

MANDATORY PRE-BID MEETING

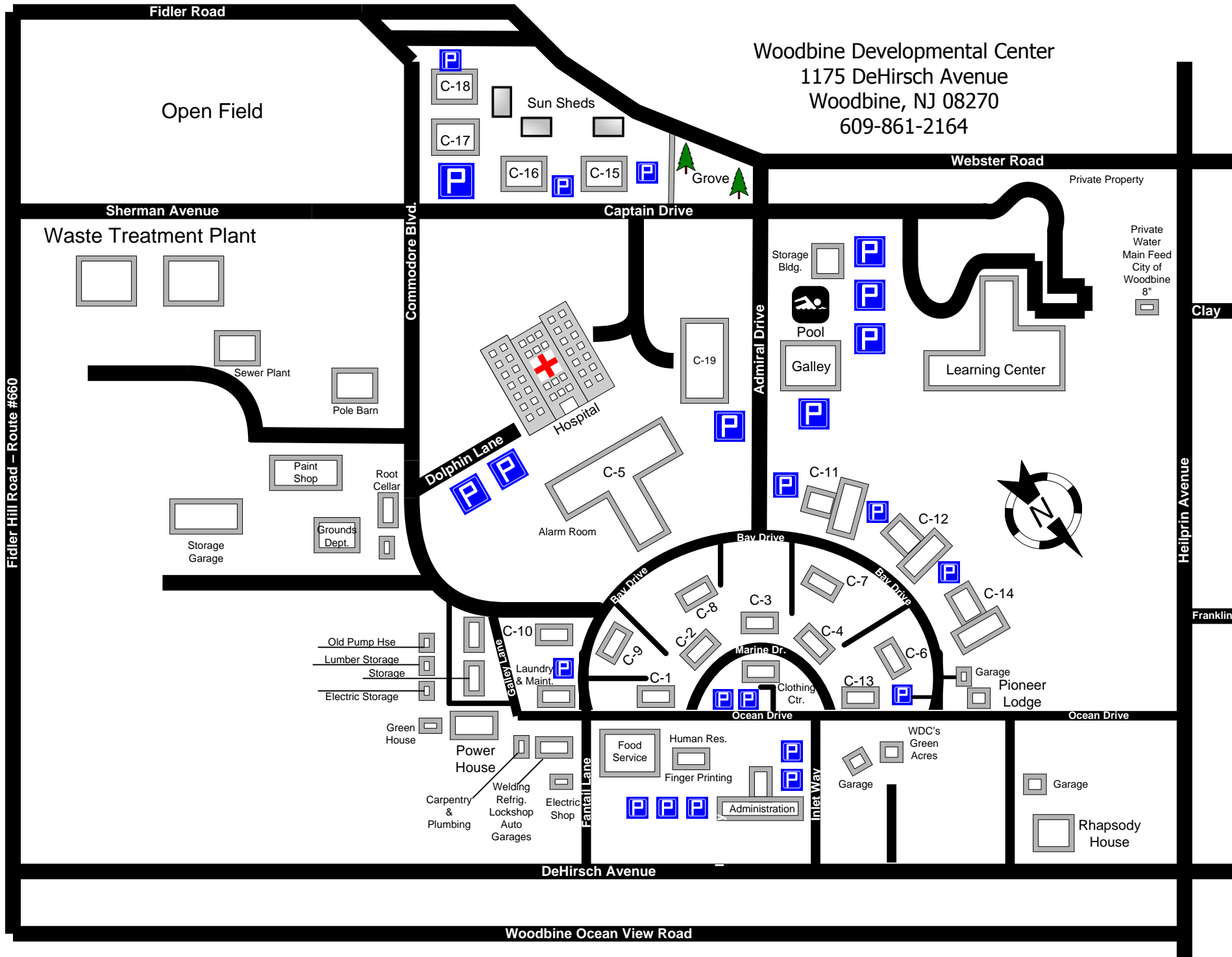
PROJECT #	M1514-00 Re-Bid
LOCATION	Woodbine Developmental Center – Woodbine, NJ 1175 DeHirsch Avenue, Woodbine, Cape May County, NJ 08270
DATE	October 26, 2021
TIME	11:00 am
CONTACT PERSON	Richard Herrero
PHONE #	Office #: 609-292-6558 Cell #: 609-468-5906
MEETING	<u>Maintenance Building - Woodbine Developmental Center – 1175 DeHirsch Avenue, Woodbine, Cape May County, NJ 08270</u> **Contractors are to report to the maintenance building and will be screened (temperature check & answering of several COVID-19 questions). <u>Contractors are to enter the grounds of the facility via the entrance off of DeHirsch Avenue onto Fantail Lane. GPS Coordinates: 39.23377, -74.80447.</u> All attendees must wear face mask coverings.**

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

MUST ATTEND TO HAVE VALID BID

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

Woodbine Developmental Center
1175 DeHirsch Avenue
Woodbine, NJ 08270
609-861-2164



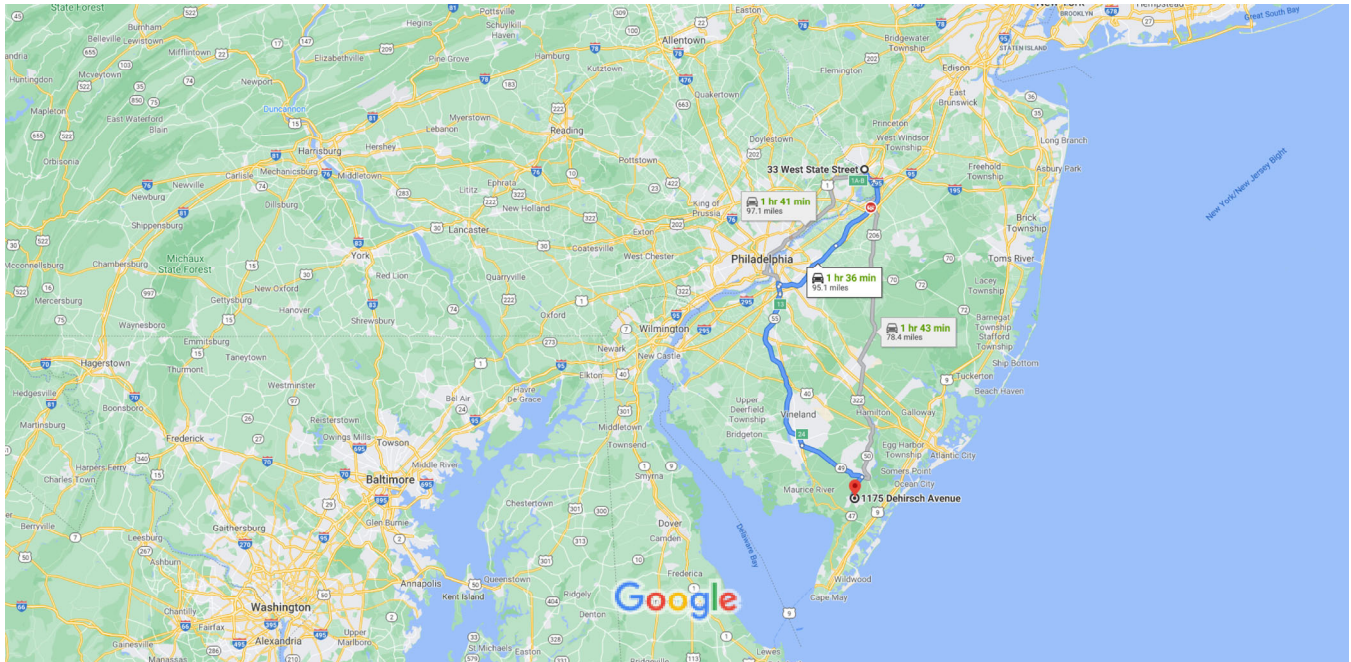
Fidler Hill Road - Route #660

Clay

Franklin



33 West State Street, Trenton, NJ to Drive 95.1 miles, 1 hr 36 min
1175 Dehirsch Ave, Woodbine, NJ 08270



Map data ©2021 Google 10 mi

33 W State St


Trenton, NJ 08608


Get on NJ-29 S


- 3 min (0.8 mi)
- ↑ 1. Head west on W State St toward Barrack St
262 ft
- ↶ 2. Turn left onto Barrack St
0.2 mi
- ↶ 3. Turn left onto Memorial Dr
0.1 mi
- ↗ 4. Turn right onto the ramp to NJ-29 S
0.1 mi
- ↗ 5. Take the ramp onto NJ-29 S
0.4 mi


Follow I-295 S and NJ-55 S to NJ-49 E/E Main St in Millville. Take exit 24 from NJ-55 S


- 1 hr 9 min (74.6 mi)
- ↗ 6. Merge onto NJ-29 S
3.0 mi


-  7. Use the right 2 lanes to take exit 1A-B to merge onto I-295 S


17.6 mi
-  8. Keep left to stay on I-295 S

15.6 mi
-  9. Use the right 2 lanes to take the I-295/NJ-42 S exit toward Del Mem Br/Atlantic City

1.1 mi
-  10. Keep left at the fork, follow signs for NJ-42 S and merge onto NJ-42 S



1.4 mi
-  11. Use the right 2 lanes to take exit 13 for NJ-55 S toward Glassboro/Vineland



0.3 mi
-  12. Continue onto NJ-55 S


35.4 mi
-  13. Use the 2nd from the right lane to take exit 24 for NJ-49 E toward Tuckahoe


0.2 mi


Follow NJ-49 E and Woodbine Rd to your destination in Woodbine



-
- 24 min (19.7 mi)
-  14. Turn left onto NJ-49 E/E Main St
 [Continue to follow NJ-49 E](#)

14.5 mi
 -  15. Turn right onto Cape May 617/Woodbine Rd
 [Continue to follow Woodbine Rd](#)

3.6 mi
 -  16. Continue onto Washington Ave

0.8 mi
 -  17. Turn left onto Dehirsch Ave

0.7 mi
 -  18. Turn right onto Inlet Way

174 ft
 -  19. Turn left
 [Destination will be on the left](#)

148 ft

1175 Dehirsch Ave

Woodbine, NJ 08270

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

SPECIFICATIONS

POWERHOUSE STACK REPLACEMENT
WOODBINE DEVELOPMENTAL CENTER
WOODBINE, CAPE MAY COUNTY, N.J.

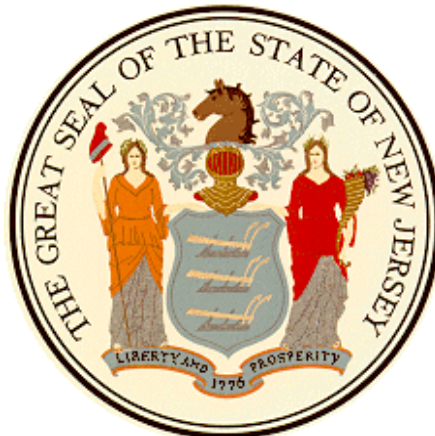
M1514-00

STATE OF NEW JERSEY

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

DEPARTMENT OF THE TREASURY

Elizabeth Maher Muoio, State Treasurer



DIVISION OF PROPERTY MANAGEMENT AND CONSTRUCTION
Christopher Chianese, Director

DEPARTMENT OF HUMAN SERVICES
Sarah Adelman, Acting Commissioner

BID DOCUMENTS

M

M

**MOTT
MACDONALD**

Date: January 22, 2021

**WOODBINE DEVELOPMENTAL CENTER
POWERHOUSE STACK REPLACEMENT**
Woodbine, Cape May County, N.J.
DPMC Project Number M1514-00

Robert Kevin Fritz
Registered Architect; NJ #11686

Michael LaPilusa
Professional Engineer; Lic. No. NJ
#24GE04474900

Miguel A. Nieto
Professional Engineer; Lic. No. NJ
#24GE04136400

Igor Bondar
Professional Engineer; Lic. No. NJ
#24GE05050300



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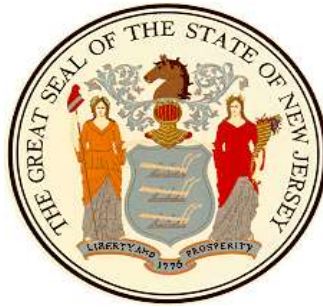
EXHIBIT ITEMS

EXHIBIT A CONTRACTOR USE OF THE PREMISES – WOODBINE DEVELOPMENTAL CENTER

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



REVISED
DECEMBER 2015

INSTRUCTIONS TO BIDDERS
AND
GENERAL CONDITIONS

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INSTRUCTIONS TO BIDDERS

IB 1 Bid Proposals

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

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

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

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

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

DPMC BID DOCUMENTS FEE SCHEDULE (PER PACKAGE):

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

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

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

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

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

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

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

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

IB 1.11 Procurement Reform

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

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

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

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

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

IB 2 Bid Modification

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

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

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

IB 3 Consideration of Bids

IB 3.1 Award of Contracts or Rejection of Bids:

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

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

IB 4 Awards

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

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

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

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

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

IB 5 Qualification of Bidders

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

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

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

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

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

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

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

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

IB 6 Deposit and Bid Bond

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

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

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

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

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

IB 7 Performance and Payment Bond

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

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

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

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

IB 8 Bulletins and Interpretations

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

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

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

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

IB 9 Assignments

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

IB 10 Federal Excise Taxes and State Sales Tax

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

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

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

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

IB 11 Restrictive Specifications

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

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

IB 12 Offer of Gratuities

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

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

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

END OF INSTRUCTIONS TO BIDDERS

GENERAL CONDITIONS

ARTICLE 1 - GENERAL PROVISIONS

1.1 DEFINITIONS:

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

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

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

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

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

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

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

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

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

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

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

1.1.12 Day: A calendar day, unless otherwise designated.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.2 CONTRACT DOCUMENTS TO BE PROVIDED BY DPMC

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

1.3 INTENT OF THE CONTRACT

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

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

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

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

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

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

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

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

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

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

1.4 WORKDAYS

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

1.5 ASSIGNMENTS

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

1.6 STATE SALES TAX

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

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

ARTICLE 2 - OWNER/DPMC

2.1 DPMC'S REPRESENTATION

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

2.2 RIGHT TO PERFORM WORK

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

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

2.3 MEANS AND METHODS

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

ARTICLE 3 - ARCHITECT/ENGINEER

3.1 DUTIES AND RESPONSIBILITIES

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

3.2 PROGRESS MEETINGS

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

3.3 SITE OBSERVATIONS

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

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

3.4 SHOP DRAWINGS AND SUBMITTALS AND INVOICES

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

3.5 PAYMENT APPROVALS

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

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

ARTICLE 4 - THE CONTRACTOR

4.1 REVIEW OF THE CONTRACT DOCUMENTS AND FIELD CONDITIONS

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

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

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

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

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

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

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

4.2 INSURANCE

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

4.3 PERMITS, LAWS, AND REGULATIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

4.4 RESPONSIBILITY FOR THE WORK

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

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

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

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

4.4.5 In order to protect the lives and health of its employees, the Contractor shall comply with all applicable statutes and regulations and pertinent provisions of the "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Inc. and shall maintain accurate records of all cases of death, occupational disease, and injury requiring medical attention or causing loss of time from work arising out of and in the course of employment on work under the Contract. If a conflict should exist with the requirements of the Federal Occupational Safety and Health Act of 1970, then the most stringent statute or pertinent provision shall apply.

