON DRAWING "Colliers Mill Wildlife Management Area Partial Topographic Survey" BY MASER CONSULTING, P.A. DATED APRIL, 2018.
2. THIS DRAWING IS PART OF MASER CONSULTING'S REPORT (PROJECT NO. 17006864A) DATED APRIL 2018 AND SHOULD ONLY BE USED IN CONJUNCTION WITH THE REPORT.
3. SOIL EXPLORATION LOCATIONS ARE APPROXIMATE BASED UPON EXISTING SITE FEATURES AND BASE MAP INFORMATION AVAILABLE AT THE TIME OF OUR FIELD EXPLORATION.
4. TEST BORINGS PERFORMED BY ALLIED WELL DRILLING ON MARCH 27, 2018 UNDER CONTINUOUS OBSERVATION OF MASER CONSULTING.

80 64 48 32 16 0 40 80 160

SCALE : 1" = 80'

LEGEND

TB-0X TEST BORING

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REV	DATE	DRAWN BY	DESCRIPTION
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

EXPLORATION LOCATION PLAN
FOR
COLLIERS MILLS WMA PROPOSED COVERED SHOOTING RANGE
TOWNSHIP OF JACKSON
OCEAN COUNTY,
NEW JERSEY

MONTVALE OFFICE
50 Chestnut Ridge Road
Suite 101
Montvale, NJ 07645
Phone: 845.352.0411
Fax: 845.352.2611

SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	04/17/2018	P.A.	A.E.
PROJECT NUMBER:	DRAWING NAME:		
17006864A	17006864A - ELP		

SHEET TITLE:
EXPLORATION LOCATION PLAN

SHEET NUMBER:
FIGURE NO. 1

APPENDIX A

TEST BORING LOGS

VISUAL IDENTIFICATION OF SAMPLES

(Burmister Soil Classification System)

I. Definition of Soil Components and Fractions

Material	Symbol	Fraction	Sieve Size	Definition
Boulders	Bldr	-----	9" +	Material retained on 9" sieve.
Cobbles	Cbl	----	3" to 9"	Material passing the 9" sieve and retained on the 3" sieve.
Gravel	G	coarse (c) medium (m) fine (f)	1" to 3" 3/8" to 1" No. 10 to 3/8"	Material passing the 3" sieve and retained on the No. 10 sieve.
Sand	S	coarse (c) medium (m) fine (f)	No. 30 to No. 10 No. 60 to No. 30 No. 200 to No. 60	Material passing the No. 10 sieve and retained on the No. 200 sieve.
Silt	$	---	Passing No. 200 (0.075 mm)	Material passing the No. 200 sieve that is non-plastic in character and exhibits little or no strength when air dried.
Clayey SILT	Cy$	Slight (SL)	1 to 5	Clay - Soil
SILT & CLAY	$ & C	Low (L)	5 to 10	Material passing the No. 200 which can be made to exhibit plasticity and clay qualities within a certain range of moisture content, and which exhibits considerable strength when air-dried.
CLAY & SILT	C & $	Medium (M)	10 to 20	
Silty CLAY	$yC	High (H)	20 to 40	
CLAY	C	Very High (VH)	40 Plus	
Organic Silt	(O$)			Material passing the No. 200 sieve which exhibits plastic properties within a certain range of moisture content, and exhibits fine granular and organic characteristics.

II. Definition of Component Proportions

Component	Written	Proportions	Symbol	Percentage Range by Weight*
Principal	CAPITALS	---		50 or more
Minor	Lower Case	and	a.	35 to 50
		some	s.	20 to 35
		little	l.	10 to 20
		trace	t.	1 to 10

* Minus sign (-) lower limit, plus sign (+) upper limit, no sign middle range.

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Phone (732) 383-1950
Fax (732) 383-1990

PROJECT WMA Shooting Range
Colliers Mills WMA Shooting Range
Jackson, NJ.
PROJECT NO. 17006864A

BORING NO. TB-01
PAGE 1 OF 1
LOCATION See Location Plan
OFFSET

CONTRACTOR: Allied Well Drilling
DRILLER: Lou Davis
DRILLING EQUIPMENT: 77DT Geoprobe
METHOD: HSA x Mud Rotary ____ Other ____
HAMMER: CH ____ Safety ____ Automatic x
Weight 140 lb Drop 30 in
RODS: AW x NW ____ Other ____

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	20'	3/27/18
End of Drilling (0 hrs.) ▼	20'	3/27/18
After Drilling (>24 hrs.) ◭		

DATE STARTED 3/27/18
DATE FINISHED 3/27/18

GROUND ELEV. 141.5 +/-
GROUND WATER ELEV. 121.5 +/-

DEPTH BELOW SURFACE (ft)	SAMPLE NUMBER / DEPTH (ft)	BLOWS PER 6 INCHES 0-6"	6-12"	12-18"	18-24"	RECOVERY (in)	POCKET PENETR-OMETER (tsf)	PROFILE CHANGE DEPTH / ELEV.	IDENTIFICATION OF SOILS / REMARKS
0	S-1	WOH	1	2	2	14			Surface covered with shooting fire debris.
	0'-2'								S-1: Yellow-Brown mf(+) SAND, little Silt. (Moist).
	S-2	3	3	2	3	14			S-2: Lt. Brown mf SAND, little Silt. (Moist).
	2'-4'								
	S-3	4	5	5	7	12			S-3: Lt. Brown c(-)mf SAND, little Silt. (Moist).
	4'-6'								
	S-4	5	6	8	10	14			S-4: Yellow cmf SAND, little Silt, f Gravel. (Moist).
	6'-8'								
	S-5	6	6	10	11	14			S-5: Lt. Brown cmf SAND, little f Gravel, Silt. (Moist).
	8'-10'							S	
10									
	S-6	11	13	21	26	16			S-6: Lt. Brown cmf(+) SAND, little Silt. (Moist).
	13'-15'								
	S-7	6	9	12	13	14			S-7: Lt. Brown mf SAND, little(+) Silt. (Wet tip).
	18'-20'							▼	
20									
	S-8	12	11	13	13	16			S-8: Lt. Brown mf SAND, little(+) Silt. (Wet).
	23'-25'								
									END OF BORING AT 25.0 FEET.
30									
40									

NOTES:

VISUAL IDENTIFICATION OF SOILS (BURMISTER CLASSIFICATION SYSTEM)

Component	Proportions	% Range (by weight)
PRINCIPAL	---	50 or more
Minor	and	35 to 50
	some	20 to 35
	little	10 to 20
	trace	1 to 10

Clayey Soils	
Clayey SILT	slight PI.
SILT & CLAY	low PI.
CLAY & SILT	medium PI.
Silty CLAY	high PI.
CLAY	very high PI.