4.5 INDEMNIFICATION

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

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

4.6 SUPERVISION

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

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

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

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

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

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

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

4.7 SHOP DRAWINGS AND OTHER SUBMITTALS

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

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

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

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

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

4.7.5 Substitutions

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

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

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

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

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

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

4.7.6 Additional Submissions

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

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

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

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

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

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

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

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

4.8 AS-BUILT DRAWINGS

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

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

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

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

4.9 EXCAVATIONS, CUTTING AND PATCHING

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

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

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

4.10 TESTING

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

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

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

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

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

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

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

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

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

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

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

4.11 EQUIPMENT AND MATERIALS

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

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

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

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

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

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

4.12 TEMPORARY FACILITIES

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

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

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

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

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

4.12.4 Toilet Facilities

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

4.12.5 Access, Roads and Walks

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

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

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

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

4.12.6 Light and Power

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

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

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

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

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

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

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

4.12.7 Temporary Enclosures

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

4.12.8 Temporary Heating, Ventilation and Air Conditioning

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

b. Generally Enclosed

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

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

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

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

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

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

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

c. Permanent Enclosure

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

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

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

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

4.12.10 Temporary Water

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

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

4.12.11 Standby Personnel

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

4.12.12 Dust Control

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

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

4.13 STORAGE AND SITE MAINTENANCE

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

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

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

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

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

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

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

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

4.14 CUT-OVERS AND INTERRUPTIONS

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

4.15 PROTECTION/SAFETY

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

4.15.2 Protection of Persons

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

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

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

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

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

4.15.3 Protection of Property

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

4.15.4 Hazardous Materials

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

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

4.16.5 Emergencies

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

4.16 UNCOVERING AND CORRECTION OF WORK

4.16.1 Uncovering of Work

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

4.16.2 Correction of Work

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

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

4.16.3 Acceptance of Non-Conforming Work

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

4.17 LAYOUT AND DIMENSIONAL CONTROL

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

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

4.18 PROJECT SIGN

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

4.19 SECURITY

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

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

4.20 DPMC FIELD OFFICE

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

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

4.21 PHOTOGRAPHS

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

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

4.22 REPAIR OF FINISHED SURFACES, APPLIED FINISHES, GLASS

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

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

ARTICLE 5 - SUBCONTRACTORS

5.1 SUBCONTRACTORS AND MATERIAL SUPPLIER APPROVALS

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

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

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

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

5.2 CONTRACTOR-SUBCONTRACTOR RELATIONSHIP

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

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

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

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

ARTICLE 6 - CONSTRUCTION PROGRESS SCHEDULE

6.1 GENERAL

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

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

6.2.1 Critical Path Method

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

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

6.2.2 Initial Submittal

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

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

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

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

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

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

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

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

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

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

6.2.3 Review and Approval:

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

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

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

6.2.4 Progress Reporting and Changes:

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

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

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

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

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

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

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

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

6.2.5 Payments to Contractor

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

6.2.6 Biweekly Progress Meetings

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

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

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

6.2.7 Responsibility for Completion

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

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

6.2.8 Adjustment of Contract Completion Date

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

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

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

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

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

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

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

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

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

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

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

6.3 CONSTRUCTION PROGRESS SCHEDULING PROVIDED BY THE CONTRACTOR

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

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

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

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

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

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

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

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

6.3.8 The progress schedule shall show:

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

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

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

ARTICLE 7 - TIME OF COMPLETION

7.1 CONTRACT DURATION/NOTICE TO PROCEED

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

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

7.2 SUBSTANTIAL COMPLETION

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

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

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

7.3 FINAL COMPLETION

7.3.1 Final completion of the Contract shall occur when:

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

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

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

7.4 PARTIAL OCCUPANCY FOR USE

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

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

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

7.5 DELAY, DISRUPTION AND INTERFERENCE

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

7.5.2 Contractor's Damages for Delay, Disruption or Interference

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

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

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

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

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

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

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

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

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

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

ARTICLE 8 - CLOSE-OUT

8.1 CLOSE-OUT PROCEDURES/FINAL PAYMENT

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

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

8.2 OPERATIONS, EQUIPMENT AND MAINTENANCE MANUALS

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

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

8.3 TRAINING

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

8.4 GUARANTEE

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

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

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

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

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

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

ARTICLE 9 - PAYMENTS

9.1 INVOICES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

9.2 INTEREST

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

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

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

9.3 SCHEDULE OF VALUES AND FINAL PAYMENT

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

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

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

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

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

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

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

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

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

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

9.4 CERTIFICATION OF PAYMENTS TO SUBCONTRACTOR

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

9.5 STORED MATERIALS

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

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

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

9.6 ALLOWANCES

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

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

9.6.2 Unless otherwise provided in the Contract Documents:

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

9.7 RETAINAGE

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

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

9.7.3 Withholding Payment for Non-Delivery of Data:

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

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

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

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

9.8 MISCELLANEOUS

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

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

ARTICLE 10 - CHANGES IN THE WORK

10.1 CHANGES IN THE WORK

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

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

10.1.2 Change Orders

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

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

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

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

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

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

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

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

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

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

10.2 ACCELERATION

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

ARTICLE 11 - CLAIMS AND DISPUTES

11.1 CONTRACTOR CLAIMS

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

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

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

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

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

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

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

ARTICLE 12 - TERMINATION/SUSPENSION

12.1 SUSPENSION OF THE WORK / STOP WORK

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

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

12.2 TERMINATION FOR CAUSE

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

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

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

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

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

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

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

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

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

12.3 OWNER'S RIGHT TO COMPLETE THE WORK

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

12.4 TERMINATION FOR CONVENIENCE

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

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

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

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

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

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

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

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

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

ARTICLE 13 – OTHER REQUIREMENTS

13.1 PREVAILING WAGE

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

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

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

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

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

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

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

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

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

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

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

13.2 PATENTS

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

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

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

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

13.3 RIGHT TO AUDIT

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

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

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

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

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

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

13.4 INSURANCE

13.4.1 Insurance To Be Carried By The Contractor:

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

a Commercial General Liability:

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

- Premises/Operations

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

b Business Automobile Liability:

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

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

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

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

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

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

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

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

13.5 ASSIGNMENT OF ANTITRUST CLAIMS

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

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

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

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

END, GENERAL CONDITIONS

SECTION 011000 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Access to site.
 - 4. Coordination with occupants.
 - 5. Work restrictions.

1.3 PROJECT INFORMATION

- A. Project Identification: Powerhouse Stack Replacement. DPMC Project Number M1514-00.
 - 1. Project Location: Powerhouse, Woodbine Developmental Center, Woodbine, Cape May County, NJ.
 - a. 1175 DeHirsch Ave., Woodbine, NJ 08270
- B. Owner: State of New Jersey.
 - 1. Owner's Representative: Division of Property Management and Construction (DPMC).
- C. Architect: Mott MacDonald Architects PC, 111 Wood Ave. South, Suite 102, Iselin, NJ 08830-4112.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:

- 1. Powerhouse Stack Replacement:

Demolish the existing powerhouse smokestack and replace it with a new system that serves all three boilers in the powerhouse - three individual stacks that exit the roof of the building. Provide new structural steel supports for the new boiler flues.

Boilers shall continue to operate throughout construction. The existing stack shall be demolished after the new stack(s) are constructed and operational.

2. Stack Testing:

New boilers flues/stack shall be tested using protocols approved by the NJ Department of Environmental Protection (DEP).

3. Permits:

Obtain all permits required for the project.

4. HAZARDOUS BUILDING MATERIALS

Abatement and disposal of Hazardous materials.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

C. Period of Construction:

1. The work shall be completed in 206 calendar days.

1.5 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 1. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.6 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy the building, site and adjacent building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

1.7 WORK RESTRICTIONS

- A. See the Woodbine Developmental Center regulations governing contractors and their employees.
- B. Work Hours: 7:00 am to 4:30pm Monday through Friday. No work shall be permitted on weekends or state holidays.
- C. Work Restrictions, General: Comply with restrictions on construction operations.
 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 1. Notify Owner not less than two days in advance of proposed disruptive operations.
 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Nonsmoking Campus: Smoking is not permitted on the property.
- F. Controlled Substances: Use of tobacco products and other controlled substances within the existing campus is not permitted.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 011400 - SECURITY PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 USE OF PREMISES

- A. Comply with Woodbine Developmental Facility, Security Procedures for Outside Contractors.
- B. See enclosed "Exhibit A".

1.3 OCCUPANCY REQUIREMENTS

- A. Owner Occupancy: Owner will occupy site during entire construction period. Comply with Woodbine Developmental Facility, Security Procedure for Outside Contractors.
 - 1. See Section 02 – 028200 "Asbestos Abatement & Disposal", 028313 "Lead in Construction", and 028500 "Remediation of Microbial Contaminants" for additional requirements.

1.4 WORK SEQUENCE

- A. Work shall be completed in several sequences. Work shall be completed on site based on the sequence as indicated in the Summary of Work.

1.5 CONTRACTOR WORK AREAS, WORKING CONDITIONS AND EQUIPMENT STORAGE REGULATIONS

- A. The Contractor shall not unreasonably encumber the facilities with its equipment or work to be performed. Work conducted by the Contractor, Subcontractor, or any other person and/or firm affiliated with the Contractor shall be contained within pre-designated working areas established by the documents.
- B. The Contractor shall, at all times during the progress of the work, keep the site free from the accumulation of all rubbish and debris caused by its performance. The Contractor shall remove all debris and rubbish related to its work at the end of each workday to the satisfaction of the Project Manager. Tool storage boxes shall be permitted only in a locked box located in the area designated for storage on the drawings.

- C. The Contractor shall adequately secure and protect its equipment, materials and vehicles. The State assumes no liability for any damage to, or theft of, the Contractor's property. The Contractor shall have the use of a designated area for storage and staging of construction materials and equipment. The Contractor shall be responsible for adhering to security procedures outlined in this section.
- D. The Contractor is responsible for all safety precautions for all of its employees and property while performing its services.

1.6 WORK STOPPAGES, EXISTING UTILITY INTERRUPTIONS, NOISE AND ODOR RESTRICTIONS, AND MATERIAL APPROVALS

- A. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner.
- B. Consideration shall be given by the Contractor regarding excessive noise. If the noise is such that they may disturb the employees and detainees then the playing of radios and other unnecessary noise will not be permitted at any time.

1.7 PROTECTION OF INTERIOR FINISHES

- VA. The Contractor shall take extra care to avoid damage or soiling to any part of the facility. The Contractor is responsible for all damages or destruction caused directly or indirectly by its performance to any part of the building or adjoining property. Any damage or destruction caused by the Contractor or its employees will be repaired or replaced as the Construction Manager directs and to their satisfaction with all costs charged to the Contractor. The costs may be deducted from any and all amounts due to the Contractor.
- B. The Contractor is responsible for the cost of cleanup of dust, dirt and stains caused by the work to the satisfaction of the Construction Manager. The Contractor shall take all necessary precautions to keep dust, dirt and debris to a minimum both within the construction area and throughout the buildings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011400

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Construction Meetings.
- B. Related Sections include the following:
 - 1. Division 01 Section "General Conditions" for submitting the Schedule of Values.
 - 2. Division 01 Section "Submittal Procedures" for submitting schedules and reports.

1.3 SUBMITTALS

- A. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:
 - 1. Scheduled date for first submittal.
 - 2. Submittal category (action or informational).
 - 3. Description of the Work covered.
 - 4. Scheduled date for Architect's and Construction Manager's final release or approval.
- B. Contractor's Construction Schedule: Submit one opaque copies of initial schedule, large enough to show entire schedule for entire construction period.

1.4 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
1. Secure time commitments for performing critical elements of the Work from parties involved.
 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.5 MEETINGS

- A. Pre-Construction Meeting: This meeting will be conducted to introduce parties, and review all DPMC required paperwork, procedures, and reporting requirements. The Engineer will be responsible to prepare and distribute meeting minutes and a project directory.
- B. Progress Meetings: These meetings will be held bi-weekly and must be attended by Contractor and Subcontractor representatives who are authorized to make binding decisions for their respective firms. The Engineer will be responsible to prepare and distribute meeting minutes. The following topics will be reviewed:
- Approval of previous minutes.
 - Review of Old Business that is outstanding.
 - Review of Contractor's approved project schedule.
 - Review of job progress over the past two weeks against the project schedule.
 - Two week look ahead of progress as anticipated by Contractor.
 - If work is behind schedule the Contractor must show how they will recover the lost time.
 - Review of submittal log and outstanding submittals. Long lead items that require expedited delivery must be submitted promptly.
 - Test reports conducted over the past two weeks or anticipated over the next two weeks.

- The Contractor is required to maintain a set of “as-built” drawings on site and they will be reviewed at each job meeting.
- A report on inspections received and inspections anticipated.
- Invoice review and status of invoices and payments.
- Review of pending or approved change orders.
- New Business discussion to review items that require resolution.
- Site observations that will confirm the work in place is as reported by the Contractor.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for selection of named products for use in Project.
- B. Submit the following for the Architect's review and action:
 - 1. Shop drawings.
 - 2. Product data.
 - 3. Samples.
 - 4. Submittals for which procedures are not defined elsewhere.
- C. Related Sections include the following:
 - 1. General Conditions "Substitutions" for procedures for products proposed that are not named in the specifications.
 - 2. Division 1 Section "Closeout Procedures" for submitting warranties for Contract closeout.
 - 3. Divisions 2 through 9 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.

3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. "Shop drawings" are drawings and other data prepared, by the entity who is to do the work, specifically to show a portion of the work.
- C. "Product data submittals" are standard printed data which show or otherwise describe a product or system, or some other portion of the work.
- D. "Samples" are actual examples of the products or work to be installed.
- E. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Refer to General Conditions for procedures.
- F. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.4 FORM OF SUBMITTALS

- A. Utilize standard State of New Jersey DPMC/OCS 12/13 forms for identification of sub-contractors and products; submit original and 8 copies.
- B. Manufacturer's Product Data: Utilize State of New Jersey DBC-13 form for transmittal of product data, shop drawings and samples; submit original and 8 copies.
- C. Sheets Larger than 8-1/2 x 11-inches: Sheet size: 24 x 36-inch maximum; submit original and 8 copies.
- D. Small Sheets or Pages: Sheet size 8-1/2 x 11-inch minimum, 11 x 17-inch maximum; submit original and 8 copies.
- E. Samples: Submit 9 samples; each sample shall be labeled.
- F. If additional sets are needed by other entities involved in work represented by the samples, submit with original submittal.
- G. Copies in excess of the number requested will not be returned.
- H. Provide additional copies for project record documents.

1.5 COORDINATION OF SUBMITTALS

- A. Coordinate submittals and activities that must be performed in sequence, so that the Architect has enough information to properly review the submittals.
- B. Coordinate submittals of different types for the same product or system so that the Architect has enough information to properly review each submittal.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 TIMING OF SUBMITTALS

- A. Transmit each submittal at or before the time indicated on the approved schedule of submittals. In general, all submittals must be completed within 20 calendar days from the date of the Notice to Proceed.
 - 1. Prepare and submit for approval a schedule showing the required dates of submittal of all submittals.
 - 2. Organize the schedule by the applicable specification section number.
 - 3. Incorporate the contractor's construction schedule specified elsewhere.
 - 4. Revise and resubmit the schedule for approval when requested.
- B. Deliver each submittal requiring approval in time to allow for adequate review and processing time, including resubmittals if necessary; failure of the Contractor in this respect will not be considered as grounds for an extension of the contract time.
- C. If a submittal must be processed within a certain time in order to maintain the progress of the work, state so clearly on the submittal.
- D. If a submittal must be delayed for coordination with other submittals not yet submitted, the Architect may at his option either return the submittal with no action or notify the Contractor of the other submittals which must be received before the submittal can be reviewed.

3.2 SUBMITTAL PROCEDURES - GENERAL

- A. Contractor Review: Sign each copy of each submittal certifying that Contractor has reviewed the submittal and that it complies with the requirements of the contract documents.
- B. Notify the Architect, in writing and at time of submittal, of all points upon which the submittal does not conform to the requirements of the contract documents, if any.

- C. Do not commence work which requires review of any submittals until receipt of returned submittals with an acceptable action.
- D. Do not allow submittals without an acceptable action marking to be used for the project.
- E. Do not submit substitute items that have not been approved by means of the procedure specified elsewhere.
- F. Preparation of Submittals:
 - 1. Follow DPMC procedures for all submittals.
 - 2. Label each copy of each submittal, with the following information:
 - a. Project name and DPMC project number.
 - b. Date of submittal.
 - c. Contractor's name and address.
 - d. Subcontractor's name and address.
 - e. Supplier's name and address.
 - f. Manufacturer's name.
 - g. Specification section where the submittal is specified.
 - h. Other necessary identifying information.
 - 2. Pack submittals suitably for shipment.
 - 3. Submittals to receive Architect's action marking: Provide blank space on the label or on the submittal itself for action marking; minimum 4 inches wide by 5 inches high.
- G. Transmittal of Submittals:
 - 1. Submit all submittals to the Architect, with copy of transmittal to DPMC Construction Manager.
 - 2. Submittals will be accepted from the Contractor only. Submittals received from other entities will be returned without review or action.
 - 3. Submittals received without a transmittal form will be returned without review or action.
 - 4. Transmittal form: Use DPMC 12/13 (no substitutions).
 - 5. Fill out a separate transmittal form for each submittal; also include the following:
 - a. Other relevant information.
 - b. Requests for additional information.

3.3 SHOP DRAWINGS

- A. Content: Include the following information:
 - 1. Dimensions, at accurate scale.
 - 2. All field measurements that have been taken, at accurate scale.
 - 3. Names of specific products and materials used.
 - 4. Show compliance with the specific standards referenced.

5. Coordination requirements; show relationship to adjacent or critical work.
6. Name of preparing firm.

B. Preparation:

1. Reproductions of contract documents are not acceptable as shop drawings.
2. Identify as indicated for all submittals.
3. Space for Architect's action marking shall be adjacent to the title block.

3.4 PRODUCT DATA

A. Submit all product data submittals for each system or unit of work as one submittal.

B. Content:

1. Submit manufacturer's standard printed data sheets.
2. Identify the particular product being submitted; submit only pertinent pages.
3. Show compliance with properties specified.
4. Identify which options and accessories are applicable.
5. Include recommendations for application and use.
6. Show compliance with the specific standards referenced.
7. Show compliance with specified testing agency listings; show the limitations of their labels or seals, if any.
8. Identify dimensions which have been verified by field measurement.
9. Show special coordination requirements for the product.