TERMINOLOGY for STRATIFIED SOILS

Term	Definition
parting	0 to 1/16" thickness
seam	1/16" to 1/2" thickness
layer	1/2" to 12" thickness
occasional	one or less per foot of thickness
frequent	more than one per foot of thickness

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PROJECT WMA Shooting Range
Colliers Mills WMA Shooting Range
Jackson, NJ.
PROJECT NO. 17006864A

BORING NO. TB-02
PAGE 1 OF 1
LOCATION See Location Plan
OFFSET

CONTRACTOR: Allied Well Drilling
DRILLER: Lou Davis
DRILLING EQUIPMENT: 77DT Geoprobe
METHOD: HSA x Mud Rotary ____ Other ____
HAMMER: CH ____ Safety ____ Automatic x
Weight 140 lb Drop 30 in
RODS: AW x NW ____ Other ____

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	21'	3/27/18
End of Drilling (0 hrs.) ▼	21'	3/27/18
After Drilling (>24 hrs.) ◭		

DATE STARTED 3/27/18
DATE FINISHED 3/27/18
GROUND ELEV. 142.5 +/-
GROUND WATER ELEV. 121.5 +/-

DEPTH BELOW SURFACE (ft)	SAMPLE NUMBER / DEPTH (ft)	BLOWS PER 6 INCHES 0-6"	6-12"	12-18"	18-24"	RECOVERY (in)	POCKET PENETR-OMETER (tsf)	PROFILE CHANGE DEPTH / ELEV.	IDENTIFICATION OF SOILS / REMARKS
0	S-1	1	3	3	4	16			Surface covered with shooting fire debris.
	0'-2'								S-1: Top 10": Yellow Brown mf SAND, little Silt. (Moist). Bot 6": Lt. Brown mf SAND, little Silt. (Moist).
	S-2	3	4	3	4	12			S-2: Lt. Brown c(-)mf SAND, little Silt, trace f Gravel. (Moist).
	2'-4'								
	S-3	2	3	3	4	12			S-3: Lt. Brown c(-)mf SAND, trace Silt. (Moist).
	4'-6'								
	S-4	4	4	4	7	14			S-4: Lt. Brown mf SAND, little(-) Silt. Frequent Orange Sand partings. (Moist).
	6'-8'								
	S-5	7	10	18	20	12			S-5: Lt. Brown mf(+) SAND, little Silt. Frequent Orange Sand and Clayey Silt seams. (Moist).
	8'-10'							S	
10									
	S-6	11	17	17	21	14			S-6: Lt. Brown cmf SAND, little f Gravel, Silt. (Moist).
	13'-15'								
	S-7	11	17	18	21	14			S-7: Yellow mf SAND, little Silt. (Inreasing w%) (Moist).
	18'-20'								
20								▼	
	S-8	10	11	17	21	10			S-8: Lt. Brown mf(+) SAND, little Silt. (Wet).
	23'-25'								
									END OF BORING AT 25.0 FEET.
30									
40									

NOTES:

VISUAL IDENTIFICATION OF SOILS (BURMISTER CLASSIFICATION SYSTEM)

Component	Proportions	% Range (by weight)
PRINCIPAL	---	50 or more
Minor	and	35 to 50
	some	20 to 35
	little	10 to 20
	trace	1 to 10

Clayey Soils	
Clayey SILT	slight Pl.
SILT & CLAY	low Pl.
CLAY & SILT	medium Pl.
Silty CLAY	high Pl.
CLAY	very high Pl.

TERMINOLOGY for STRATIFIED SOILS

Term	Definition
parting	0 to 1/16" thickness
seam	1/16" to 1/2" thickness
layer	1/2" to 12" thickness
occasional	one or less per foot of thickness
frequent	more than one per foot of thickness

APPENDIX B

USGS SEISMIC DESIGN REPORT

USGS Design Maps Detailed Report

ASCE 7-10 Standard (40.07743°N, 74.45265°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1]	S_S = 0.208 g
From Figure 22-2 [2]	S_1 = 0.061 g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index *PI* > 20, • Moisture content *w* ≥ 40%, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk–Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4–1: Site Coefficient F_a

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = D and S_s = 0.208 g, F_a = 1.600

Table 11.4–2: Site Coefficient F_v

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at 1–s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.061 g, F_v = 2.400

Equation (11.4–1): $S_{MS} = F_a S_S = 1.600 \times 0.208 = 0.332$ g

Equation (11.4–2): $S_{M1} = F_v S_1 = 2.400 \times 0.061 = 0.146$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

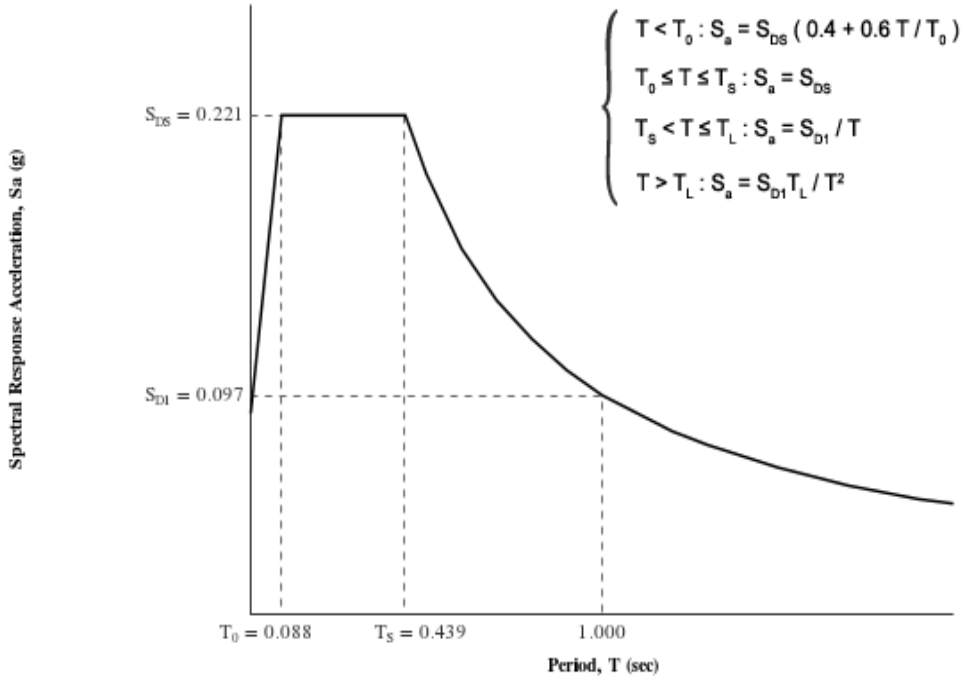
Equation (11.4–3): $S_{DS} = ⅔ S_{MS} = ⅔ \times 0.332 = 0.221$ g