3.5 SAMPLES

A. Samples:

1. Provide samples that are the same as proposed product.
2. Where products are to match a sample prepared by other entities, prepare sample to match.

B. Preparation:

1. Attach a description to each sample.
2. Attach name of manufacturer or source to each sample.
3. Where compliance with specified properties is required, attach documentation showing compliance.
4. Where there are limitations in availability, delivery, or other similar characteristics, attach description of such limitations.

3.6 REVIEW OF SUBMITTALS

- A. Submittals for approval will be reviewed, marked with appropriate action, and returned.

3.7 RETURN, RESUBMITTAL, AND DISTRIBUTION

- A. Submittals will be returned to the Contractor by mail or at periodic project meetings.
- B. Perform resubmittals in the same manner as original submittals; indicate all changes other than those requested by the Engineer.
- C. Distribution:
 - 1. Distribute returned submittals to all subcontractors and suppliers involved in work covered by the submittal.
 - 2. Make extra copies for operation and maintenance data submittals, as required.
 - 3. Record distribution on transmittal form with copy to the Engineer.

END OF SECTION 013300

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
 - 1. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
 - 2. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
 - 3. ANSI - American National Standards Institute; www.ansi.org.
 - 4. APA - APA - The Engineered Wood Association; www.apawood.org.
 - 5. ARI - American Refrigeration Institute; (See AHRI).
 - 6. ASCE - American Society of Civil Engineers; www.asce.org.
 - 7. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
 - 8. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
 - 9. ASTM - ASTM International; (American Society for Testing and Materials International); www.astm.org.
 - 10. AWS - American Welding Society; www.aws.org.
 - 11. FM Approvals - FM Approvals LLC; www.fmglobal.com.
 - 12. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
 - 13. ICC - International Code Council; www.iccsafe.org.
 - 14. MPI - Master Painters Institute; www.paintinfo.com.
 - 15. NEMA - National Electrical Manufacturers Association; www.nema.org.
 - 16. NFPA - NFPA; (National Fire Protection Association); www.nfpa.org.
 - 17. NFPA - NFPA International; (See NFPA).
 - 18. NRCA - National Roofing Contractors Association; www.nrca.net.
 - 19. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
 - 20. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
 - 21. UL - Underwriters Laboratories Inc.; www.ul.com.
- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. ICC - International Code Council; www.iccsafe.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up-to-date as of the date of the Contract Documents.

1. OSHA - Occupational Safety & Health Administration; www.osha.gov.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; and special warranties.
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittal Procedures" for products proposed that are named in the specifications.
 - 2. Division 1 Section "Closeout Procedures" for submitting warranties for Contract closeout.
 - 3. Divisions 2 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Substitutions: Changes in products, materials, equipment, and methods of

construction from those required by the Contract Documents and proposed by the Contractor.

- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

- B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

- C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrently with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Refer to Divisions 2 through 9 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that

have been produced and used successfully in similar situations on other projects.

3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
2. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.

2.2 PRODUCT SUBSTITUTIONS

- A. Refer to General Conditions "Substitutions".

2.3 COMPARABLE PRODUCTS

- A. Conditions: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record non-compliance with these requirements:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those

named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated. A

3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. General installation of products.
 - 3. Progress cleaning.
 - 4. Starting and adjusting.
 - 5. Protection of installed construction.
 - 6. Correction of the Work.
- B. Related Sections include the following:
 - 1. Division 1 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
 - 2. Division 1 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services into and throughout each building.

- B. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings. If discrepancies are discovered, notify Engineer and Construction Manager promptly.
- B. General:

1. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 2. Inform installers of lines and levels to which they must comply.
 3. Check the location, level and plumb, of every major element as the Work progresses.
 4. Notify Engineer and Construction Manager when deviations from required lines and levels exceed allowable tolerances.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Make the log available for reference by Architect and Construction Manager.

3.4 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property

and that will not damage exposed surfaces.

- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 STARTING AND ADJUSTING

- A. Start operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.8 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Divisions 2 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that

- will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
 5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
 6. Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Those components include, but are not limited to the following:
 1. Primary operational systems and equipment.
 2. Air or smoke barriers.
 3. Fire-protection systems.
 4. Control systems.
 5. Communication systems.
 6. Electrical wiring systems.
- C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 1. Water, moisture, or vapor barriers.
 2. Membranes and flashings.
 3. Equipment supports.
 4. Piping, ductwork, vessels, and equipment.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1. If possible, retain original Installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage original Installer or fabricator, engage another recognized, experienced, and specialized firm.
- E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of these specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse

weather conditions for portions of Project that might be exposed during cutting and patching operations.

- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 5. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible.

Provide materials and comply with installation requirements specified in other Sections of these Specifications.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

END OF SECTION 017329

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Advise Owner of pending insurance changeover requirements.
 - 2. Participate with Owner in conducting inspection.
 - 3. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - 4. Complete final cleaning requirements, including touchup painting.
 - 5. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
 - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - 2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment.
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.
 2. Submit list of incomplete items in the following format:
 - a. PDF electronic file. Architect will return annotated file.
 - b. Three paper copies. Architect will return two copies.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 - 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - i. Remove labels that are not permanent.
 - j. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - k. Leave Project clean and ready for occupancy.

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 1. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 2. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

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

1.4 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
 - 2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return one copy.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

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

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name and contact information for Contractor.
 - 6. Name and contact information for Construction Manager.
 - 7. Name and contact information for Architect.
 - 8. Name and contact information for Commissioning Authority.

9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.

4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 PRODUCT MAINTENANCE MANUALS

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

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- C. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of operation and maintenance manuals.
 - 2. Comply with requirements of newly prepared record Drawings in Instructions to Bidders and General Conditions."
- D. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

- 1. Record Drawings.
- 2. Record Product Data.

- B. Related Sections include the following:

- 1. Division 1 Section "Closeout Procedures" for general closeout procedures.
- 2. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
- 3. Divisions 2 through 26 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

- A. Record Drawings: Comply with the following:

- 1. Number of Copies: Submit one set(s) of marked-up Record Prints.

- B. Record Product Data: Submit nine (9) copies of each Product Data submittal.

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

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

- 1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity

who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

- a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Changes made by Change Order or Construction Change Directive.
 - d. Changes made following Architect's written orders.
 - e. Details not on the original Contract Drawings.
 - f. Field records for variable and concealed conditions.
 - g. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Identification: As follows:
 - a. Project name and DPMC Number.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders and Record Drawings where applicable.

2.3 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Engineer's and Construction Manager's reference during normal working hours.

END OF SECTION 017839

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Demolition and removal of selected portions of building or structure.
 - 2. Salvage of existing items to be reused or recycled.

- B. Related Requirements:

- 1. See General Conditions for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 3. Coordination for shutoff, capping, and continuation of utility services.
 4. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- D. Pre-demolition Photographs or Video: Submit before Work begins.
- E. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.7 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Owner of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Storage or sale of removed items or materials on-site is not permitted.
- E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Engineer.
- D. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or preconstruction videotapes.
 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 1. Comply with requirements for existing services/systems interruptions specified in The General Conditions.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off indicated utilities with utility companies.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove plumbing, and ventilation systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - c. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Provide temporary enclosures for dust, heating, and control.
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Temporarily cover openings to remain.
 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
4. Maintain adequate ventilation when using cutting torches.
5. Remove decayed or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
6. Members and lower to ground by method suitable to avoid ground impact or dust generation.
7. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
8. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Store items in a secure area until delivery to Owner.
3. Protect items from damage during storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Protect items from damage during.
3. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- C. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 4. Comply with requirements specified in the General Conditions.
 5. Do not burn demolished materials.
 6. Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

DIVISION 2 – EXISTING CONDITIONS

SECTION 02 82 00 – ASBESTOS ABATEMENT AND DISPOSAL

PART 1 GENERAL REQUIREMENTS

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.
- B. Environmental Connection, Inc., report dated June 20, 2018, Hazardous Material Testing Powerhouse - Woodbine Developmental Center 1175 Dehirsch Avenue Woodbine, New Jersey 08270 DPMC Project #M1514-00 presented in Appendix “A” of this Specification Section.

1.2 CONDITIONS

- A. All documents prepared by Environmental Connection, Inc., (EC) including any attachments, may contain information that is privileged and confidential, and is exclusively generated for the sole and intended use of the recipient(s). EC’s Instruments of Service, included Contract Drawings, Technical Specifications and other documents prepared by EC, are for the sole use of this Project, and unless otherwise provided, EC shall be deemed the Author and Owner of these documents and shall retain all common law, statutory and other reserved rights, including copyrights. EC shall not be liable for the acts, errors or omissions of the Owner and/or Owner’s representative, Vendors, Agents or other entities performing any of the work relative to this Project/Assignment. Should the Owner, and/or Owner’s other Representatives, Vendors, Agents or other entities performing any of the work fail to substantially prevail in any lawsuit brought against EC, EC shall be entitled to recover its reasonable attorneys’ fees and other costs, in the court of appropriate jurisdiction.
- B. This project involves the removal of asbestos containing materials, as identified by EC, to facilitate renovations to the Powerhouse located on the Woodbine Developmental Center Campus in Woodbine, New Jersey.
- C. For the purposes of this document, the term Contractor shall apply to that Trade which will be performing the respective work relative to the removal of identified asbestos containing materials, and those asbestos containing materials that shall require removal by a State of New Jersey, Department of Labor and Workforce Development, (DLWD) licensed Asbestos Abatement Contractor.
- D. The removal of asbestos containing materials referenced in this Section shall be compliant with New Jersey Administrative Codes (N.J.A.C.) 8:60 and 12:120, in addition to the United States Department of Labor, Occupational Safety and Health Administration (OSHA), 29 CFR, Part 1926.1101, and the United States Environmental Protection Agency (USEPA), National Emissions Standard for Hazardous Air Pollutants (NESHAPs), 40 CFR, Part 61, Sub-part M.
- E. The disposal of asbestos containing materials shall be in accordance with N.J.A.C. 7:26, in addition to, 40 CFR, Part 61M, which requires, at a minimum, asbestos containing waste to be adequately wetted and appropriately packaged, transported in leak-tight containers and disposed at an authorized landfill for such waste. Waste manifests shall be provided to the Owner.
- F. The transport of asbestos containing waste materials shall be in accordance with N.J.A.C. 7:26, including the use of a State of New Jersey, Department of Environmental Protection, (DEP) registered solid waste haulers. United States Department of Transportation regulations, including, but not limited to, 49 CFR, Part 173, shall apply, with respect to placards, labels, etc.
- G. Definitions as noted in these Technical Specifications are included as part of the Contract.

DIVISION 2 – EXISTING CONDITIONS

- H. It shall be the sole responsibility of the Contractor to pay directly all fees associated with any Patent, instrument, devices, process, etc., utilized on this project where required by the patent holder.
- I. Except as herein specified, no signs or photographs shall be required other than that necessary for the Contractor to comply with code and the United States Department of Labor, Occupational Safety and Health Administration (OSHA), posting regulations.
- J. Water supply is available at the site(s). Extension to the point of source shall be the responsibility of the Contractor. The Contractor shall ensure leak tight connections. The Contractor shall comply with code specification requirements regarding connections.
- K. Temporary electric service for use during construction is available at the site(s). Extension to the source and point of use shall be the responsibility of the Contractor. The Contractor shall install GFCI protection at a point of source outside of containment. **All temporary electrical connections shall be accomplished by a licensed electrician employed by the Asbestos Abatement Contractor.**
- L. Temporary heat and temporary cooling is not required.
- M. The Contractor shall refer to the General and Supplemental General Conditions with respect to submission of schedules, including a Critical Path Method (CPM) Schedule, a schedule that reflects coordination with other Trades, where applicable, for the installation of temporary protection, etc. The same shall apply for submission of “AS-BUILT” drawings.
- N. All requests for work and project scheduling shall be coordinated in writing with the the Owner's representative. The Contractor shall not proceed until written authorization and approval on the scheduled start date is obtained. A 72-Hour advance notice to the Owner's representative shall be issued in writing requesting any change to the schedule.
- O. The Contractor shall field verify all field conditions and quantities specified. The quantities shown are for informational purposes only and no guarantee is expressed or implied that the quantities are correct or that the asbestos containing materials are easily removable from the substrate, surfaces or components. No allowances shall be made for failure of the Contractor to verify in the field amounts or existing field conditions.
- P. The Contractor shall comply with all applicable OSHA regulations, relative to fall protection, operation of boom lifts, etc., where applicable, and the manufacturer's recommendations, which shall be included with the Contractor's Health and Safety Program. Boom lift operations, where applicable, shall be in accordance with the American National Standards Institute (ANSI) A92.2-1969 and 29 CFR, Part 1926.453 – Aerial Lifts. Fall Protection, as per 29 CFR, Part 1926.502 – Fall Protection Systems Criteria and Practices, shall also be followed, in addition to any applicable federal, state and local regulations for such activities.
- Q. All Sections and components, including the Contract Drawings and/or Plans, of these Technical Specifications are interrelated and must be considered in context with provisions documented throughout the Contract Documents. As such, this Section shall not be separated from the balance of the Contract Documents.
- R. Where these Technical Specifications conflict with a regulatory requirement, the regulatory requirement shall be considered the more stringent, including the Contractor's agreement filed with the DLWD to obtain/maintain licensure as an Asbestos Abatement Contractor/firm.
- S. Summary by References: Work of this Contract can be summarized by references to the Contract, General Conditions, Supplementary Conditions, Specifications Sections, Drawings, Addenda and modifications to the Contract Documents issued subsequent to the initial printing of this project manual and included, but not necessarily limited to, printed material referenced by any of these. Work

DIVISION 2 – EXISTING CONDITIONS

of the Contract is also unavoidably affected or influenced by governing regulations, natural phenomena including weather conditions and other forces outside the Contract Documents.

1.3 PROJECT DIRECTORY

- A. Facility New Jersey Department of Human Services
Woodbine Developmental Center
1175 DeHirsch Avenue
Woodbine, Cape May County, NJ 08270
- B. Architectural/Engineering:
Firm of Record: Mott MacDonald
111 Wood Avenue South
Iselin, New Jersey 08830
- C. Environmental Consultant: Environmental Connection, Inc.
120 North Warren Street
Trenton, New Jersey 08608
Telephone: 609-392-4200
Telefax: 609-392-1216
- D. Project Designer/Contact: Jordan Reed
Asbestos Project Designer
Certification # 807632
Expires March 14, 2019

1.4 COORDINATION

- A. The Contractor shall coordinate all activities with the Owner (herein refers to the State of New Jersey, Department of Treasury, Division of Property Management and Construction (DPMC), the State of New Jersey, Department of Human Services, (DHS), and/or the Facility), or the Owner's representative (Mott MacDonald), and the Prime Contractor. Where the Trade performing the work specified herein is a sub-contractor, the sub-contractor shall coordinate all work with the Prime Contractor for coordination with the Owner's representative.
- B. Coordination of work shall be notified, at a minimum within seventy-two (72) hours of an event. The exception shall be that of emergency situations.

1.6 QUANTITIES

- A. The quantities shown are for informational purposes only. The Contractor shall inspect and verify all locations, quantities and measurements indicated in Contract Documents prior to bidding. No additional compensation shall be awarded for failure to complete said review or inspection.

1.7 CONTRACT DOCUMENTS

- A. Contract Documents: Indicate the work of the Contract and related requirements and conditions that have an impact on the project. Related requirements and conditions that are indicated on the Contract Documents include, but are not necessarily limited to, the following:
1. Applicable federal, state and local codes and regulations.
 2. Notices and Permits.
 3. Existing site conditions and restrictions on the use of the site.
 4. Work performed prior to work under this Contract.
 5. Alterations and coordination with existing work.

DIVISION 2 – EXISTING CONDITIONS

1.8 DEFINITIONS

- A. Definitions contained in this Section are not necessarily complete but are general to the extent that they are not defined more explicitly elsewhere in the Contract Documents.
1. Indicated: This term refers to graphic representations, notes or schedules on the drawings, or other Paragraphs or Schedules in Specifications, and similar requirements in Contract Documents. Where terms such as "shown," "noted," "scheduled" and "specified" are used, it is to help locate the reference; no limitation on location is intended except as specifically noted.
 2. Directed: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean "directed by the Owner's representative," "requested by the Owner's representative," and similar phrases. However, no implied meaning shall be interpreted to extend the Owner's representative's responsibility into the Contractor's area of construction supervision.
 3. Approve: The term "approved," where used in conjunction with the Owner's representative's action on the Contractor's submittals, application, and request, is limited to the responsibilities and duties of the ASCM stated in General and Supplementary Conditions. Such approval shall not release the Contractor from the responsibility to fulfill other Contract requirements.
 4. Regulation: The term "Regulations" includes laws, statutes, ordinances and lawful orders issued by authorities having jurisdiction, as well as rules, conventions and agreements within the construction industry that control performance of the work, whether they are lawfully imposed by authorities having jurisdiction or not.
 5. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations."
 6. Install: The term "install" is used to describe operations at the project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations."
 7. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."
 8. Installer: An "Installer" is an entity engaged by the Contractor, either an employee, sub-contractor or sub-subcontractor for performance of a particular construction activity, including installation, erection, application and similar operations.
 9. Project Site: The Project Site is the space available to the Contractor for performance of the work, either exclusively or in conjunction with others performing other construction as part of the project. The extent of the project site is shown on the drawings and may or may not be identical with the description of the land upon which the project is to be built and/or the facility.
 10. Testing Laboratories: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, either at the project site or elsewhere, to report on, and, if required, to interpret, results of those inspections or tests.
 11. Owner's representative: The Owner's representative will represent the Owner during construction. The Owner's representative will advise and consult with the Owner. The Owner's instructions to the Contractor will be forwarded through the Owner's representative.

DIVISION 2 – EXISTING CONDITIONS

12. Project Administrator: The Project Administrator is a full time representative of the Owner at the job site with authority to stop the work upon verbal order if requirements of the Contract Documents are not met, or if in the sole judgment of the Project Administrator, Owner's representative or Owner, the interests of the Owner, safety of any person or the Owner's property are jeopardized by the work.
13. General Superintendent: This general superintendent is the Contractor's representative at the work site. This person will generally be the competent person required by OSHA in 29 CFR, Part 1926.1101.

B. Definitions Relative To Asbestos Abatement

1. Accredited or Accreditation (when referring to a person or laboratory): A person or laboratory accredited in accordance with Section 206 of Title II of the Toxic Substance Control Act (TSCA).
2. Aerosol: A system consisting of particles, solid or liquid, suspended in air.
3. Air Cell: Insulation normally used on pipes and duct work that is comprised of corrugated cardboard which is frequently comprised of asbestos combined with cellulose or refractory binders.
4. Air Monitoring: The process of measuring the fiber content of a specific volume of air.
5. Amended Water: Water to which a surfactant has been added to decrease the surface tension to 35 or less dynes.
6. Asbestos: The asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite, anthophyllite, and actinolite-tremolite. For purposes of determining respiratory and worker protection both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered as asbestos.
7. Asbestos Containing Material (ACM): Any material containing more than 1% by weight of asbestos of any type or mixture of types.
8. Asbestos Containing Building Materials (ACBM): Surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members of other parts of a building.
9. Asbestos Containing Waste Material: Any material which is or is suspected of being or material with an asbestos-containing material which is to be removed from a work area for disposal.
10. Asbestos Debris: Pieces of ACBM that can be identified by color, texture, or composition, or means dust, if the dust is determined by an accredited inspector to be ACM.
11. Asbestos Safety Technician (AST): A person certified by the New Jersey Department of Community Affairs, hired by the Asbestos Safety Control Monitor, to monitor and inspect the abatement activities pursuant to New Jersey Administrative Code, (N.J.A.C.) 5:23-8.

DIVISION 2 – EXISTING CONDITIONS

12. Authorized Visitor: The Owner, the Owner's representative, testing lab personnel, the Architect/Engineer, emergency personnel or a representative of any federal, state and local regulatory or other agency having authority over the project.
13. Barrier: Any surface that seals off the work area to inhibit the movement of fibers.
14. Breathing Zone: A hemisphere forward of the shoulders with a radius of approximately six (6) to nine (9) inches.
15. Ceiling Concentration: The concentration of an airborne substance that shall not be exceeded.
16. Certified Industrial Hygienist (C.I.H.): An industrial hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene.
17. Demolition: The wrecking or taking out of any building component, system, finish or assembly of a facility with any related handling operation.
18. Disposal Bag: A properly labeled six (6) mil thick leak-tight plastic bag used for transporting asbestos waste from work to disposal site.
19. Encapsulant: A material that surrounds or embeds asbestos fibers in an adhesive matrix, to prevent release of fibers.
20. Bridging Encapsulant: An encapsulate that forms a discrete layer on the surface of an asbestos matrix.
21. Penetrating Encapsulant: An encapsulate that is absorbed by the in situ asbestos matrix without leaving a discrete surface layer.
22. Removal Encapsulant: A penetrating encapsulate specifically designed to minimize release during removal of asbestos containing materials.
23. Encapsulation: Treatment of asbestos containing materials, with an encapsulant.
24. Enclosure: The construction of an air-tight, impermeable, permanent barrier around asbestos containing material to control the release of asbestos fibers into the air.
25. Filter: A media component used in respirators to remove solid or liquid particles from the inspired air.
26. Friable Asbestos Material: Material that contains more than 1.0% asbestos by weight and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.
27. Glove Bag: A polyethylene bag (typically constructed of 10 mil transparent polyethylene or polyvinyl chloride plastic) with inward projecting long sleeve gloves, which is designed to enclose an object from which an asbestos containing material is to be removed.
28. HEPA Filter: A High Efficiency Particulate Air (HEPA) filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 microns in a diameter.
29. HEPA Filter Vacuum Collection Equipment (or vacuum cleaner): High efficiency particulate air filtered vacuum collection equipment with a filter system capable of collecting and retaining asbestos fibers. Filters should be of 99.97% efficiency for

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retaining fibers of 0.3 microns or larger. May also be referred to as Air Filtration Device (AFD).

30. High-Efficiency Particulate Air Filter (HEPA): Refers to a filtering system capable of trapping and retaining 99.97 percent of all monodispersed particles 0.3 um in diameter or larger.
31. Industrial Hygiene Technician: A person hired by the Asbestos Safety Control Monitor, to monitor and inspect the abatement activities not regulated by the New Jersey Administrative Code, (N.J.A.C.) 5:23-8.
32. Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.
33. Negative Pressure Ventilation System: A pressure differential and ventilation system.
34. Personal Monitoring: Sampling of the asbestos fiber concentrations within the breathing zone of an employee.
35. Polyethylene Sheet (Fire Retardant): Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame Resistant Textiles and Films. Provide largest sheet size possible to minimize seams, six (6) mil thick as indicated, clear, frosted or black as indicated.
36. Pressure Differential and Ventilation System: A local exhaust system, utilizing HEPA filtration capable of maintaining a pressure differential with the inside of the work area at a lower pressure than any adjacent area, and which cleans re-circulated air or generates a constant air flow from adjacent areas into the work area.
37. Protection Factor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
38. Repair: Returning damaged ACM to an undamaged condition or to an intact state so as to prevent fiber release.
39. Respirator: A device designed to protect the wearer from inhalation of harmful atmospheres.
40. Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation of area.
41. Time Weighted Average (TWA): The average concentration of a contaminant in air during a specific time period.
42. Visible Emissions: Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.
43. Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened

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with amended water or diluted removal encapsulate and afterwards thoroughly decontaminated or disposed of as asbestos-contaminated waste.

44. Work Area: The area where asbestos related work or removal operations are performed which is defined and/or isolated to prevent the spread of asbestos dust, fibers or debris, and entry by unauthorized personnel. Work area is a regulated area as defined by 29 CFR, Part 1926.
45. Requirements expressed imperatively are to be performed by the Contractor. At certain locations in the text, for clarity, subjective language is used to describe responsibilities which must be fulfilled indirectly by the Contractor, or by others when so noted.
46. Assignment of Specialists: The Specification requires that certain specific construction activities shall be performed by specialists who are recognized experts in the operations to be performed. The specialists must be engaged for those activities.

1.9 CODES & STANDARDS RELATIVE TO ASBESTOS ABATEMENT

- A. Except to the extent that more explicit or more stringent requirements are written directly into the Contract Documents, all applicable codes, regulations and standards have the same force and effect (and are made a part of the Contract Documents by reference) as if copied directly into the Contract Documents, or as if published copies are bound herewith.
- B. The Contractor shall assume full responsibility and liability for the compliance with all applicable federal, state, and local regulations pertaining to work practices, hauling, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable federal, state and local regulations. The Contractor shall hold the Owner and the Owner's representative harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on the part of himself, his employees, or sub-contractors.
- C. A copy of the appropriate codes and standards, as referenced herein, shall be maintained at the project site.
- D. Conflicting Requirements: Where compliance with two (2) or more standards is specified, and they establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the Contract Documents indicate otherwise. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to the Owner's representative for a decision before proceeding.
- E. Code of Federal Regulations
 1. 29 CFR, Part 1910.20, Access to Employee Exposure and Medical Records;
 2. 29 CFR, Part 1910.134, Respiratory Protection;
 3. 29 CFR, Part 1910.145, Specifications for Accident Prevention Signs and Spill Response;
 4. 29 CFR, Part 1910.1001 & 29 CFR, Part 1926.1101, Occupational Exposure to Asbestos, Final Rule;
 5. 29 CFR, Part 1910.1200 & 29 CFR, Part 1926.59, Hazard Communication;
 6. 29 CFR, Part 1926.55, Gases, Vapors, Fumes, Dusts, and Mists;

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7. 29 CFR, Part 1926.103, Respiratory Protection;
 8. 40 CFR, Part 61, National Emission Standard for Hazardous Air Pollutants (NESHAP);
 9. 40 CFR, Part 173, General Requirements for Shipments and Packaging;
 10. 40 CFR, Part 178, Shipping Container Specifications;
 11. 40 CFR, Part 260 & 40 CFR, Part 261, Hazardous Waste Management Systems
 12. 40 CFR, Part 763, Sub-part G, Asbestos Hazard Emergency Response Act (AHERA), Asbestos Abatement Projects, Worker Protection; and
- F. State of New Jersey requirements which govern asbestos abatement work or hauling and disposal of asbestos waste materials include, but are not limited to the following:
1. **Asbestos Licenses and Permits**
N.J.A.C. 8:60 and 12:120
 2. **Asbestos Training Courses**
N.J.A.C. 8:60 and 12:120
 3. **Disposal Regulations**
N.J.A.C. 7:26
 4. **Asbestos Hazard Abatement Sub-code**
N.J.A.C. 5:23-8
 5. **Indoor Air Quality Standard**
N.J.A.C. 12:100-13
- G. Standards which apply to asbestos abatement work of hauling and disposal of asbestos waste materials include but are not limited to the following:
1. American National Standards Institute (ANSI)
1430 Broadway
New York, New York 10018
(212) 354-3300
 2. Fundamentals Governing the Design and Operation of local Exhaust Systems Publication Z9.2-79
 3. Practices for Respiratory Protection Publication Z88.2-80
 4. American Society for Testing and Materials (ASTM)
1916 Race Street
Philadelphia, PA 19103
(215) 299-5400
 5. Specification for Encapsulants for Friable Asbestos Containing Building Materials Proposal P-189

1.10 PRE-PROJECT INSPECTION

- A. Prior to commencement of work, inspect areas in which work is to be performed. Prepare a listing of damage to structure, surfaces, equipment or of surrounding properties which could be misconstrued as damage resulting from the work. Photograph or videotape existing conditions, as necessary to document conditions. Submit a copy of these photos or tapes to the Owner's representative prior to starting work.

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1.11 POTENTIAL ENVIRONMENTAL HAZARDS

- A. The disturbance or dislocation of asbestos containing materials identified in these Technical Specifications may cause a release within the building's atmosphere or the environment, thereby creating a potential health hazard to workmen and building occupants. The Contractor shall also be aware of other potential environmental hazards that may exist at the subject site including, but not limited to: mercury containing equipment, refrigerant containing equipment, fuel storage tanks, polychlorinated biphenyl (PCB) containing equipment/materials, etc. Apprise all workers, supervisory personnel, sub-contractors, consultants and authorized visitors who will be at the job site of the seriousness of the hazard and of proper work procedures which must be followed. THE BUILDING SHALL BE OCCUPIED DURING ALL ASPECTS OF ENVIRONMENTAL REMEDIATION.

1.12 STOP WORK

- A. If the Owner, the Owner's representative, or the Project Administrator presents a written stop work order, immediately and automatically stop all work. Do not recommence work until authorized in writing by the Owner or his/her appropriate representative.

1.13 CONTRACTOR'S USE OF THE PREMISE

- A. Confine operations, at the site, to the areas permitted under the Contract. Portions of the site beyond areas in which work is indicated are not to be disturbed. Conform to site rules and regulations affecting the work while engaged in project construction.
- B. Secure and obtain facility security regulations for Contractors. All facility security requirements are incorporated by reference. No additional compensation or time shall be allotted for failure to comply with the facility's security requirements.
- C. Keep existing driveways and entrances serving the premises clear and available to the Owner and his employees at all times. Do not use these areas for parking or storage of materials.
- D. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas indicated. If additional storage is necessary obtain and pay for such storage off site.
- E. Maintain existing building in a safe and weather tight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building during the construction period.
- F. Keep public areas such as hallways, stairs, elevator lobbies and toilet rooms free from accumulation of waste, rubbish or construction debris.
- G. Smoking or open fires will not be permitted within the building enclosure or on the premises.
- H. Cooperate fully with the Owner and/or the Owner's representative during construction operations to minimize conflicts with other Trades. Perform the work so as not to interfere with the Owner's operation.
- I. The Contractor shall be apprised of and be compliant with Facility Requirements, which shall be presented to the Contractor, prior to or during mobilization to, the project site.

DIVISION 2 – EXISTING CONDITIONS

1.14 SUBMITTALS

A. Pre-Project Submittals

1. Written Respiratory Protection Plan, in accordance with 29 CFR, Parts 1910 and 1926.
2. Written site-specific Health and Safety Plan.
3. All notifications and permits.
4. All Safety Data Sheets (SDS).

B. Post Project Submittals: Upon completion of work on this project the Asbestos Abatement Contractor shall submit the following information to the Owner:

1. Daily activity reports and personnel sign-in sheets
2. Minutes of meetings
3. Visitations; authorized and unauthorized
4. Special or unusual events
5. Waste material disposal manifests

PART 2 DESCRIPTION OF THE WORK

2.1 Scope of Work

A. Prior to the commencement of abatement, the Contractor shall coordinate with the General Contractor to ensure that all electric to the Boilers are locked out/tagged out, and any other boiler utilities are shut down as required to complete the work.

B. The DWLD licensed Asbestos Abatement Contractor shall remove the following asbestos containing materials identified in the Table below. Refer to Architectural and Engineering Drawings prepared by Mott MacDonald for additional information.

Table 1 – Asbestos Containing Material Quantity Woodbine Developmental Center - Powerhouse 1175 Dehirsch Avenue Woodbine, New Jersey			
Material	Location	Quantity	Method of Removal
Band Caulk associated with Stack	Ventilation Stack Exterior	520 LF	Non-friable – Exterior Abatement
Gasket at Breaching Seams	Boiler Breaching	99 LF	Wrap & Cut or Non-Friable Intact Removal
Gasket at Breaching Door	Boiler Breaching	20 LF	Wrap & Cut or Non-Friable Intact Removal

SF – Square Feet | LF – Linear Feet

C. The Contractor shall be responsible for removing all breaching seam gaskets necessary to facilitate breaching removal and replacement as specified in Mott MacDonald Plans and Specification for this project.

D. Surfaces throughout the Powerhouse, including but not limited to, windows and breaching, are contaminated with bird guano. The Contractor shall be responsible for cleaning guano contaminated surfaces where required to facilitate renovations. Refer to Specification section 02 85 00.

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- E. The quantities shown are for informational purposes only. The Contractor shall inspect and verify all locations, quantities and measurements indicated in Contract Documents prior to bidding. No additional compensation shall be awarded for failure to complete said review or inspection.

2.2 ADDITIONAL INFORMATION

- A. The appropriate Trade performing the abatement of asbestos containing materials shall refer to the appropriate Architectural and Engineering Plans, as prepared by the Mott MacDonald, for reference with respect to the locations that will require asbestos abatement as outlined in this Section of the Technical Specifications.
- B. The Contractor shall ensure all electrical and other means of hazardous energy is appropriately de-energized, locked-out/tagged-out, in accordance with 29 CFR, Part 1910.147.
- C. The Contractor shall comply with the OSHA Technical Manual, Section III, Chapter #4, relative to heat stress.
- D. The Contractor shall be advised of OSHA bulletin 3156 from 1998 regarding Cold Stress, the asbestos abatement work may be scheduled during seasons with cold weather and there is exterior asbestos abatement work.
- E. The Contractor shall be responsible for the cleaning of all suspect asbestos containing debris and dust within the work areas, prior to asbestos abatement, which is an industry standard. The cleaning shall consist of High Efficiency Particulate Air (HEPA) vacuuming and/or wet-wiping/mopping surfaces within the work. For large debris items, the debris shall be misted with amended water prior to packaging as asbestos waste.
- F. The Contractor shall comply with all applicable OSHA regulations, relative to fall protection, operation of boom lifts, etc., where applicable, and the manufacturer's recommendations, which shall be included with the Contractor's Health and Safety Program. Boom lift operations, where applicable, shall be in accordance with the American National Standards Institute (ANSI) A92.2-1969 and 29 CFR, Part 1926.453 – Aerial Lifts. Fall Protection, as per 29 CFR, Part 1926.502 – Fall Protection Systems Criteria and Practices, shall also be followed, in addition to any applicable federal, state and local regulations for such activities.
- G. AFDs shall exhaust via duct work to the exterior of the building.
- H. Where suspect asbestos containing materials that are not identified above are uncovered during alterations and renovations work, the activities shall cease. The suspect asbestos containing materials shall be inspected by an accredited USEPA Asbestos Building Inspector. A third party independent laboratory that is accredited by the American Industrial Hygiene Association (AIHA), participating in the National Voluntary Laboratory Accreditation Program (NVLAP) shall provide analytical services. Sampling efforts and analytical services shall not be cause for a delay claim by the Contractor against the Owner, the Owner's representative and/or the Owner's agents, as well as the Prime and/or General Contractor.