Equation (11.4–4): $S_{D1} = ⅔ S_{M1} = ⅔ \times 0.146 = 0.097$ g

Section 11.4.5 — Design Response Spectrum

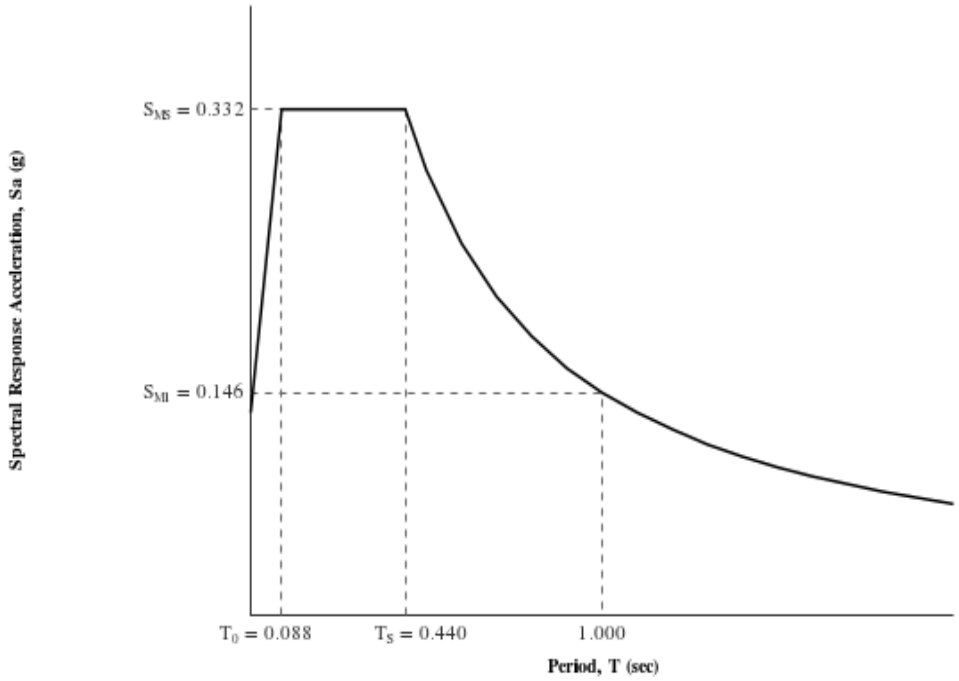
From Figure 22-12 [3] $T_L = 6$ seconds

Figure 11.4–1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4] PGA = 0.115

Equation (11.8–1): $PGA_M = F_{PGA}PGA = 1.570 \times 0.115 = 0.18$ g

Table 11.8–1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.115 g, F_{PGA} = 1.570

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5] C_{RS} = 0.882

From Figure 22-18 [6] C_{R1} = 0.909

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 0.221 g, Seismic Design Category = B

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.097 g, Seismic Design Category = B

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = B

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 22-1*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

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July 31, 2018

VIA EMAIL & U.S. MAIL

David Clark, RA, Vice President
Ronald A. Sebring Associates, LLC
Architecture - Planning - Design
405 Richmond Avenue
Point Pleasant Beach, NJ 08742

Re: Addendum to Geotechnical Exploration Report dated May 8, 2018
Proposed Covered Shooting Ranges
Colliers Mills WMA Shooting Range
Township f Jackson, Ocean County, NJ
MC Project No. 17006864A

Dear Mr. Clark:

At your request, we are issuing this Addendum to allow the use of round foundations to support the proposed columns with reference to the above project.

Foundations

Test boring data revealed that the subsurface conditions are favorable for support of the proposed construction. Based on engineering analysis of the test boring logs and laboratory test results, the proposed building may be supported on shallow footings provided that the site preparation, per our report dated May 8, 2018, is completed prior to foundations and slab installation.

Conventional spread, strip footings or round foundations may be designed for a maximum net allowable soil bearing pressure of 2000 psf. (1-tsf.). Footings may be supported on Stratum S or compacted structural fill. Loose soil is not considered suitable for foundation support and if encountered, should be excavated and replaced with structural fill. See the Structural Fill section of our report dated May 8, 2018 for further details.

Column footing widths or diameter should not be less than 30 inches, respectively, or less than applicable code requirements, whichever is greater. Exterior footings should be founded at a minimum depth of 3.5 feet beneath the outside finished grades for frost protection.

The contractor should exercise extreme caution not to disturb the subgrade soils. Should the footing subgrade be disturbed, the loosened soil should be compacted in-place. Backfilling against footings and under floor slabs should be accomplished using structural fill placed and compacted

under engineering inspection. Any water that accumulates in the bottom of the excavation should be removed within 24 hours.

Should you have any questions or require any additional information, please do not hesitate to contact me directly.

Very truly yours,

MASER CONSULTING P. A.

Moustafa A. Gouda, P.E., D.GE, F.ASCE
Senior Principal
Professional Engineer
NJ License No. 20848

MAG/sab

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Engineers Planners Surveyors Landscape Architects Environmental Scientists

MASER CONSULTING P. A.

GEOTECHNICAL EXPLORATION REPORT

FOR

Proposed Covered Shooting Ranges

Stafford Forge Shooting Range
Township of Little Egg Harbor, Ocean County, New Jersey

May 8, 2018

Prepared For

Ronald A. Sebring Associates, LLC
405 Richmond Avenue
Point Pleasant Beach, NJ 08742

Prepared By

Maser Consulting P.A.
Corporate Headquarters
331 Newman Springs Road, Suite 203
Red Bank, NJ 07701
732.383.1950

Moustafa A. Gouda, P.E., D. GE, F.ASCE, Senior Consultant
Professional Engineer
New Jersey License No. 20848

MC Project No. 17006864A

TABLE OF CONTENTS

1. INTRODUCTION

In accordance with project requirements, Maser Consulting P. A. completed a geotechnical exploration program for the construction of the proposed covered shooting range at the existing Stafford Forge WMA Shooting Range located off Route 539 in the Township of Little Egg Harbor, Ocean County, New Jersey.

The exploration program was undertaken to evaluate the existing subsurface conditions at the project site, and develop related recommendations for foundation support and site development. This report provides our geotechnical design recommendations and construction considerations for the project.

2. AVAILABLE INFORMATION

a. Report titled " Scope of Work Covered Shooting Ranges" by New Jersey Department of the Treasury, dated May 9, 2017 and revised on August 31, 2017.

3. SITE AND PROJECT DESCRIPTION

The project site is located within the existing Stafford Forge WMA Shooting Range, Township of Little Egg Harbor, New Jersey (N 39.695985, W 74.368830). The site lies within an undeveloped densly wooded area.

The existing shooting range structure does not comply with the "No Blue Sky" Concept. In the interest of public safety, the project aims to limit firing lines and control projectiles in compliance with the "No Blue Sky" Concept. Therefore, the project comprises the construction of a new roof supported by columns along with the construction of a concrete slab at grade.

4. SCOPE OF SERVICES

To evaluate the subsurface conditions within the area influenced by the proposed construction, and provide geotechnical consultation regarding foundation recommendations, we performed the following Scope of Services:

a) Retained drilling contractor to perform the test boring exploration of subsurface soil, rock and groundwater conditions;

b) Provided full-time technical observation of the work of the drilling contractor;

c) Obtained representative soil samples encountered within the zone of influence of the proposed construction;

d) Prepared test boring logs showing the types of soils encountered and depth to encountered groundwater;

e) Prepared this Geotechnical Exploration Report, presenting the results of our subsurface exploration, engineering evaluation and subsequent foundation support and site earthwork recommendations.

5. SUBSURFACE EXPLORATION

Maser Consulting P.A. performed a subsurface exploration program consisting of two (2) test borings, TB-01 and TB-02, drilled within the footprint of the proposed structures. The corresponding locations are shown on Figure 1.

The test borings were performed by Allied Well Drilling of Annanapolis, MD, on March 27, 2018 under the full-time technical observation of Maser Consulting. The test borings were advanced to depths of 18 feet below the existing grade using standard hollow-stem auger drilling technique. Split spoon sampling was performed in accordance with ASTM D-1586 (Standard Method for Penetration Test and Split-Barrel Sampling of Soils). The number of blows required to drive the split spoon every six (6) inches into the soil were recorded and are shown on the logs. The sum of blows for the middle foot is the N value. The SPT N-value indicates the soil resistance encountered at each layer. Sampling was performed continuously from the ground surface to a depth of 10 feet then at five (5)-foot intervals to the completion depth in each boring.

Soils encountered were classified in the field in accordance with the Burmister Soil Classification System. Appendix A presents logs of the test borings.