2.3 SCHEDULE

- A. The Contractor shall complete all work referenced herein within a schedule determined by Mott MacDonald. Environmental Connection, Inc., (EC) shall provide an Industrial Hygiene Technician (IHT) that shall monitor the project and complete Phase Contrast Microscopy (PCM) air sampling with on-site analysis, as well as provide for post asbestos abatement air sampling for demobilization and work area re-occupancy with Transmission Electron Microscopy (TEM). TEM sampling shall be employed where more than 160 square feet/260 linear feet of asbestos

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containing materials are removed, per work area, that shall require analysis by a third party, independent laboratory that is accredited by the American Industrial Hygiene Association (AIHA) and is a National Voluntary Laboratory Accreditation Program (NVLAP) participant. Results for TEM post abatement air samples shall be available within six (6) hours upon receipt by the laboratory.

- B. Should final clearance air samples fail for all or any of the phases, the Contractor shall re-clean the work area at no additional cost to the Owner or his/her representatives. Additional costs incurred for all re-sampling of the work area shall be the responsibility of the Contractor, at no additional cost to the Owner or his/her representatives.
- C. The Contractor's schedule shall account for 10-day notifications to Federal and State Enforcement Agencies prior to the project start date. These contingencies shall not be cause for a delay claim to complete the asbestos abatement work within the renovation project's schedule.
- D. Asbestos abatement work shall be completed prior to all demolition and renovation work by other Trades.
- E. Failure for the Contractor to complete the project in said time period will result in liquidated damages of \$1,000.00 per day, for each day the project exceeds the project completion date.
- F. Should final clearance air and/or surface samples fail, the Contractor shall re-clean the work area at no additional cost to the Owner, the Owner's representative and/or the Prime/General Contractor. Additional costs incurred for all re-sampling of the work area shall be the responsibility of the Contractor, at no additional cost to the Owner, Owner's representative and/or the Prime/General Contractor.

PART 3 ASBESTOS ABATEMENT REQUIREMENTS

3.1 GENERAL REQUIREMENTS

- A. The Contractor shall provide a "competent person" on-site at all times, in accordance with OSHA Regulations, and shall maintain the necessary staffing to complete the project in accordance with the project schedule. The competent person shall have knowledge in construction and shall be knowledgeable in reading and interpreting construction documents.
- B. All materials (i.e., caulk, polyethylene sheeting, lumber, etc.) utilized in association with asbestos abatement activities shall be of nominal size and fire-retardant. All polyethylene sheeting shall be six (6) mil in thickness.
- C. Worker Protection
 - 1. The Contractor shall utilize workers trained in accordance with 29 CFR, Part 1926.1101, dangers inherent in handling asbestos and breathing asbestos dust and in proper work procedures and personal and area protective measures.
 - 2. Appropriate respiratory protection shall be provided by the employer, upon notification that employees have received medical clearance and monitoring, followed by passing respiratory fit testing, and have read the Contractor's written Respiratory Protection Program.
 - a. The Contractor shall provide medical examinations for all workers in accordance with 29 CFR, Part 1926.1101. Provide an evaluation of the individual's ability to work with respiratory protection in an environment capable of producing heat stress in the worker.

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- b. The Contractor shall have a respiratory protection program established which is in compliance with ANSI Z88.2 - 1980 "Practices for Respiratory Protection" and OSHA's 29 CFR, Parts 1910 and 1926. The written program shall be posted at the job site.
 - c. Provide half-face or full-face type respirators to each worker. Equip full face respirators with a nose cup or other anti-fogging device. If negative pressure air purifying respirators are being used, the Contractor shall supply a sufficient quantity of respirator filters approved for asbestos dust, so that workers can change filters during the work day. Store respirators and filters at the job site and protect from exposure to asbestos prior to their use. Clean and sanitize as required.
 - d. Provide, at a minimum, HEPA type filters labeled with NIOSH and MSHA Certification for "Radionuclides, Radon Daughters, Dust, Fumes, Mists including Asbestos-Containing Dusts and Mists" and color coded in accordance with ANSI Z88.2 (1980). In addition, a chemical cartridge section may be added, if required, for solvents, etc., in use. In this case, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH/MSHA Certification.
 - e. Single use, disposable, or quarter face respirators are strictly forbidden for use during asbestos containing roofing removal and related work.
 - f. No one having a beard or other facial hair in the respiratory facial fit area will be permitted to don a respirator and enter the work area.
3. Provide disposable full-body coveralls including foot and head covers and require that they be worn by all workers in the work area. Provide a sufficient number for all required changes, for all workers in the work area.
 4. Provide gloves to all workers and require that they be worn inside the work area. Do not remove gloves from the work area rather dispose of as asbestos contaminated waste at the end of work.
 5. The Contractor shall strictly prohibit workers from eating, drinking, smoking and chewing gum or tobacco while within the work area. In order to perform any of these functions, workers must exit the work area, and are required to follow the outlined decontamination procedures on each occasion.
- D. Perform United States Department of Labor, Occupational Safety and Health Administration, (OSHA) 8-hour Time Weighted Average personal exposure air monitoring in accordance with 29 CFR, Part 1926.1101. OSHA monitoring is solely the responsibility of the Contractor, and the Contractor shall ensure that the Contractor's Supervisor performs OSHA monitoring in accordance with 29 CFR, Part 1926.1101. The Owner's representative is not responsible for the Contractor's compliance with OSHA monitoring.
1. Negative Exposure Assessment: The employer shall demonstrate that employees trained in accordance with 29 CFR, Part 1926.1101, shall be exposed to airborne fiber concentrations below the Permissible Exposure Limit (PEL) of less than 0.1 fibers per cubic centimeter of air. However, such as with typical roofing products, product data may demonstrate the material does not release fibers under normal circumstances and/or when removed, that exceeds the PEL for an 8-hour Time Weighted Average (TWA) or the excursion limit (EL) of 1.0 fibers per cubic centimeter of air; therefore, personal monitoring may not be required. If the employer has monitored employees on previous

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similar projects, within twelve (12) months of the current project, and the PEL and EL were not exceeded, then the aforementioned monitoring is not necessarily required.

- E. The Contractor shall establish the means for personnel decontamination, such as, but not limited to:
 - 1. Decontamination procedures requiring personnel entering the work area/performing the work, to don two (2) protective suits. The first suit shall be a protective suit and shall be HEPA vacuumed, removed and placed in appropriate disposal bags, prior to exiting. The second suit shall be removed and disposed of appropriately upon exiting the work area. The Contractor shall establish hygiene facilities for hand, face, etc.; respiratory protection shall be removed during this process and the respirator cleaned of all visible dust/debris.
 - 2. Construction of a personal decontamination unit which consists of a shower room for the workers to remove protective clothing and wash hands, face, etc., and a clean room to be used for changing from street clothes into protective clothing and to dry off from decontaminating and donning street cloths at the end of the work shift.
 - a. A decontamination unit with an equipment, shower and clean room shall be construed as a decontamination unit constructed remote, but in proximity to, the work area(s). Therefore, personnel shall exit the work area in the same manner as Part 3, Article 3.1.E.1.
 - b. The shower chamber shall be the hygiene facility for all workers involved with the removal of asbestos containing materials.
- F. Ensure all HVAC and electrical systems within proximity to the work area are deactivated and/or protected with polyethylene sheeting that is secured airtight with duct tape.
- G. Asbestos warning signs and/or tape shall be posted around the perimeter of the exterior work areas for the removal of asbestos containing materials.
- H. No asbestos containing material shall be disturbed during preparation activity. The exception is asbestos material required to be cleaned up to complete preparation shall be treated first with an amended water solution and removed in a manner designed to limit or prevent fiber release to the environment.
- I. Removal activities shall generate no visible emissions, as enforceable under 40 CFR, Part 61 of the National Emissions Standard for Hazardous Air Pollutants (NESHAPS).
- J. All asbestos waste bags and packages shall be labeled with the prescribed federal OSHA warning signs and shall include site specific waste generator information.
 - 1. The Contractor shall provide a fully enclosed, watertight waste container complete with a locking device for storage of all contaminated waste removed from the site. The waste container shall have asbestos warning signs affixed to all sides and doors. A perimeter warning band shall be placed near the trailer location and the exterior route of travel during waste transfer activities.
 - 2. The Contractor shall be responsible for coordination of waste removal immediately upon completion of the project. This is essential in order to obtain a permit for re-occupancy. No payment shall be made to the Contractor until all contaminated waste has been removed from the site and a waste manifest signed by the proper authority is submitted to the Owner.
 - 3. Asbestos waste that may puncture or tear waste bags, and which is required to be bagged for disposal, shall be placed in cardboard boxes, burlap or nylon sacks, or other protective covering, prior to bagging, as necessary to ensure that bags are not punctured or torn during the disposal process. Items that are too large for standard bagging that require

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bagging for disposal, shall be wrapped in two (2) layers of six (6) mil polyethylene sheeting and sealed with duct tape. All asbestos waste shall be packaged and disposed of in accordance with all applicable local, state and federal regulations and ordinances.

3.2 NOTIFICATIONS, WARNING SIGNS, LABELS AND POSTINGS

- A. At the entrance to each work area, the Contractor's ingress/egress point to the work area and at the waste removal route, and all sides of the waste dumpster/container, post an approximate 20-inch by 14-inch manufactured caution sign displaying the following legend with letter sized and styles of a visibility required by 29 CFR, Part 1926:

**DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED
IN THIS AREA**

- B. Disposal/Waste Bags/Containers shall be labeled as follows:

DANGER

CONTAINS ASBESTOS FIBERS

AVOID CREATING DUST

CANCER AND LUNG DISEASE HAZARD

AVOID BREATHING AIRBORNE ASBESTOS FIBERS

AND

Asbestos, NA2212, RQ

AND

Class 9 Label

In addition, the Contractor shall also label all disposal bags and/or containers with the name of the waste generator (Owner) and the location from which the waste was generated; all in accordance with the USEPA NESHAPS regulation - 40 CFR, Part 61, Sub-part M.

- C. Provide other signs, labels, warnings and posted instructions that are necessary to protect, inform and warn people of the hazard from asbestos exposure. Post in a prominent and convenient place for the workers a copy of the latest applicable regulations from OSHA, USEPA and NIOSH.
- D. Post Construction Permits, if applicable, at the entrance to the work area(s).
- ### 3.3 WRAP AND CUT REMOVAL OF ASBESTOS CONTAINING THERMAL SYSTEM ASSOCIATED INSULATING MATERIALS
- A. Description of the Work
1. This Section describes the procedure to remove asbestos containing thermal system materials utilizing "wrap and cut" methods. Refer to Part 2 of this Technical

DIVISION 2 – EXISTING CONDITIONS

Specification for additional information regarding quantity and location of materials to be removed utilizing this method.

B. Products

1. Amended Water
2. Wettable/Adhesive Lagging Cloth
3. Six (6) mil Disposal Bags
4. Six (6) mil polyethylene sheeting
5. HEPA vacuum
6. High Quality Duct Tape
7. Spray Glue
8. Reciprocating power saw

C. Execution

1. Post appropriate warning signs and/or tape at the entrance to the work area(s) and around the work area boundaries.
2. All work shall be conducted in strict accordance with applicable federal, state and local regulations and shall be coordinated through the Owner's representative. The Contractor shall erect a negative pressure enclosure with a remote three-stage decontamination unit, as outlined in these Technical Specifications. The negative pressure enclosure shall consist of critical barriers, two (2) layers of six (6) mil polyethylene sheeting, sealed at all openings in the work area (i.e., windows, doors, doorways, etc.). If required by appropriate code, all wall, ceiling and floor surfaces shall be protected with two (2) layers of six (6) mil polyethylene sheeting.
3. HEPA filter equipped negative air filtration devices shall be incorporated in the work areas, exhausting to the building exterior, in sufficient quantity to establish a minimum work area pressure differential of -0.02 inches of water column, with four (4) air exchanges per hour. Upon request by the Owner's representative and/or the Owner, the Contractor shall provide calculations demonstrating compliance with the work area pressure requirements.
4. The Contractor shall adequately wet all asbestos containing materials with amended water and wrap all exposed thermal system insulation with two individual layers of six (6) mil polyethylene sheeting. Each layer shall be sealed with high grade duct tape, and "candy-striped" around the system to create the best seal possible.
5. Upon the wetting, wrapping and sealing of thermal system insulation the Contractor shall cut the metal at existing spatial openings into manageable sections. These wetted, wrapped and sealed sections shall be properly labeled and disposed of as asbestos waste.
6. The Contractor shall remove all asbestos containing materials from the work site in double six (6) mil polyethylene waste bags or impermeable packages. All asbestos materials shall be adequately wet with amended water using a fine low-pressure sprayer or other wetting mechanism. The surfactant used by the Contractor shall be available at all times at the work site. The Contractor shall ensure that all asbestos waste materials are sufficiently saturated with amended water to prevent fiber emission and/or visible emissions.
7. Shower water from the decontamination unit shall be added to the asbestos containing waste or contained and solidified and disposed of as asbestos contaminated waste. No waste water shall be disposed of in a sanitary drain.

DIVISION 2 – EXISTING CONDITIONS

8. Critical barriers, decontamination and negative air pressure systems shall remain operational until final air tests indicate acceptable clearance criteria and authorization to disassemble the containment structure is obtained from the Owner's representative.
9. All asbestos waste bags, metal sections and other waste packages shall be labeled with the prescribed Federal OSHA warning signs and shall include site specific waste generator information.
10. The Contractor shall provide a fully enclosed, watertight waste container complete with a locking device for storage of all contaminated waste removed from the site. The waste container shall have asbestos warning signs affixed to all sides and doors. A perimeter warning band shall be placed near the trailer location and along the exterior route of travel during waste transfer activities. The Contractor shall be responsible for coordination of waste removal immediately upon completion of the project.

3.4 REMOVAL OF ASBESTOS CONTAINING CAULKS ASSOCIATED WITH EXTERIOR MASONRY

A. Description of Work

1. This Section describes the procedure to remove asbestos containing caulk associated with masonry utilizing non-friable methods. Refer to Part 2 of this Technical Specification Section for additional information and locations where asbestos containing insulating materials are to be removed utilizing this method

B. Products

1. Six (6) mil polyethylene sheeting
2. Garden Sprayer
3. HEPA filter equipped Vacuum
4. Six (6) mil Disposal Bags
5. Hand Scraper/ Caulk extractor
6. HEPA shroud equipped Caulk Remover
7. Asbestos Warning Signs/ Caution Tape

C. Execution

1. The Contractor shall be responsible for furnishing all labor, equipment, supplies, ladders, scaffolding, plant, etc., to facilitate the work specified herein.
2. The Contractor shall pre-clean the area below the proposed work area prior to the installation of the drop cloth.
3. Post appropriate warning signs and/or tape at the entrance to the work area and around the work area boundaries.
4. The Contractor shall place a single layer of six (6) mil polyethylene sheeting, as a drop cloth, around the perimeter of the work area. The Contractor shall be responsible for weighting or staking said sheet(s) to the ground to ensure the sheets do not blow away during the course of the project. At minimum the drop cloth shall extend five (5) feet from the perimeter of the work area

DIVISION 2 – EXISTING CONDITIONS

5. Once engineering controls, remote personal decontamination units and work area isolation is established and operational, commence with the removal of asbestos containing materials.
6. Where possible, materials shall be removed intact, in conjunction with wet methods. If cutting machines are to be employed, they must be equipped with a High Efficiency Particulate Air (HEPA) filtration vacuum shroud. The shroud must operate continuously during removal. Otherwise Wet scrape in conjunction with HEPA filter equipped vacuuming.
7. Continuously mist the asbestos containing material with amended water (surfactant in water solution) to minimize airborne particulates/fibers, prior to and during removal.
8. The Contractor shall comply with the NESHAP regulation, which prohibits visual emissions during abatement.
9. All abated surfaces shall be HEPA filter equipped vacuumed to extract dust and debris. The same shall apply to the drop cloth at the end of each work shift.
10. At the end of each work shift, the polyethylene sheeting drop cloth shall be vacuumed with a HEPA filter equipped vacuum and then misted with amended water. Roll the corners of the drop cloth inwards towards the center of the sheet. Place the sheet in two 6-mil polyethylene waste bags and dispose as asbestos waste.
11. Engineering controls shall remain operational until a satisfactory visual inspection, and where required, final clearance air samples have been collected and the clearance criteria achieved.