6. SUBSURFACE CONDITIONS

Regional Geology

The surficial geology is presented within the West Creek Quadrangle in Ocean County, which indicates the overlying soils are part of the Upland Gravel, Lower Phase. This deposit consists mainly of very pale brown, yellow, reddish-yellow coarse to fine sand, with varying amounts of coarse to fine gravel and silt. Clayey soils are present in places. This formation has a thickness ranging between 10 feet and 30 feet.

Subsurface Description

The test borings were advanced through approximately 2 inches to 3 inches of root mat. Detailed description of soils encountered below surface materials are shown on the attached test boring logs and are summarized below in order of occurrence with depth:

Stratum S: Sand

Stratum S was encountered in all test borings and extended to their termination depths. This stratum consists of very loose to medium-dense yellow-brown, light brown medium to fine sand, trace to little silt/clayey silt, fine gravel. The SPT-N values for this stratum ranged between 3 blows per foot (bpf) and 17 blows per foot (bpf).

Stratum C: Clay

Stratum C is interbedded within Stratum S and was only encountered in Test Boring TB-02. Stratum C has an approximate thickness of 2 feet and was encountered at a depth of 14 feet below ground surface (bgs). This stratum consists of medium-stiff light brown clay and silt, trace fine sand. The SPT N-value for this stratum was 9 blows per foot (bpf).

Groundwater Conditions

Groundwater was encountered in all test borings at a depth of 7 ft below the ground surface.

Note that groundwater levels can fluctuate with locations, seasonal changes, precipitation, nearby construction activities, leakage into and out of utilities, and other factors.

7. DESIGN RECOMMENDATIONS

The following recommendations are based upon our review and interpretation of the geotechnical conditions below the site:

Foundations

Test boring data revealed that the subsurface conditions are favorable for support of the proposed construction. Based on engineering analysis of the test boring logs, the proposed building may be supported on shallow footings provided that the site preparation listed above is completed prior to foundations and slab installation.

Conventional spread and strip footings may be designed for a maximum net allowable soil bearing pressure of 3,000 psf (1.5 tsf). Footings may be supported on Stratum S or compacted structural fill. Loose soil is not considered suitable for foundation support and if encountered, should be excavated and replaced with structural fill. See the Structural Fill section of this report for further details.

Footings may be stepped up or down at 2H:1V to achieve any necessary grade changes. Actual footing grades should be evaluated in the field based on observation and probing by the Geotechnical Engineer.

Wall and column footing widths should not be less than 1.5 and 3.0 feet, respectively, or less than applicable code requirements, whichever is greater. Exterior footings should be founded at a minimum depth of 3.0 feet beneath the outside finished grades for frost protection. All footing subgrades should be compacted using a "Jumping Jack" or similar compactor upon completion of footing excavation.

To confirm the design allowable soil bearing pressure, a qualified geotechnical engineer prior to the placement of concrete must inspect the footing subgrade. The contractor should exercise extreme caution not to disturb the subgrade soils. Should the footing subgrade be disturbed, the loosened soil should be compacted in-place. Backfilling against footings and under floor slabs should be accomplished using structural fill placed and compacted under engineering inspection. Any water that accumulates in the bottom of the excavation should be removed within 24 hours.

Settlement

It is estimated that maximum post-construction footing settlement of the proposed building will be less than 1 inch and the differential settlement between adjacent columns will be less than ¾ inch. This value is generally within tolerable limits for this type of structure.

Protection of Subsurface Utilities

We recommend that the shallow foundations be established in a zone bounded by a plane that extends outward and upward at a one (1) horizontal to one (1) vertical slope from the bottom of any proposed or existing adjacent utilities.

Slab-at-Grade

The existing soft and loose surface soil is not suitable for the support of the slab-at-grade without prior site preparation. It is recomended that the upper root mat and one foot of existing soil be excavated from within the proposed building extending three (3) feet from all directions. The exposed subgrade shall be proofrolled and compacted with a vibratory roller in the static mode. Any week or soft zone encountered during proofrolling and compaction shall be excavated and replaced with controlled structural fill. After proper site preparation , the site subgrade shall be raised to proposed grades utilizing structural fill.

The slab-at-grade shall be designed utilizing a 125 pounds per cubic inch modulus of subgrade reaction. Proposed mesh reinforced concrete floor slabs can be uniformly supported on-grade and simply supported at the wall to allow unrestricted rotation or vertical movement of slab edges. Saw joints or construction joints should isolate each bay to control shrinkage cracks. A minimum of six inches of ¾-inch clean, crushed stone or a 12-inch thick layer (minimum) of well-graded sand and gravel with no more than 12% non-

plastic fines, is recommended below the slab to assure uniform curing conditions. A 6-mil PVC vapor retarder may be placed between the slab and base course, as directed by the Architect, to minimize moisture migration to the surface. All structural fill supporting the floor slab should be compacted to 95% of the maximum dry density (ASTM D 1557).

Groundwater

Foundations design shall consider a minimum depth to groundwater of 2 feet to account for seasonal variations.

Lateral Earth Pressures

Lateral earth pressures acting on exterior walls that are restrained from lateral movement should be designed considering the following:

- Compute lateral earth pressures using a total unit weight for soils of 110 pounds per cubic foot and an internal friction angle of 30 degrees. Foundation elements restrained from movement should be designed considering at-rest earth pressures. Consider the buoyant unit weight for zones below the groundwater table.
- Surcharge loads from streets, construction equipment, and nearby structures should be added to the lateral earth pressures. We recommend using a coefficient of 0.50 times the vertical surcharge loads to determine the horizontal surcharge load.

Lateral Resistance

Lateral loads on shallow foundations will be resisted by passive pressures on the vertical sides of the foundations, and by frictional sliding resistance on the bases of foundations:

- *Passive Resistance to Lateral Loads*
  - Compute ultimate passive resistance using a total unit weight for soils of 110 pounds per cubic foot and an internal friction angle of 30 degrees. Consider the buoyant unit weight for zones below the groundwater table.
  - Use a factor of safety of 1.5 on the passive ultimate resistance when working loads are used.
  - Spacing between adjacent footings needs to be considered to verify that a full passive “wedge” can be developed.

- *Frictional Resistance to Lateral Loads:*
  - Compute ultimate frictional resistance using a coefficient of friction of 0.35 on the horizontal base of foundations.

Seismic Design

Based on the subsurface conditions encountered at the site and considering the foundation level will be within Stratum S, the seismic design shall consider Site Class D. The following represents the seismic design parameters (See also Appendix B):

Seismic Site Class: D
Site Coefficient F_a: 1.6
Site Coefficient F_v: 2.4

Spectral Response Accelerations:
S_{MS} (g): 0.247
S_{M1} (g): 0.127

Design Spectral Accelerations:
SDS (g): 0.164
SD1 (g): 0.085

Based on the nature of the site soils encountered within the test boring, the site soils are not susceptible to liquefaction.

8. CONSTRUCTION CONSIDERATIONS

Excavation

We anticipate excavations for the proposed foundations to extend to relatively shallow depths not exceeding 5 ft. below grade. The subsurface conditions encountered within the test borings suggest conventional dozers and excavators appear practical to remove these materials.

Excavation Support

All construction excavations should be sloped and/or shored in accordance with OSHA excavation regulations or stricter local governing safety codes.