3.5 WORK AREA(S) CLEAN UP

- A. First Cleaning: Carry out a first cleaning of all surfaces of the Work Area including items of remaining sheeting, tools, scaffolding and/or staging by use of damp-cleaning and mopping, and/or a High Efficiency Particulate Air (HEPA) Filtered Vacuum. (Note: A HEPA vacuum may fail if used with wet material.) Do not perform dry-dusting or dry sweeping. Use each surface of a cleaning cloth one time only and then dispose of as contaminated waste. Continue this cleaning until there is no visible debris from removed materials or residue on plastic sheeting or other surfaces.
- B. Second Cleaning: Carry out a second cleaning of all surfaces in the work area in the same manner as the first cleaning.
- C. Encapsulation of Exposed Surfaces: Where surfaces have been removed of asbestos containing materials, perform encapsulation of work area surfaces. Apply two (2) individual coats to all exposed surfaces and allow to dry between coats. Assure color is sufficiently distinct to allow for identification of applications.
- D. Final Cleaning: Carry out a Final Cleaning of all surfaces in the Work Area in the same manner as the previous cleaning.
- E. Removal of Work Area Isolation: After approval of the visual inspection and testing, remove Personnel Decontamination Unit and Critical Barriers. Remove any small quantities of residual material found upon removal of the plastic sheeting with wet wiping, HEPA filtered vacuum cleaners. If significant quantities, as determined by the owner's representative, are found, then the entire area affected shall be decontaminated as specified in Cleaning and Decontamination Procedures.
- F. Remove all equipment, materials and debris from the work site. Dispose of all asbestos containing

DIVISION 2 – EXISTING CONDITIONS

waste material as specified in Disposal of Asbestos Containing Waste Materials.

PART 4 WASTE HANDLING AND DISPOSAL

4.1 ASBESTOS WASTE HANDLING AND DISPOSAL

- A. Disposal bags shall be six (6) mil, leak tight, and labeled in accordance with OSHA, NESHAPS, and the United States Department of Transportation (USDOT) regulations.
- B. Load all asbestos containing waste material in disposal bags or leak-tight drums. All materials are to be contained in one (1) of the following:
 - a. Two (2), six (6) mil disposal bags, or,
 - b. Two (2), six (6) mil disposal bags and a fiberboard drum, or
 - c. Two (2), six (6) mil disposal bags and sealed steel drum.
- C. Two (2) layers of six (6) mil polyethylene sheeting shall be utilized for wrapping large components not suited for disposal bags or drums.
- D. Duct tape shall be used to seal disposal bags and wrapped components.
- E. The Contractor's vehicle and/or dumpster shall be lined with a critical barrier. The Contractor's vehicle and/or dumpster utilized to transport the asbestos waste off-site, and the Waste Hauler shall be licensed by the New Jersey Department of Environmental Protection.
- F. Maintain records of waste shipments in accordance with NESHAPS 40 CFR, Part 61, Section 61.150, (d) 1-5 and (e).
- G. Notify the USEPA ID #27 approved landfill within 10-days prior to transportation of the asbestos containing waste to the landfill. Provide the name and address of the landfill. Retain manifest from the landfill for all materials disposed of. At the completion of asbestos abatement, forward all manifests to the Owner.
- H. On-site activities shall not be considered complete until all waste is off-site, upon demobilization of the work area(s), and after receipt of satisfactory final clearance air sample results.

4.2 REGULAR CONSTRUCTION DEBRIS WASTE DISPOSAL

- A. Demolished materials shall be treated as regular construction debris ID Waste No. 13. Material and packaged in four (4) mil polyethylene bags for disposal.
- B. All waste shall be disposed of in accordance with the County waste flow plan, as applicable. The specific landfill facility chosen must be designated by the State of New Jersey, Department of Environmental Protection, as the recipient facility for the community in which the project is located.
- C. The waste hauler must possess a valid solid waste transporter registration issued by the state in which the remediation work is to occur. A licensed solid waste transporter shall be a commercial collector/hauler or the Contractor if so registered.

PART 5 AIR MONITORING

5.1 SUMMARY

DIVISION 2 – EXISTING CONDITIONS

- A. Where required by the Owner, the State of New Jersey, Department of Treasury, Division of Property Management and Construction, (DPMC) and/or the Architectural/Engineering Firm of Record, air monitoring shall be performed by EC to demonstrate the effectiveness of engineering controls and methods for the removal of asbestos containing materials with respect to the potential release of asbestos fibers, and the clearance of the work area(s) for re-occupancy.
1. This Section describes air monitoring to verify that the building beyond the work area(s) and the outside environment remains uncontaminated.
 2. This Section also sets forth work area clearance criterion.
- B. AIR MONITORING REQUIRED BY OSHA IS WORK OF THE CONTRACTOR AND IS NOT COVERED IN THIS SECTION.
- C. Daily air monitoring shall be completed along the work area perimeter. Sample collection and analysis shall be in accordance with the National Institute of Occupational Safety and Health (NIOSH) method #7400, most recent revision, by Phase Contrast Microscopy (PCM). The acceptable airborne fiber concentrations for this type of analysis shall be less than 0.01 fibers per cubic centimeter (f/cc) of air.
- D. Final Clearance Air Monitoring
1. Final clearance air samples shall be collected at the completion of the asbestos abatement activities, upon receipt of a satisfactory Clean-up Inspection, in writing by the Environmental Consultant to the Contractor.
 2. Engineering controls, critical barriers and the decontamination unit shall remain during final clearance air sampling.
 3. A minimum of five (5) samples will be taken from the work area(s) and analyzed in accordance with the method set forth in the AHERA Regulation 40 CFR, Part 763, Appendix A, and N.J.A.C. 8:60 and 12:120.
 - a. For work area(s) where more than 260 LF/160 SF of asbestos containing materials have been removed, final clearance samples shall be collected/analyzed utilizing Transmission Electron Microscopy (TEM).
 - b. For work area(s) where less than 260 LF/160 SF of asbestos containing materials have been removed, final clearance samples shall be collected/analyzed utilizing Phase Contrast Microscopy (PCM).
 - c. TEM samples shall be analyzed at a laboratory accredited by the American Industrial Hygiene Association, participating in the National Voluntary Laboratory Accreditation Program (NVLAP). Analytical results shall be available to the Owner's representative within six (6) hours upon receipt by the laboratory.
 - d. PCM samples shall be analyzed in accordance with the most recent revision to NIOSH method 7400.
 4. Acceptable Clearance Criteria for work area(s) demobilization and re-occupancy shall be as follows:
 - a. TEM: less than 70 Structures per millimeter squared.
 - b. PCM: less than 0.01 fibers per cubic centimeter.

END OF SECTION 02 82 00

SEE EXHIBIT C

**REPORT - Hazardous Material Testing Powerhouse - Woodbine Developmental Center 1175 Dehirsch
Avenue Woodbine, New Jersey 08270 DPMC Project #M1514-00**

DIVISION 2 – EXISTING CONDITIONS

SECTION 02 83 13 - LEAD IN CONSTRUCTION

PART 1 – GENERAL REQUIREMENTS

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.
- B. Environmental Connection, Inc., report dated June 20, 2018, Hazardous Material Testing Powerhouse - Woodbine Developmental Center 1175 Dehirsch Avenue Woodbine, New Jersey 08270 DPMC Project #M1514-00 presented in Appendix “A” of Specification Section 028200.

1.2 DESCRIPTION

This Section specifies the treatment of lead in construction, which can either be lead containing materials or lead based paint and controls needed to limit occupational and environmental exposure to lead hazards.

- A. For the purposes of this document, the term Contractor shall apply to any and all Trades that will disturb surfaces, components, objects, etc., coated with paint, shellac, varnish, stains, etc., and potentially generate dust, debris, airborne contaminants, etc., as a result of the powerhouse exhaust stack replacement activities at the Woodbine Developmental Center located in Woodbine, New Jersey. Should the tasks involved within the scope of work disturb paint, shellac, varnish or stains, the Contractor shall employ the Minimum Safe Work Practices Requirements identified within Part 3.1.C of this Section.
- B. Based on limited sampling of paints, Lead Based Paint (LBP) has been identified in the following locations listed in the table below.

Table 1 – Lead-Based Paint Building Components Woodbine Developmental Center - Powerhouse 1175 Dehirsch Avenue Woodbine, New Jersey		
Component	Color	Quantity
Boiler Room Walls	Gray	2,100 SF
Window Mullions	Black	5,040 SF
Metal Fire Door to Locker Room	Red	90 SF
Locker Room Door Frame to Exterior	Tan	10 SF
Locker Room Door to Exterior	Tan	24 SF
Lintel between Boiler Room and Generator Room	Brown	12 SF

DIVISION 2 – EXISTING CONDITIONS

Table 1 – Lead-Based Paint Building Components Woodbine Developmental Center - Powerhouse 1175 Dehirsch Avenue Woodbine, New Jersey		
Component	Color	Quantity
Louvers	Red	180 SF
Louver Frame	Red	96 SF

SF – Square Feet

- D. At all other tested paint locations, lead was detected at concentrations below the threshold for LBP. However, the United States Department of Labor, Occupational Safety and Health Administration, (OSHA) does not establish a threshold for lead based paint. Therefore, the Contractor shall comply with 29 CFR, Part 1926.62, and the New Jersey Public Employee Occupational Safety and Health (PEOSH) program, Indoor Air Quality Standard, N.J.A.C. 12:100-13, if applicable.

- E. Work referenced within these Technical Specifications is not to address potential lead health issues and children, as outlined by N.J.A.C. 5:17, which is the New Jersey Lead Hazard Evaluation and Abatement Code; 40 CFR, Part 745, the Lead Based Paint Poisoning Prevention in Certain Residential Structures, including child occupied buildings; and/or N.J.A.C. 5:10, the New Jersey Regulations for Lead-Safety Maintenance of Rental Housing.

- F. Treatment of Painted Surfaces: The United States Department of Labor, Occupational Safety and Health Administration, (OSHA) does not establish a threshold lead level to determine a coating as lead-based paint. As such, the Contractor shall utilize appropriate engineering controls and personal protective equipment when disturbing paint. This shall also apply for any demolition work that generates nuisance dust/particulates. Further, where applicable, the New Jersey Public Employees Occupational Safety and Health (PEOSH) program, requires, at a minimum, the use of engineering controls during demolition/construction work to minimize dust/particulates.
 - 1. To fulfill the requirements of OSHA, the disturbance of any coating (i.e., paint, stain, shellac, varnish, glazed ceramic tiles, etc.) should be treated by a Contractor in accordance with 29 CFR, Part 1926.62, the OSHA “Lead in Construction Standard.” In addition, State Facilities are within the jurisdiction of PEOSH. The New Jersey Air Quality Standard, N.J.A.C. 12:100-13, if applicable, requires the Contractor’s engineering controls to diffuse dust, stone and other small particles, toxic gases or other harmful substances in quantities hazardous to health by means of work area isolation, local ventilation and other protective devices.

 - 2. OSHA’s “Lead in Construction Standard” requires, at a minimum, the Contractor provide a site specific Lead Safety Plan to address 1.) worker protection, including respiratory protection; 2.) worksite contamination, clean-up, including personal hygiene, and waste disposal; and 3.) exposure monitoring for workers as required by the OSHA, for those persons whose trade will disturb painted surfaces as a result of demolition activities, paint refinishing, construction and re-construction, etc.

DIVISION 2 – EXISTING CONDITIONS

1.3 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only.
- B. Code of Federal Regulations (CFR):
 - CFR 29, Part 1910.....Occupational Safety and Health Standards
 - CFR 29, Part 1926.....Safety and Health Regulations for Construction
 - CFR 40, Part 148.....Hazardous Waste Injection Restrictions
 - CFR 40, Part 260.....Hazardous Waste Management System: General
 - CFR 40, Part 261.....Identification and Listing of Hazardous Waste
 - CFR 40, Part 262.....Standards Applicable to Generators of Hazardous Waste
 - CFR 40, Part 263.....Standards Applicable to Transporters of Hazardous Waste
 - CFR 40, Part 264.....Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
 - CFR 40, Part 265.....Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
 - CFR 40, Part 268.....Land Disposal Restrictions
 - CFR 49, Part 172.....Hazardous Material Table, Special Provisions, Hazardous Material Communications, Emergency Response Information, and Training Requirements
 - CFR 49 Part 178.....Specifications for Packaging
- C. National Fire Protection Association (NFPA):
 - NFPA 701-2004Methods of Fire Test for Flame-Resistant Textiles and Films
- D. National Institute for Occupational Safety and Health (NIOSH)
 - NIOSH OSHA Booklet 3142 Lead in Construction
- E. Underwriters Laboratories (UL)
 - UL 586-1996 (Rev 2004)..High-Efficiency, Particulate, Air Filter Units
- F. American National Standards Institute
 - Z9.2-2001Fundamentals Governing the Design and Operation of Local Exhaust Systems
 - Z88.2-1992Respiratory Protection

1.4 DEFINITIONS

- A. Action Level: Employee exposure, without regard to use of respirations, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8-hour period. As used in this section, "30 micrograms per cubic meter of air" refers to the action level.
- B. Area Monitoring: Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations which may reach the breathing zone of personnel potentially exposed to lead.
- C. Physical Boundary: Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean the same as "outside lead control area."

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- D. Certified Industrial Hygienist (CIH): As used in this section, refers to an Industrial Hygienist employed by the Contractor and is certified by the American Board of Industrial Hygiene in comprehensive practice.
- E. Change Rooms and Shower Facilities: Rooms within the designated physical boundary around the lead control area equipped with separate storage facilities for clean protective work clothing and equipment and for street clothes which prevent cross-contamination.
- F. Competent Person: A person capable of identifying lead hazards in the work area and is authorized by the Contractor to take corrective action.
- G. Decontamination Room: Room for removal of contaminated personal protective equipment (PPE).
- H. Eight-Hour Time Weighted Average (TWA): Airborne concentration of lead averaged over an 8-hour work day to which an employee is exposed.
- I. High Efficiency Particulate Air (HEPA) Filter Equipment: HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated paint dust. A high efficiency particulate filter means 99.97 percent efficient against 0.3 micron size particles.
- J. Lead: Metallic lead, inorganic lead compounds, and organic lead soaps. Excluded from this definition are other organic lead compounds.
- K. Lead Control Area: An enclosed area or structure with full containment to prevent the spread of lead dust, paint chips, or debris of lead-containing paint removal operations. The lead control area is isolated by physical boundaries to prevent unauthorized entry of personnel.
- L. Lead Permissible Exposure Limit (PEL): Fifty micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR, Part 1910.1025. If an employee is exposed for more than 8 hours in a work day, the PEL shall be determined by the following formula. $PEL \text{ (micrograms/cubic meter of air)} = 400/\text{No. of hours worked per day}$.
- M. Personnel Monitoring: Sampling of lead concentrations within the breathing zone of an employee to determine the 8-hour time weighted average concentration in accordance with 29 CFR, Part 1910.1025. Samples shall be representative of the employee's work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 150 mm to 225 mm (6 to 9 inches) and the center at the nose or mouth of an employee.

1.5 QUALITY ASSURANCE

- A. Before exposure to lead-contaminated dust, provide workers with a comprehensive medical examination as required by 29 CFR, Part 1926.62 (I) (1) (i) & (ii). The examination shall not be required if adequate records show that employees have been examined as required by 29 CFR, Part 1926.62(I) within the last year.
- B. Medical Records: Maintain complete and accurate medical records of employees in accordance with 29 CFR, Part 1910.20.
- C. CIH Responsibilities: The Contractor shall employ a Certified Industrial Hygienist who will be responsible for the following:
 - 1. Certify Training.

DIVISION 2 – EXISTING CONDITIONS

2. Review and approve lead safe work practices plan for conformance to the applicable referenced standards.
 3. Inspect the work for conformance with the approved plan.
 4. Direct monitoring.
 5. Ensure work is performed in strict accordance with specifications at all times.
 6. Ensure hazardous exposure to personnel and to the environment are adequately controlled at all times.
- D. Training: Train each employee performing paint removal, disposal, and air sampling operations prior to the time of initial job assignment, in accordance with 29 CFR, Part 1926.62.
- E. Training Certification: Submit certificates signed and dated by the CIH and by each employee stating that the employee has received training.
- F. Respiratory Protection Program:
1. Furnish each employee required to wear a negative pressure respirator, or other appropriate type, with a respirator fit test at the time of initial fitting and at least every six (6) months thereafter as required by 29 CFR, Part 1926.62.
 2. Establish and implement a respiratory protection program as required by 29 CFR, Part 1910.134, 29 CFR, Part 1910.1025, and 29 CFR, Part 1926.62.
- G. Hazard Communication Program: Establish and implement a Hazard Communication Program as required by 29 CFR, Part 1910.1200.
- H. Hazardous Waste Management: The Hazardous Waste Management Plan shall comply with applicable requirements of Federal, State, and local hazardous waste regulations and address:
1. Identification of hazardous wastes associated with the work.
 2. Estimated quantities of wastes to be generated and disposed of.
 3. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and a 24-hour point of contact. Furnish two (2) copies of NJ DEP, state and, if applicable, local hazardous waste permit applications, permits and EPA Identification numbers.
 4. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.
 5. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.
 6. Spill prevention, containment, and clean-up contingency measures to be implemented.
 7. Work plan and schedule for waste containment, removal and disposal. Wastes shall be cleaned up and containerized daily.
 8. Cost for hazardous waste disposal according to this plan.
- I. Safety and Health Compliance:
1. In addition to the detailed requirements of this Specification, comply with laws, ordinances, rules, and regulations of Federal, State, and local authorities regarding removing, handling, storing, transporting, and disposing of lead waste materials. Comply with the applicable requirements of the current issue of 29 CFR, Part 1910.1025.

DIVISION 2 – EXISTING CONDITIONS

2. Where Specification requirements and the referenced documents vary, the most stringent requirements shall apply.
3. The following local laws, ordinances, criteria, rules and regulations regarding removing, handling, storing, transporting, and disposing of lead-contaminated materials apply:
 - a. N.J.A.C. 5:17
 - b. N.J.A.C. 7:26
 - c. N.J.A.C. 8:62

J. Pre-Construction Conference: Meet with the CIH to discuss in detail the lead-containing paint removal work plan, including work procedures and precautions for the work plan.

1.6 SUBMITTALS

A. Submit the following:

- a. Shop Drawings
- b. Product Data
- c. Samples

B. Manufacturer's Catalog Data:

- a. Vacuum filters
- b. Respirators

C. Instructions for:

- a. Paint removal materials (Include applicable Material Safety Data Sheets).

D. Certifications and Statements:

1. Qualifications of CIH: Submit name, address, and telephone number of the CIH selected to perform responsibilities in paragraph entitled "CIH Responsibilities." Provide previous experience of the CIH. Submit proper documentation that the Industrial Hygienist is certified by the American Board of Industrial Hygiene in comprehensive practice, including certification number and date of certification/recertification.
2. Testing Laboratory: Submit the name, address, and telephone number of the testing laboratory selected to perform the monitoring, testing, and reporting of airborne concentrations of lead. Provide proper documentation that persons performing the analysis have been judged proficient by successful participation within the last year in the National Institute for Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) Program. The laboratory shall be accredited by the American Industrial Hygiene Association (AIHA). Provide AIHA documentation along with date of accreditation/reaccreditation.
3. Lead Safe Work Practices Plan:
 - a. Submit a detailed job specific plan of the work procedures to be used in the disturbance of any paint. The plan shall include a sketch showing the location, size, and details of work areas, location and details of decontamination rooms, change rooms, shower facilities, and mechanical ventilation system, where applicable.

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- b. Include in the plan, eating, drinking, smoking and restroom procedures, interface of trades, sequencing of lead related work, collected wastewater and paint debris disposal plan, air sampling plan, respirators, protective equipment, and a detailed description of the method of containment of the operation to ensure that airborne lead concentrations of 30 micrograms per cubic meter of air are not exceeded outside of the lead control area.
- c. Include air sampling, training and strategy, sampling methodology, frequency, duration of sampling, and qualifications of air monitoring personnel in the air sampling portion on the plan.
- d. Field Test Reports: Monitoring Results: Submit monitoring results within three (3) work days, signed by the testing laboratory employee performing the air monitoring, the employee that analyzed the sample, and the CIH.
- e. Records:
 - i. Completed and signed hazardous waste manifest from treatment or disposal facility.
 - ii. Certification of Medical Examinations.
 - iii. Employee training certification.

PART 2 - PRODUCTS

- A. PRODUCTS: Submit applicable Material Safety Data Sheets for paint removal products used in paint removal work. Use the least toxic product, suitable for the job and acceptable as determined by the Industrial Hygienist.

PART 3 EXECUTION

3.1 PROTECTION

- A. Notification: Notify the Owner/Owner's representative 20 days prior to the start of any work involving the disturbance of paint.
- B. Lead in Construction Requirements
The following is a brief summary of the Lead Exposure in Construction requirements, as per 29 CFR, Part 1926.62.
 - 1. Tasks and Trades Covered by This Rule:
 - a. General Contractors - Commercial, Residential, Highway, Street
 - b. Bridge, Tunnel & Elevated Highway
 - c. Plumbing, Painting, Electrical, Plaster, Drywall & Insulation
 - d. Carpentry
 - e. Floor Layers
 - f. Roofing & Siding
 - g. Structural Steel Erection

DIVISION 2 – EXISTING CONDITIONS

- h. Wrecking & Demolition
 - i. Miscellaneous Special Trades
 - j. Operators of Dwellings
 - k. Operators of State & Municipal Governments
2. Exposure Assessment: The initial step in compliance with this rule shall be to assess exposure to lead of any trade known to be or suspected of being exposed to lead. The purpose is to determine if any employee is exposed at or above the action level. Employee exposure is that which occurs without the use of respirators. Action Level for Lead Exposure - 30 micrograms per cubic meter of air, Time Weighted Average (TWA) per 8-hour shift. Permissible Exposure Level Limit (PEL) - 50 micrograms per cubic meter of air, Time Weighted Average (TWA) per 8 hr. shift.
 3. Until the exposure assessment is complete, each affected Trade shall be treated as though exposure occurs above the PEL. Personnel samples representative of a full shift shall be collected and include at least one (1) sample for each job classification in each work area for each shift. The results of the exposure assessment will dictate the protection level to be prescribed. Positive and negative indications of exposure should be carefully documented. Additional exposure monitoring shall occur when there is a change in equipment, task, personnel, process, control or any occurrence which may result in additional or further exposure.
 4. Employees shall be notified of the results within five (5) working days from the completion of the exposure assessment. Employees found to be exposed at greater levels than the PEL shall be given written notice along with the description of corrective measures to be taken to reduce the exposure to below the PEL.
 5. Administrative Controls: If any exposure monitoring results in levels greater than the PEL, the employer shall maintain written programs and make these programs available to employees. Programs shall include: Hazardous Communications (HAZ COM), Respiratory Program in accordance with 29 CFR, Part 1910.134 (b), (d), (e) & (f), Personal Protection Program (including good housekeeping, hygiene facilities and practices, good work practices, etc.) Medical Surveillance, Record Keeping, Training, Medical Removal.
 6. Medical Surveillance: Shall include initial blood sampling for lead and zinc protoporphyrin levels. For employees who are, or may be exposed at, or above the Action Level for more than 30 days in any consecutive 12 months, biological monitoring with employee notification and medical examination and consultation at least annually shall be implemented.
 7. Medical Examination shall include:
 - a. Work History and Medical History (to include past lead exposure).
 - b. Habits: (Smoking & Hygiene).
 - c. Problems with: gastrointestinal, hematologic, renal, cardiovascular, reproductive and neurological problems.

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- d. A thorough physical examination with attention to: teeth, gums, hematologic, gastrointestinal, renal, cardiovascular, and neurological systems.
 - e. Pulmonary Status for respiratory wearers.
 - f. Blood Pressure Measurement.
 - g. Hemoglobin & Hematocrit determination, red cell indices, and peripheral smear morphology.
 - h. Zinc protoporphyrin.
 - i. Blood urea nitrogen.
 - j. Serum creatinine.
 - k. Routine urinalysis with microscopic examination.
 - l. Any other test relevant to lead exposure deemed necessary by examining physician.
8. Any employee is entitled to, with proper notification to the employer, a second opinion. Should the second examination conducted differ from the first in results, the employee and employer shall negotiate a third opinion. Pregnancy testing and male fertility assessment shall be made available to employees requesting testing.
9. Training shall be on an annual basis, for each employee at or above the action level:
- a. Content of OSHA Standard
 - b. Nature of Operations
 - c. Description and purpose of Medical Surveillance, Medical Removal Programs
 - d. Health Effects of Exposure (specific to male and female)
 - e. Engineering controls and work practices
 - f. Any other Compliance Plan in Effect
 - g. Chelation
 - h. Respiratory and Personal Protection
 - i. Right to Access of Records
10. Records shall be kept for a period of 30 years. Records are transferred to the new Owner if employee ceases to do business prior to 30 years. If employer discontinues business with no new Owner, prior to 30 years, records are transferred to the Commissioner. Records shall be maintained for the following:
- a. Exposure Assessment

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- b. Exposure Monitoring
 - c. Respiratory Protection
 - d. Medical Surveillance
 - e. Medical Removals
 - f. Employee Records
11. Records shall be made available for examination and copying to:
- a. Affected Employees
 - b. Former Employees
 - c. OSHA Assistant Secretary and Director
- C. Minimum Safe Work Practices Requirements

In addition to 29 CFR, Part 1926.62, the Contractor shall implement the minimum safe work practices, as developed by the USEPA and the United States Department of Housing and Urban Development (HUD), which includes and shall apply to coatings that could contain lead and for general demolition and construction practices that produce dust, debris, airborne particulates, etc. Procedures referenced herein also incorporate those of OSHA, N.J.A.C. 5:17, and general industry practices, as applicable, for guidance.

- a. Isolate all openings between the exterior work areas and building interiors and/or interior work areas and interior non-work areas, such as windows, doors, HVAC fresh air intakes, etc., with a minimum of two (2) layers of six (6) mil polyethylene sheeting secured airtight with duct tape, and where necessary, spray-glue.
 - b. Utilize drop cloths, consisting of two (2) layers of six (6) mil polyethylene sheeting within work areas; for exterior work areas, extend the polyethylene sheeting at least five (5) feet from the building's perimeter for exterior related work, to capture any dust, paint chips, debris, etc., generated from the work.
 - c. Outside work area ingress/egress points, shall have "sticky pads" placed to capture residual dust, including lead dust, from workers footwear/shoes to minimize tracking dust from outside the control area.
1. Wet scraping
- a. Mist surfaces prior to wet scraping in preparation for painting and/or when components are removed for disposal or restoration.
 - b. Lightly mist the component to be removed. Do not apply water to components containing electrical circuits.
 - c. Using a utility knife or other sharp instrument, carefully score all affected painted seams.
 - d. Remove any screws or other fasteners.

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- e. Using a flat pry instrument and a hammer, carefully pry the affected building component away from the surface to which it is attached. The pry bar should be inserted into the seam at the nail or other fastening device at one end of the component and prying pressure applied. This process should be repeated at each subsequent fastening location until the end of the component is reached as the component is freed.
 - f. Carefully remove or bend back all nails (or other fastening devices) and wrap removed components and nails in polyethylene sheeting and seal airtight with high quality spray-glue and duct tape.
 - g. HEPA vacuum any dust that may have accumulated behind the component removed.
2. Preparation for torch cutting of components.
- a. Perform the limited removal of lead-based paint coatings and primers, at increments of four (4) feet, to facilitate the removal of lead-based paint for the use of cutting torches on bare metal to removal sections of components.
 - b. The limited paint removal shall expose bare metal, free of all coatings, four (4) inches out from the area to be cut.
 - c. Limited paint removal shall be accomplished using HEPA vacuum needle guns and/or chemical paint remover.
 - d. Utilize torches to cut through bare metal for component removal, ensuring that heat from the torch does not impact any adjacent lead-based paint.
3. Vacuum Water Blasting
- a. The Contractor shall utilize the equipment in strict conformance with the Manufacturer's specifications.
 - b. The blast head shall remain in contact with the surface at all times.
 - c. The Contractor shall implement control measures to capture and/or prevent the migration of water from outside the work area.
 - d. Waste water generated from the project shall be containerized and undergo a Toxicity Characteristic Leachate Procedure (TCLP) test to determine the method of waste disposal (hazardous versus non-hazardous).
4. Strippable Chemical Solvent
- a. The chemical stripper shall be troweled, brushed or spray applied. Application thickness of the material shall be determined by the sample test patches.
 - b. The dwell-time for the paint stripper shall be determined by the evaluation of the sample test patches. Once a proper dwell time is determined, the Contractor shall remove the paint and chemical stripping compound onto the polyethylene ground cover or directly into 55-gallon

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drums. Any remaining residue shall then be washed down with a detergent and water to reveal the bare surface. Wash down of these surfaces is required to remove any remaining residue left by the chemical stripper. The wash down water shall be contained as specified in the Section. All water and residue shall be removed by using a wet vacuum system.

- c. Apply paste type chemical stripper material to the existing painted surfaces by spray application, and simultaneous application of fibrous laminated cloth, where applicable.
- d. Remove all spent chemical stripper, fibrous laminated cloth, and old paint from the substrate manually.
- e. Provide low pressure fresh water rinse for cleaning of the substrate to remove any visible residual of remover and old paint.
- f. Special care must be taken to remove chemical stripper materials before they dry or harden to prevent damaging the surfaces being treated during the removal process. Any tools used shall be made of natural, non-abrasive materials.
- g. When utilizing a chemical stripper, the Contractor must determine (by contacting the Manufacturer) if the abated surface must be neutralized prior to subsequent paint application. The Contractor must also determine if neutralization of the surface is required even if the surface will remain unpainted after paint removal.
- h. Waste water generated from the project shall be containerized and undergo a Toxicity Characteristic Leachate Procedure (TCLP) test to determine the method of waste disposal (hazardous versus non-hazardous).

5. HEPA Vacuum Needle Gun

- a. Maintain HEPA vacuum attachment in operation during removal operation. Select proper shroud to match the configuration of the surface being treated.
- b. The shroud shall remain in contact with the surface at all times.
- c. HEPA vacuum needle guns shall only be utilized for metal surfaces.

6. Core Penetrations and Drilling

- a. Maintain HEPA vacuum attachment in operation during the creation of core penetrations and/or drilling through surfaces coated with paint, shellac, varnish, etc. Select proper shroud to match the configuration of the surface being treated and for attachment to the coring/drilling device. The shroud shall remain in contact with the surface at all times.
- b. Alternatively, core penetrations/drilling through surfaces shall be via contact through a wet sponge over the surface, or viscous foam applied to the surface where the penetrations/drilling shall occur.
- c. Sponges utilized for procedures referenced herein shall only be used once per

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penetration. Viscous foam shall be collected and surfaces where the foam has potentially run along the surface due to gravity or residual shall be wet-wiped clean. All sponges, foam and cloths/rags used for wet-wiping off foam from surfaces shall be included with the waste stream for TCLP testing to determine if the waste is hazardous or non-hazardous.

7. Utilize High Efficiency Particulate Air (HEPA) filter equipped vacuums to clean surfaces at the completion of the require work and to extract dust/debris from polyethylene sheeting used for isolation and/or as drop cloths.
8. Roll polyethylene sheeting drop cloths inward after misting with water prior to disposal.
9. Wet-mop/wipe all horizontal surfaces within proximity to the work area, both inside and outside the building, depending on the work area location, with a trisodium phosphate (TSP) in water solution. Follow the Manufacturer’s recommendations for dilution ratio. Prior to and after wet-mopping/wiping, HEPA vacuum all horizontal surfaces, accounting for drying time from wet-mopping/wiping.
10. Utilize personal protection equipment as required by 29 CFR, Part 1926.62. Remove protective clothing on “sticky pads,” and have waste bags in proximity to this area to place disposable protective equipment.
11. Coordinate with the Owner and/or Owner’s representative for a restroom that can be dedicated to workers for hygiene purposes, inclusive of washing hands, arms, face, etc., at the completion of each shift. These restrooms shall be HEPA vacuumed, wet-wiped clean and HEPA-vacuumed at the end of each work shift, to remove all visible dust and debris from floors, sinks, urinals, toilets, etc.
12. All disposable items, including mop heads, rags, personal protection equipment, etc., shall be treated as referenced in these Technical Specifications.

3.2 WORK PROCEDURES

- A. Perform treatment of lead-containing paint in accordance with approved lead-containing safe work practices plan. Use procedures and equipment required to limit occupational and environmental exposure to lead when lead-containing paint is removed in accordance with 29 CFR, Part 1926.62, except as specified herein. Dispose of removed paint chips and associated waste in compliance with Environmental Protection Agency (EPA), federal, state, and local requirements.
- B. Personnel Exiting Procedures:
 1. Whenever personnel exit the lead-controlled area, they shall perform the following procedures and shall not leave the work place wearing any clothing or equipment worn during the work day:
 - a. Vacuum themselves off.
 - b. Remove protective clothing in the decontamination room and place them in an approved impermeable disposal bag.
 - c. Shower.
 - d. Change to clean clothes prior to leaving the physical boundary designated around the lead-contaminated job site.
- C. Monitoring: Monitoring of airborne concentrations of lead shall be in accordance with 29 CFR, Part 1910.1025, and as specified herein. Air monitoring, testing,

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and reporting shall be performed by a CIH or an Industrial Hygiene (IH) Technician who is under the direction of the CIH:

1. The CIH or the IH Technician under the direction of the CIH shall be on the job site directing the monitoring and inspecting the lead-containing paint removal work to ensure that the requirements of the Contract have been satisfied during the entire lead-containing paint removal operation.
2. Take personal air monitoring samples on employees who are anticipated to have the greatest risk of exposure as determined by the CIH. In addition, take air monitoring samples on at least 25 percent of the work crew or a minimum of two (2) employees, whichever is greater, during each work shift.
3. Submit results of air monitoring samples, signed by the CIH, within 48 hours after the air samples are taken. Notify the Contracting Officer immediately of exposure to lead at, or in excess of, the action level of 30 micrograms per cubic meter of air outside of the lead control area.