All excavation support systems, and earth slopes must be designed by a qualified engineer, licensed in the State of New Jersey. Lateral pressures presented earlier in this report shall be employed in the design of such systems. Appropriate live loads, building loads, and surcharges for sidewalk, vehicular and construction loads shall also be considered in the design.

Structural Fill/Backfill

All fill/backfill proposed to support the building and site features that will be adversely affected by settlement is considered structural fill. Materials used as structural fill should consist of visually stable, inorganic, readily compactable materials that are free of trash, debris, organic inclusions, frozen material, or excess moisture. On-site materials with an organic content of less than 5 percent may be included in structural fill, provided they are well blended with other inorganic fill materials.

The existing on-site materials may be re-used as structural fill provided they are sufficiently dry, and any organic and other deleterious material, as well as fragments larger than four (4) inches, are removed. If additional materials are required to establish the proposed site grades, we recommend using imported fill consisting of granular soils with no more than 10 percent fines.

Structural fill should be placed in essentially horizontal lifts with a maximum loose thickness of eight (8) inches. The optimum loose lift thickness of the structural fill material shall be established by the contractor in the field via an earthwork test pad. In addition to meeting the compaction criteria, the compacted material shall maintain visual stability beneath the compaction equipment and be observed and documented by the Geotechnical Engineer.

Each lift should be compacted to at least 95 percent of the maximum dry density for building or floor slab support, and 92 percent of the maximum dry density for pavement construction and utility trench backfill, as determined by the modified Proctor test (ASTM D 1557). Compaction should be achieved using as large a vibratory compactor as practical. Moisture contents shall be maintained within 2 to 3 percent of the optimum moisture content during compaction procedures.

Asphalt millings may be utilized as load-bearing fill outside the building footprint, plus a 5-foot perimeter zone, provided they are blended to conform to a dense-graded aggregate (DGA). In addition, asphalt millings should be restricted to less than 12 inches in total thickness throughout the fill profile.

Construction Dewatering

Groundwater levels encountered during construction may vary somewhat from those levels shown on the boring logs due to seasonal variations or climatic conditions. In the worst case scenario, for bidding purposes only, the contractor should assume a groundwater elevation at the ground surface. A dewatering plan should be submitted for approval prior to construction.

The dewatering specifications should be of the performance type requiring that the successful contractor provide an adequate dewatering system capable of maintaining the water table a minimum of 600mm (2 feet) below the prevailing excavation bottom during the construction of the foundations as well as during backfilling operations.

Subgrade Preparation

Subsurface Utilities

The natural soils and new structural fill materials are suitable for support of subsurface utilities. However, should cobbles, boulders, loose and/or unstable soils be encountered at the utility invert levels, the subgrade should be over-excavated a minimum depth of 6 inches and backfilled with granular material, such as AASHTO No. 57 aggregate, to provide uniform support. Utility excavations should be backfilled using structural fill in accordance with the "Structural Fill" section of this report.

Other Subgrade Considerations

Any possible fill or natural subgrade soils that are determined to be soft, loose, wet, or otherwise unstable should be selectively excavated and replaced with structural fill, placed and compacted in accordance with the recommendations mentioned above.

Unless foundation construction proceeds within 24 hours of foundation subgrade preparation, including approval by the geotechnical engineer, subgrades should be protected from the elements to reduce exposure and potential weakening of the subgrade materials, particularly if precipitation or freezing temperatures are expected prior to foundation construction. Preventative measures such as placing a minimum 4-inch thick lean concrete "mud mat" on the subgrade, or providing suitable cover for the excavations may be considered appropriate, depending on the prevailing weather conditions. Foundation excavations should be protected from frost and water infiltration until the foundations have been constructed and backfilled.

Site Drainage and Surface Water Control

Adequate temporary and permanent control of surface water runoff and subsurface seepage will be required to maintain stable conditions during construction. Excavation, filling, and subgrade preparation should be performed in a manner and sequence that will provide positive drainage at all times, as well as proper control of erosion.

Exposed surfaces should be graded to drain or otherwise protected from water infiltration before and during construction of the building pad and pavements. These measures may include seal-rolling the exposed subgrade surfaces and creating temporary areas to collect

stormwater. Exposed soil surfaces will also have to be repaired after rain events (i.e. removal of the wet material) or permitted to dry sufficiently prior to resuming construction activities. Standing surface water should be pumped or drained to provide a suitable working platform. Any water accumulating in an open excavation should be removed within 24 hours.

The foundation subgrade should be visually inspected by a qualified Geotechnical Engineer and approved prior to foundation placement.

Existing Utilities

Underground utilities that are to be reused should be evaluated by the Civil Engineer, and utility trench backfill should be evaluated by the geotechnical engineer, to determine their suitability for support of the planned construction. If any existing utilities are to be preserved, grading operations must be carefully performed so as not to disturb or damage the existing utility.

9. CLOSING

The conclusions and recommendations presented in this report are based, on available test boring information obtained during this investigation. It is recommended that we be provided the opportunity for general review of the project plans and specifications when they become available, to confirm that the recommendations and design considerations presented in this report have been properly interpreted and implemented into the project design package.

This report serves as a guidance document for the entity it is addressed to. As such, we emphasize that this report and/or the included recommendations should not be made available in the bid documents to prospective bidders, in lieu of or as part of the project specification. We do, however, recommend that the test boring logs be made a part of the specifications for the project along with a reference to the plan sheets that contain the test boring locations for informational purposes. Should the data not be adequate for the Contractor's purposes, the Contractor may make, prior to bidding, his own explorations, tests, and analyses.

10. LIMITATIONS

This geotechnical study has been performed in accordance with generally accepted engineering practice and any applicable design standards as referenced herein. This report and all supporting documentation have been prepared exclusively for the use of **Ronald A. Sebring Associates, LLC** pursuant to the Agreement between Maser Consulting P.A. and **Ronald A. Sebring Associates, LLC**. All provisions set forth in the Agreement and the

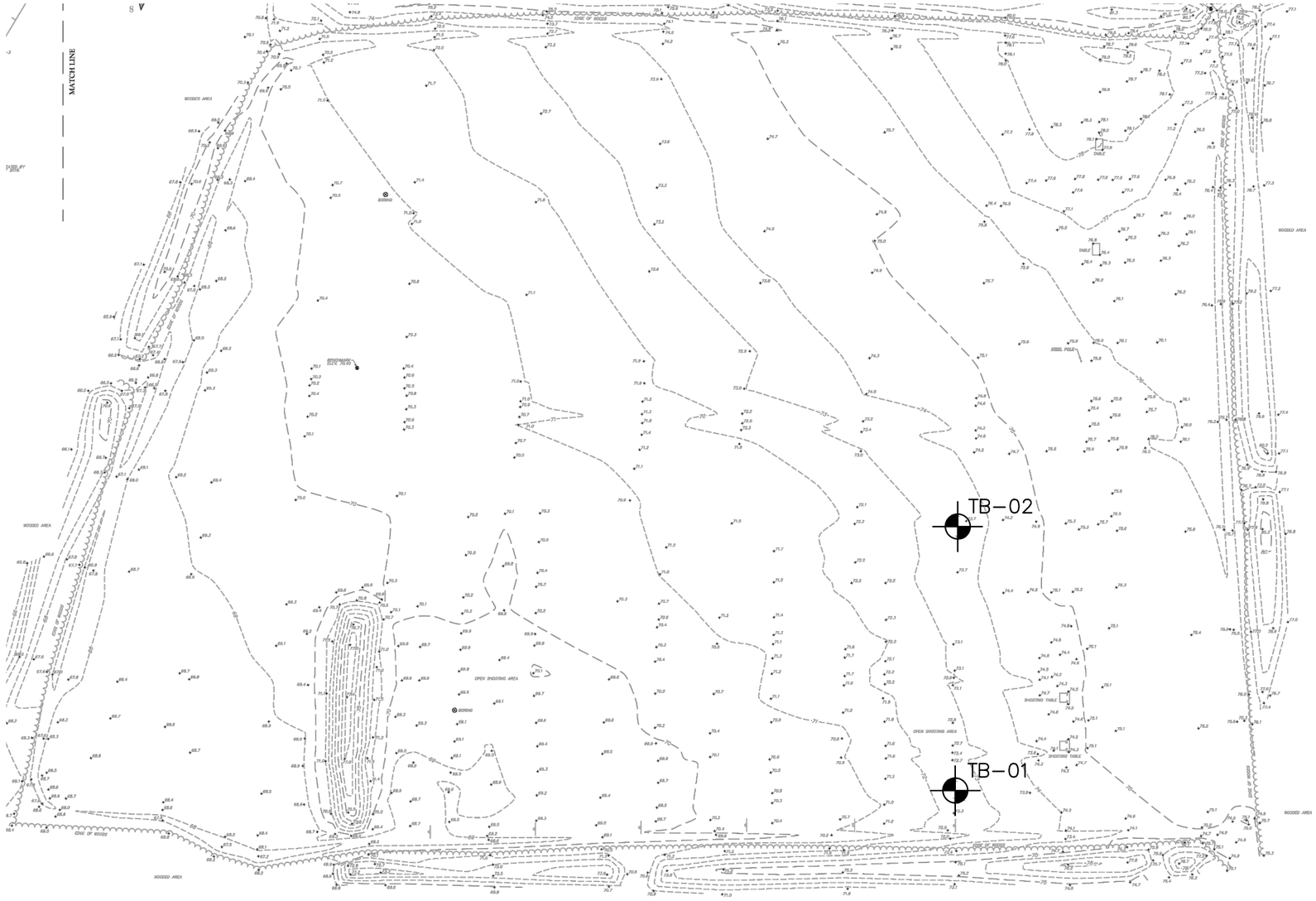
General Terms and Conditions attached thereto are incorporated herein by reference. No warranty, express or implied, is made herein.

The findings, conclusions, and recommendations contained in this report are based on data revealed by limited exploration of the subsurface reportedly performed at the site by Maser Consulting P.A. The explorations indicate subsurface conditions at the specific locations, depths, and times explored. Should deviations from the described subsurface conditions be encountered at any time prior to or during construction, Maser Consulting should be notified to determine whether the findings necessitate modification of our recommendations.

This report is applicable only to the contemplated site design described herein; any changes in the design should be brought to our attention so that we may evaluate whether our recommendations will be affected. Maser Consulting is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or reuse of the subsurface data or engineering analysis without the expressed written authorization of Maser Consulting. As such, the conclusions and recommendations contained in this report are pending our review of final plans and specifications, and verification of subsurface conditions by direct observation at the time of construction.

This report and supporting documentation are instruments of service. The subject matter of this report is limited to the facts and matters stated herein.

The scope of this geotechnical study did not include investigation or evaluation of any environmental issues, such as wetlands, or hazardous or toxic materials on, below, or in the vicinity of the subject site. Any statements in this report or supporting documentation regarding odors or unusual or suspicious items or conditions observed are strictly for the information of our Client.



GENERAL NOTES

1. SURVEY BASED ON DRAWING "Stafford Forge Wildlife Management Area Partial Topographic Survey" BY MASER CONSULTING, P.A. DATED APRIL, 2018.
2. THIS DRAWING IS PART OF MASER CONSULTING'S REPORT (PROJECT NO. 17006864A) DATED APRIL 2018 AND SHOULD ONLY BE USED IN CONJUNCTION WITH THE REPORT.
3. SOIL EXPLORATION LOCATIONS ARE APPROXIMATE BASED UPON EXISTING SITE FEATURES AND BASE MAP INFORMATION AVAILABLE AT THE TIME OF OUR FIELD EXPLORATION.
4. TEST BORINGS PERFORMED BY ALLIED WELL DRILLING ON MARCH 27, 2018 UNDER CONTINUOUS OBSERVATION OF MASER CONSULTING.

60 48 36 24 12 0 30 60 120

SCALE : 1" = 60'

LEGEND

TB-0X TEST BORING

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EXPLORATION LOCATION PLAN
FOR
STAFFORD FORGE WMA PROPOSED COVERED SHOOTING RANGE
TOWNSHIP OF STAFFORD
OCEAN COUNTY,
NEW JERSEY

MONTVALE OFFICE
50 Chestnut Ridge Road
Suite 101
Montvale, NJ 07645
Phone: 845.352.0411
Fax: 845.352.2611

SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	04/17/2018	P.A.	A.E.

PROJECT NUMBER:	DRAWING NAME:
17006864A	17006864A - ELP

SHEET TITLE:
EXPLORATION LOCATION PLAN

SHEET NUMBER:
FIGURE NO. 1

APPENDIX A

TEST BORING LOGS

VISUAL IDENTIFICATION OF SAMPLES

(Burmister Soil Classification System)

I. Definition of Soil Components and Fractions

Material	Symbol	Fraction	Sieve Size	Definition
Boulders	Bldr	-----	9" +	Material retained on 9" sieve.
Cobbles	Cbl	----	3" to 9"	Material passing the 9" sieve and retained on the 3" sieve.
Gravel	G	coarse (c) medium (m) fine (f)	1" to 3" 3/8" to 1" No. 10 to 3/8"	Material passing the 3" sieve and retained on the No. 10 sieve.
Sand	S	coarse (c) medium (m) fine (f)	No. 30 to No. 10 No. 60 to No. 30 No. 200 to No. 60	Material passing the No. 10 sieve and retained on the No. 200 sieve.
Silt	$	---	Passing No. 200 (0.075 mm)	Material passing the No. 200 sieve that is non-plastic in character and exhibits little or no strength when air dried.
Clayey SILT	Cy$	Slight (SL)	1 to 5	Clay - Soil
SILT & CLAY	$ & C	Low (L)	5 to 10	Material passing the No. 200 which can be made to exhibit plasticity and clay qualities within a certain range of moisture content, and which exhibits considerable strength when air-dried.
CLAY & SILT	C & $	Medium (M)	10 to 20	
Silty CLAY	$yC	High (H)	20 to 40	
CLAY	C	Very High (VH)	40 Plus	
Organic Silt	(O$)			Material passing the No. 200 sieve which exhibits plastic properties within a certain range of moisture content, and exhibits fine granular and organic characteristics.

II. Definition of Component Proportions

Component	Written	Proportions	Symbol	Percentage Range by Weight*
Principal	CAPITALS	---		50 or more
Minor	Lower Case	and	a.	35 to 50
		some	s.	20 to 35
		little	l.	10 to 20
		trace	t.	1 to 10

* Minus sign (-) lower limit, plus sign (+) upper limit, no sign middle range.

MASER CONSULTING P.A.
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Planners ▪ Surveyors ▪ Landscape Architects

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Montvale, N.J. 07645
Phone (732) 383-1950
Fax (732) 383-1990

PROJECT: WMA Shooting Range
Millville WMA Shooting Range
Commercial, NJ.
PROJECT NO.: 17006864A

BORING NO.: TB-01
PAGE: 1 OF 1
LOCATION: See Location Plan
OFFSET:

CONTRACTOR: Allied Well Drilling
DRILLER: Lou Davis
DRILLING EQUIPMENT: 77DT Geoprobe
METHOD: HSA x Mud Rotary ____ Other ____
HAMMER: CH ____ Safety ____ Automatic x
Weight 140 lb Drop 30 in
RODS: AW x NW ____ Other ____

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	8'	3/26/18
End of Drilling (0 hrs.) ▼	8'	3/26/18
After Drilling (>24 hrs.) ◭		

DATE STARTED: 3/26/18
DATE FINISHED: 3/26/18

GROUND ELEV.: 60 +/-
GROUND WATER ELEV.: 52 +/-

DEPTH BELOW SURFACE (ft)	SAMPLE NUMBER / DEPTH (ft)	BLOWS PER 6 INCHES 0-6"	6-12"	12-18"	18-24"	RECOVERY (in)	POCKET PENETR-OMETER (tsf)	PROFILE CHANGE DEPTH / ELEV.	IDENTIFICATION OF SOILS / REMARKS
0	S-1	4	4	6	11	*			S-1: Yellow-Brown cmf SAND, some mf(+) Gravel, little Clayey Silt. (Moist).
	0'-2'								
	S-2	8	12	13	16	*			S-2: Yellow-Brown mf SAND, some(-) Clayey Silt, little f Gravel. (Moist).
	2'-4'								
	S-3	7	9	11	13	*			S-3: Yellow cmf(-) SAND, little(+) Clayey Silt, little(-) mf Gravel. (Moist).
	4'-6'								
	S-4	11	12	10	12	*			S-4: Yellow cmf SAND, little Silt. (Moist).
	6'-8'							▼	* Started adding water into augers to maintain a hydrostatic head on top of heaving soils.
	S-5	3	6	4	5	*			S-5: Yellow cmf SAND, trace Silt. (Wet).
	8'-10'								
10									
								S	
	S-6	4	7	6	12	*			S-6: Yellow cmf(+) SAND, little(+) Silt. (Wet).
	13'-15'								
	S-7	4	5	9	12	14			S-7: Yellow mf(+) SAND, little(+) Silt. (Wet).
	18'-20'								
20									
	S-8	20	19	22	23	14			S-8: Yellow c(-)mf SAND, little Silt. (Wet).
	23'-25'								
									END OF BORING AT 25.0 FEET.
30									
40									

NOTES:

VISUAL IDENTIFICATION OF SOILS (BURMISTER CLASSIFICATION SYSTEM)

Component	Proportions	% Range (by weight)
PRINCIPAL	---	50 or more
Minor	and	35 to 50
	some	20 to 35
	little	10 to 20
	trace	1 to 10

Clayey Soils	
Clayey SILT	slight Pl.
SILT & CLAY	low Pl.
CLAY & SILT	medium Pl.
Silty CLAY	high Pl.
CLAY	very high Pl.

TERMINOLOGY for STRATIFIED SOILS

Term	Definition
parting	0 to 1/16" thickness
seam	1/16" to 1/2" thickness
layer	1/2" to 12" thickness
occasional	one or less per foot of thickness
frequent	more than one per foot of thickness

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PROJECT: WMA Shooting Range
Millville WMA Shooting Range
Commercial, NJ.
PROJECT NO. 17006864A

BORING NO. TB-02
PAGE 1 OF 1
LOCATION See Location Plan
OFFSET

CONTRACTOR: Allied Well Drilling
DRILLER: Lou Davis
DRILLING EQUIPMENT: 77DT Geoprobe
METHOD: HSA x Mud Rotary ____ Other ____
HAMMER: CH ____ Safety ____ Automatic x
Weight 140 lb Drop 30 in
RODS: AW x NW ____ Other ____

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	4'	3/26/18
End of Drilling (0 hrs.) ▼	4'	3/26/18
After Drilling (>24 hrs.) ◭		

DATE STARTED 3/26/18
DATE FINISHED 3/26/18

GROUND ELEV. 60 +/-
GROUND WATER ELEV. 56 +/-

DEPTH BELOW SURFACE (ft)	SAMPLE NUMBER / DEPTH (ft)	BLOWS PER 6 INCHES 0-6"	6-12"	12-18"	18-24"	RECOVERY (in)	POCKET PENETR-OMETER (tsf)	PROFILE CHANGE DEPTH / ELEV.	IDENTIFICATION OF SOILS / REMARKS
0	S-1	3	3	2	3	16			S-1: Top 8": Brown cmf SAND, little Clayey Silt, mf Gravel. (Moist). Bot 8": Lt. Brown mf SAND, some Clayey Silt, little mf Gravel. (Moist).
	0'-2'								
	S-2	4	6	13	14	18			S-2: Top 6": Same as S-1 bottom. Bot 12": Yellow-Brown cmf Sand, and cmf Gravel, little Silt. (Moist).
	2'-4'							▼	
	S-3	6	7	8	9	10			S-3: Yellow cmf SAND, trace Silt. (Wet). * Started adding water into augers to maintain a hydrostatic head on top of heaving soils.
	4'-6'								
	S-4	8	8	11	11	20		S	S-4: Yellow cmf SAND, little Silt. (Wet).
	6'-8'								
	S-5	12	10	15	10	24			S-5: Yellow cmf SAND, trace(+) Silt. (Wet).
	8'-10'								
10									* Excessive soils heaved up the augers. Boring terminated at 13 feet after attempting to clean auger with a spoon and water addition.
									END OF BORING AT 13.0 FEET.
20									
30									
40									

NOTES:

VISUAL IDENTIFICATION OF SOILS (BURMISTER CLASSIFICATION SYSTEM)

Component	Proportions	% Range (by weight)
PRINCIPAL	---	50 or more
Minor	and	35 to 50
	some	20 to 35
	little	10 to 20
	trace	1 to 10

Clayey Soils	
Clayey SILT	slight Pl.
SILT & CLAY	low Pl.
CLAY & SILT	medium Pl.
Silty CLAY	high Pl.
CLAY	very high Pl.

TERMINOLOGY for STRATIFIED SOILS

Term	Definition
parting	0 to 1/16" thickness
seam	1/16" to 1/2" thickness
layer	1/2" to 12" thickness
occasional	one or less per foot of thickness
frequent	more than one per foot of thickness

APPENDIX B

USGS SEISMIC DESIGN REPORT

USGS Design Maps Detailed Report

ASCE 7-10 Standard (39.32272°N, 75.05708°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1]	S_S = 0.138 g
From Figure 22-2 [2]	S_1 = 0.051 g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index *PI* > 20, • Moisture content *w* ≥ 40%, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk–Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4–1: Site Coefficient F_a

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = D and S_s = 0.138 g, F_a = 1.600

Table 11.4–2: Site Coefficient F_v

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at 1–s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.051 g, F_v = 2.400

Equation (11.4–1): $S_{MS} = F_a S_S = 1.600 \times 0.138 = 0.222$ g

Equation (11.4–2): $S_{M1} = F_v S_1 = 2.400 \times 0.051 = 0.122$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

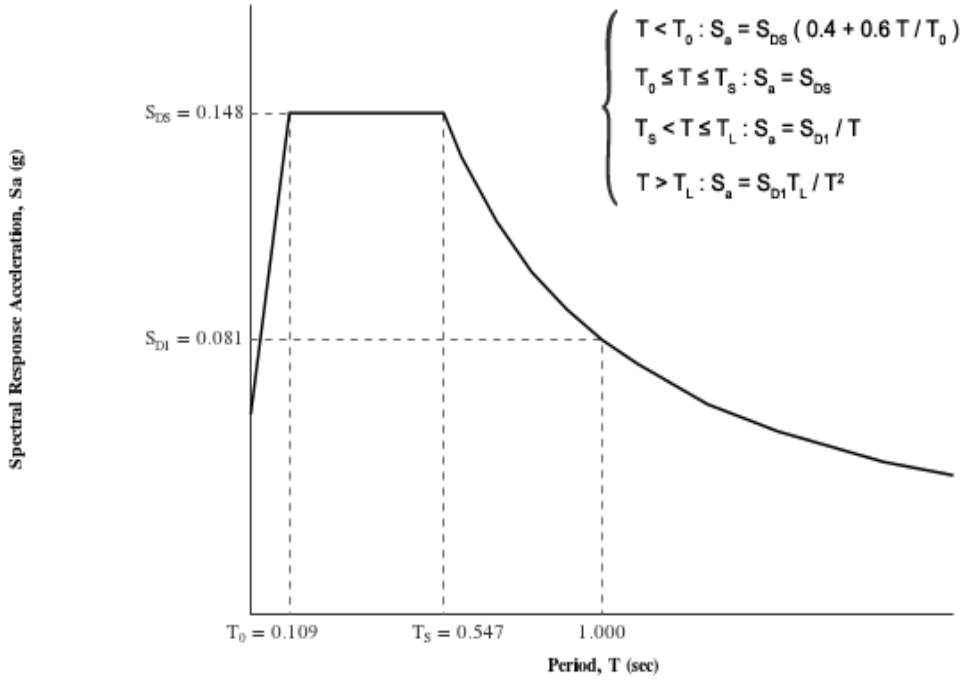
Equation (11.4–3): $S_{DS} = ⅔ S_{MS} = ⅔ \times 0.222 = 0.148$ g

Equation (11.4–4): $S_{D1} = ⅔ S_{M1} = ⅔ \times 0.122 = 0.081$ g

Section 11.4.5 — Design Response Spectrum

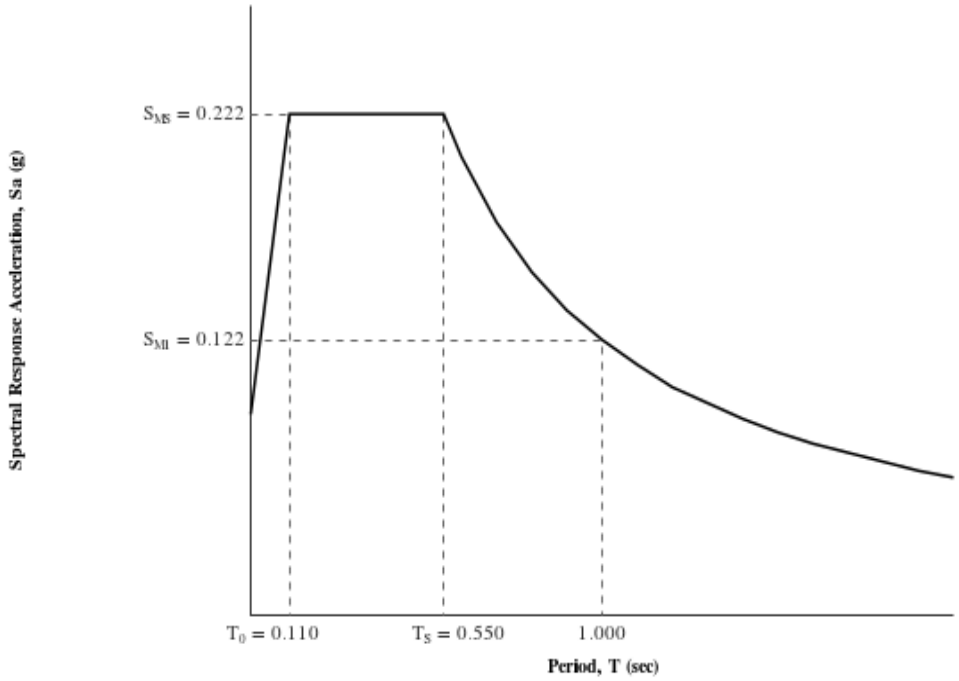
From Figure 22-12 [3] $T_L = 6$ seconds

Figure 11.4–1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4] PGA = 0.069

Equation (11.8–1): $PGA_M = F_{PGA}PGA = 1.600 \times 0.069 = 0.111$ g

Table 11.8–1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.069 g, F_{PGA} = 1.600

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5] C_{RS} = 0.890

From Figure 22-18 [6] C_{R1} = 0.905

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 0.148 g, Seismic Design Category = A

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.081 g, Seismic Design Category = B

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = B

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 22-1*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

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July 31, 2018

VIA EMAIL & U.S. MAIL

David Clark, R.A.,Vice President
Ronald A. Sebring Associates, LLC
Architecture - Planning - Design
405 Richmond Avenue
Point Pleasant Beach, NJ 08742

Re: Addendum to Geotechnical Exploration Report dated May 8, 2018
Proposed Covered Shooting Ranges
Stafford Forge WMA Shooting Range
Township of Little Egg Harbor, Ocean County, NJ
MC Project No. 17006864A

Dear Mr. Clark:

At your request, we are issuing this Addendum to allow the use of round foundations to support the proposed columns with reference to the above project.

Foundations

Test boring data revealed that the subsurface conditions are favorable for support of the proposed construction. Based on engineering analysis of the test boring logs and laboratory test results, the proposed building may be supported on shallow footings provided that the site preparation, per our report dated May 8, 2018, is completed prior to foundations and slab installation.

Conventional spread, strip or round footings may be designed for a maximum net allowable soil bearing pressure of 3,000 psf. (1.5 tsf.). Footings may be supported on Stratum S or compacted structural fill. Loose soil is not considered suitable for foundation support and if encountered, should be excavated and replaced with structural fill. See the Structural Fill section of our report dated May 8, 2018 for further details.

Column footing widths or diameter should not be less than 30 inches, or less than applicable code requirements, whichever is greater. Exterior footings should be founded at a minimum depth of 3.0 feet beneath the outside finished grades for frost protection.

To confirm the design allowable soil bearing pressure, a qualified geotechnical engineer prior to the placement of concrete must inspect the footing subgrade. The contractor should exercise extreme caution not to disturb the subgrade soils. Should the footing subgrade be disturbed, the loosened soil should be compacted in-place. Backfilling against footings and under floor slabs

should be accomplished using structural fill placed and compacted under engineering inspection. Any water that accumulates in the bottom of the excavation should be removed within 24 hours.

Should you have any questions or require any additional information, please do not hesitate to contact me directly.

Very truly yours,

MASER CONSULTING P. A.

Moustafa A. Gouda, P.E., D.GE, F.ASCE
Senior Principal
Professional Engineer
NJ License No. 20848

MAG/sab

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