D. Monitoring During the Work:

1. Perform personal and area monitoring during the work. Sufficient area monitoring shall be conducted at the physical boundary to ensure unprotected personnel are not exposed above 30 micrograms per cubic meter of air at all times. If the outside boundary lead levels are at or exceed 30 micrograms per cubic meter of air, work shall be stopped and the CIH shall immediately correct the condition(s) causing the increased levels and notify the Contracting Officer immediately.
2. The CIH shall review the sampling data collected on that day to determine if condition(s) requires any further change in work methods. Removal work shall resume when approval is given by the CIH. The Contractor shall control the lead level outside of the work boundary to less than 30 micrograms per cubic meter of air at all times. As a minimum, conduct area monitoring daily on each shift in which lead paint removal operations are performed in areas immediately adjacent to the lead control area.
3. For outdoor operations, at least one sample on each shift shall be taken on the downwind side of the lead control area. If adjacent areas are contaminated, clean and visually inspect contaminated areas. The CIH shall certify that the area has been cleaned of lead contamination.

3.3 CLEANUP AND DISPOSAL

- A. Clean-up: Maintain surfaces of the work area free of accumulations of paint chips and dust. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use compressed air to clean up the area. At the end of each shift and when the paint removal operation has been completed, clean the area of visible lead paint contamination by vacuuming with a HEPA filtered vacuum cleaner and wet mopping the area. Certification: The CIH shall certify in writing that the inside and outside of the lead control area air monitoring samples are less than 30 micrograms per cubic meter of air, the respiratory protection for the employees was adequate, the work procedures were performed in accordance

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with 29 CFR, Part 1926.62, and that there were no visible accumulations of lead-contaminated paint and dust in the worksite. Do not remove the lead control area or roped-off boundary and warning signs prior to receipt of the CIH's certification. If necessary, re-clean areas showing dust or residual paint chips.

Testing of Lead-Containing Paint Residue and Used Abrasive: Where indicated, or when directed, test lead containing paint residue and used abrasive in accordance with 40 CFR, Part 261, for hazardous waste.

B. Disposal:

1. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing, which may produce airborne concentrations of lead particles.
2. Store removed paint, lead-contaminated clothing and equipment, and lead-contaminated dust and cleaning debris into U.S. Department of Transportation (49 CFR, Part 178) approved 55-gallon drums. Properly label each drum to identify the type of waste (49 CFR, Part 172) and the date lead-contaminated wastes were first put into the drum. Obtain and complete the Uniform Hazardous Waste Manifest forms from the Activity Staff Civil Engineer located at. Comply with land disposal restriction notification requirements as required by 40 CFR, Part 268:
 - a. At least 14 days prior to delivery decide who will arrange for job site inspection of the drums and manifests by waste storage facility personnel.
 - b. As necessary, make lot deliveries of hazardous wastes to the Hazardous Waste Storage Facility to ensure that drums do not remain on the jobsite longer than 90 calendar days from the date affixed to each drum.
 - c. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing which may produce airborne concentrations of lead particles. Label the containers in accordance with 29 CFR, Part 1926.62. Dispose of lead-contaminated waste material at a EPA and New Jersey Department of Environmental Protection approved hazardous waste treatment, storage, or disposal facility.
 - d. Store waste materials in U.S. Department of Transportation (49 CFR, Part 178) approved 55-gallon drums. Properly label each drum to identify the type of waste (49 CFR, Part 172) and the date the drum was filled. An authorized representative will assign an area for interim storage of waste-containing drums. Do not store hazardous waste drums in interim storage longer than 90 calendar days from the date affixed to each drum.
 - e. Handle, store, transport, and dispose of lead or lead-contaminated waste in accordance with 40 CFR, Part 260, 40 CFR, Part 261, 40 CFR, Part 262, 40 CFR, Part 263, 40 CFR, Part 264, and 40 CFR, Part 265. Comply with land disposal restriction notification requirements as required by 40 CFR, Part 268.

- ### C. Disposal Documentation:
- Submit written evidence that the hazardous waste treatment, storage, or disposal facility is approved for lead disposal by the EPA and state or local regulatory agencies. Submit one (1) copy of the completed manifest, signed and dated by the initial transporter in accordance with 40 CFR, Part 262. The Contractor shall submit all required waste manifests prior to payment being issued by the Owner.

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END OF SECTION 02 83 13

SECTION 02 85 00

REMEDIATION OF MICROBIAL CONTAMINANTS

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.
- B. Environmental Connection, Inc., report dated June 20, 2018, Hazardous Material Testing Powerhouse - Woodbine Developmental Center 1175 Dehirsch Avenue Woodbine, New Jersey 08270 DPMC Project #M1514-00 presented in Appendix “A” of Specification Section 028200.

1.1 CONDITIONS

- A. General and Supplementary General Conditions apply to this Section.
- B. Contract Documents: Indicate the work of the Contract and related requirements and conditions that have an impact on the project. Related requirements and conditions that are indicated on the Contract Documents include, but are not necessarily limited to, the following:
 - 1. Applicable federal, state and local codes and regulations.
 - 2. Notices and Permits.
 - 3. Existing site conditions and restrictions on the use of the site.
 - 4. Work performed prior to work under this Contract.
 - 5. Alterations and coordination with existing work.
- C. Summary By References: Work of this Contract can be summarized by references to the Contract, General Conditions, Supplementary Conditions, Technical Specification Sections, Contract Drawings, Addenda and modifications to the Contract Documents issued subsequent to the initial printing of this project manual and included, but not necessarily limited to, printed material referenced by any of these. Work of the Contract is also unavoidably affected or influenced by governing regulations, natural phenomena including weather conditions and other forces outside the Contract Documents.
- D. Inspection: Prior to commencement of work, inspect areas in which work is to be performed. Prepare a listing of damage to structure, surfaces, equipment or of surrounding properties which could be misconstrued as damage resulting from the work. Photograph or videotape existing conditions, as necessary to document conditions. Submit a copy of these photos or tapes to the Owner's representative prior to starting work.
- E. Potential Environmental Hazards: The disturbance or dislocation of asbestos containing materials, polychlorinated biphenyls, biological contaminants (i.e., carcasses, fungal contaminants, fecal matter, etc.), mercury containing components, etc., identified in these Technical Specifications may cause a release within the building's atmosphere, thereby creating a potential health hazard to workmen and building occupants. Apprise all workers, supervisory personnel, sub-contractors, consultants and authorized visitors who will be at the job site of the seriousness of the hazard and of proper work procedures that must be followed.
- F. Stop Work: If the Owner, the Owner's representative, or the Project Administrator presents a written stop work order, immediately and automatically stop all work. Do not recommence work until authorized in writing by the Owner or his/her appropriate representative.
- G. The term “Contractor” referenced herein shall refer to the Environmental Remediation Contractor, which can be the General Contractor or the General Contractor’s sub-Contractor, a sub-sub-

Contractor or a Contractor under separate Contract with the Owner in relation to renovation activities at the site.

- H. Where required, the Certified Industrial Hygienist (CIH) of record for the project shall attend progress meetings relative to addressing environmental, health and safety issues that arise from the project, manage the project schedule, etc.
- I. All documents prepared by Environmental Connection, Inc., (EC) including any attachments, may contain information that is privileged and confidential, and is exclusively generated for the sole and intended use of the recipient(s). EC's Instruments of Service, included Contract Drawings, Technical Specifications and other documents prepared by EC, are for the sole use of this Project, and unless otherwise provided, EC shall be deemed the Author and Owner of these documents and shall retain all common law, statutory and other reserved rights, including copyrights.
EC shall not be liable for the acts, errors or omissions of the Owner and/or the Owner's Representatives, Vendors, Agents or other entities performing any of the work relative to this Project/Assignment. Should the Owner, and/or the Owner's other Representatives, Vendors, Agents or other entities performing any of the work fail to substantially prevail in any lawsuit brought against EC, EC shall be entitled to recover its reasonable attorneys' fees and other costs, in the court of appropriate jurisdiction.

1.2 DEFINITIONS

- A. Abatement: The process or procedure for removing, sanitizing and controlling the biological release and/or dispersion of infectious agents.
- B. Adequately Wetted: Sufficiently wet, mixed, or coated with a solution of a biocide to prevent biological and dust dispersion during the movement of contaminated items and debris.
- C. Air Filtration Device (AFD): A local exhaust HEPA equipped air filtration device capable of maintaining a negative pressure inside the work area and a constant air flow from adjacent areas into the work area exhausting clean filtered air outside the work zone.
- D. Air Testing: The process of measuring inside biological contamination and outside ambient conditions.
- E. Authorized Personnel: Building Owner or representative, and all other personnel who are authorized officials of any regulating agency, be it State, Local, Federal or Private entity who possess legal authority for enforcement or inspection of the abatement work.
- F. Barrier: Any surface which seals off the work area to inhibit the movement of infectious biological agents and contamination.
- G. Breathing Zone: A zone forward of the shoulders and head with a radius of approximately 6 to 9 inches, which is the approximate area from which an individual would obtain his/her air for breathing purposes.
- H. CIH: Certified Industrial Hygienist by the American Board of Industrial Hygiene.
- I. Clearance Criteria: A visual inspection performed by the Owner and/or the Owner's representative to verify that each work area is free of visible dust/debris and all visible suspect growth of microbial contaminants have been removed at the completion of abatement activities, prior to the removal of barriers, engineering controls, work area containments, etc.
- J. Competent Person: A person capable of identifying existing microbial hazards in the workplace and selecting the appropriate control strategy for mitigating exposure, who has the authority to take prompt corrective measures to eliminate them, and is specifically trained in a training course which meet the criteria of the United States Department of Labor, Occupational Safety and Health Administration, (OSHA) Safety and Health Bulletin (SHIB) 03-10-10, "A Brief Guide to Mold in the Workplace," and the Institute of Inspection, Cleaning and Restoration Certification (IICRC) document S520, "Standard and Reference Guide to Professional Mold Remediation.
- K. Construction Barrier: Used for construction separation only. Does not prevent movement of biological contaminants. Construction barriers shall be constructed of ¾ inch plywood and 2 x 4 studding spaced no greater than 24" o/c. Doorways (minimum), 3 ft. x 6 ft. shall be installed

- where required for ingress and egress. A lock shall be installed to secure the area when the Contractor is not on site.
- L. Contractor: The Environmental Contractor who has demonstrated proficiency in the clean-up of regulated chemical or physical substances, proficient in environmental remediation and the clean-up of contaminated debris and/or infectious biological agents.
- M. Critical Barrier: Two (2) layers of six (6) mil polyethylene sheeting adhered in such a fashion that each layer is individually visible, and completely seals off the work area to prevent the distribution of infectious biological agents into the surrounding areas that are not part of the work zone.
- N. Decontamination Unit: A serial arrangement of rooms or spaces for the purpose of separating the work area from the building environment. This unit provides for entering the work site, returning to the clean environment, cleaning of persons, equipment, and movement of properly contained waste material.
- O. Disposal Bag: A minimum six (6) mil thick leak tight plastic bag used for packaging and transporting debris and biological waste from the work zone to a disposal site. Where required, these bags shall have affixed appropriate warning labels and site specific waste generator labels.
- P. Facility: Any institutional, commercial or industrial structure, installation or building.
- Q. Facility Component: Any building component, such as, but not limited to: structural steel, steel decking, ceiling grid, block and brick, floors, walls, ceilings, bar joists, light fixtures, ceiling hangers, studs, plates, insulation, and all other vertical and horizontal surfaces.
- R. Fixed Object: Mechanical equipment, electrical equipment, fire detection systems, alarms and all other fixed equipment, furniture, fixtures or other items which cannot be removed from the work area.
- S. HEPA: High Efficiency Particulate Absolute filtration efficiency of 99.97% at 0.3 microns. Filtration provided on specialized vacuums and air filtration devices to trap particles and infectious agents.
- T. HVAC: Heating, Ventilation and Air Conditioning system.
- U. Moveable Object: Equipment, furniture or other items in the work area which can be removed from the work area.
- V. Mold: Microbiological contaminants commonly referred to as mold, but shall be synonymous with the terms microbial, fungal contaminants and mold for the purposes of this Technical Specification.
- W. Negative Pressure Ventilation System: A system established for the work zone utilizing HEPA filtration capable of maintaining a negative pressure inside the work area and which creates a constant air flow from adjacent areas into the work area and exhausts clean filtered air outside the work zone. Maintain a minimum of one (1) complete air change every fifteen (15) minutes and 0.02 inches of water column pressure differential from the surrounding area.
- X. Respirator: Device designed to protect the wearer from the inhalation of harmful respirable dust, fumes, mists and infectious biological agents.
- Y. Separation Barrier: Used for isolating contaminated work areas from non-contaminated occupied areas. Separation barriers shall be constructed of ¾" plywood and 2' x 4' studding spaced no greater than 16" on center (o.c.) with two (2) layers of six (6) mil fire resistant polyethylene installed on both sides. A minimum 3 ft. x 6 ft. emergency escape kick-out panel shall be cut and secured into place with duct tape where required for emergency egress. This exit shall be clearly marked from the work area side and indicated on the emergency route document posted at the entrance to the work area.
- Z. Staging Area: Site where the Contractor maintains waste transfer airlock, where containerized waste has been placed, an outside site of material storage, equipment storage, construction trailer, etc. These areas are off limits to unauthorized personnel and shall be clearly and visibly marked.
- AA. Structural Member: Any load supporting member of a facility, such as, but not limited to: beams, decking, load supporting walls or any non-load supporting member, such as: ceilings, non-load supporting walls.

- BB. Visible Emissions: Emissions containing particulate materials that are visually detectable without the aid of instruments.
- CC. Waste Transfer Airlock: A system airlock constructed in such a manner as to prevent the free flow of air to areas outside of the work area and utilized for transferring containerized waste from inside to outside the work area. The system shall be checked prior to use for negative air flow.
- DD. Water Column (w.c.): Means a unit of measurement for pressure differential expressed in inches of water column. Maintain 0.02 inches of w.c. in occupied facilities.
- EE. Wet Biocide Cleaning: The process of eliminating biological contamination from building surfaces and objects by using cloths, mops, or other cleaning devices which have been dampened with a biocide.
- FF. Work Area: The area where the related work or biological decontamination operations are performed which is defined and or isolated to prevent the spread of biological agents.

1.3 ABBREVIATIONS

- A. Abbreviations for organizations and regulating authorities which may appear in this document:

ACGIH American Conference of Governmental Industrial Hygienists
 1330 Kemper Meadow Drive
 Cincinnati, Ohio 45240-1634

AIHA American Industrial Hygiene Association
 2700 Prosperity Avenue
 Suite 250
 Fairfax, Virginia 22031

ANSI American National Standards Institute
 1430 Broadway
 New York, New York 10018
 212-354-3300

ASTM American Society for Testing and Materials
 1916 Race Street
 Philadelphia, Pennsylvania 19103
 215-299-5400

NIOSH National Institute for Occupational Safety and Health
 Building J.N.E. Room 3007
 Atlanta, Georgia 30333

- B. Code of Federal Regulations (CFR) - Government Printing Office, Washington, D.C., 20402

USEPA United States Environmental Protection Agency
 401 M Street SW
 Washington, DC 20460
 202-382-3949

OSHA United States Department of Labor
 Occupational Safety and Health Administration
 200 Constitution Avenue
 Washington, DC 20210

1.4 STANDARDS

- A. These Technical Specifications are based on industry standards and practices, including applicable federal, state and local regulations and requirements. The Contractor has the responsibility of informing himself /herself fully of the requirements of the Agencies' Regulations and shall satisfy completely these Technical Specifications and all referenced regulations as may be amended by said Agencies during the course of this work.
- B. The Contractor shall comply with all federal regulations including but not limited to:
1. Respiratory Protection, Title 29, Part 1910, Section 134 of the Code of Federal Regulations.
 2. Construction Industry, Title 29, Part 1926, of the Code of Federal Regulations.
 3. Hazard Communication, Title 29, Part 1910, Section 1200 of the Code of Federal Regulations.
 4. Specifications for Accident Prevention Signs and Spill Response, Title 29, Part 1910, Section 145 of the Code of Federal Regulations.
 5. Gases, Vapors, Fumes, Dust and Mists, Construction Industry, Title 29, Part 1926, Section 55 of the Code of Federal Regulations.
 6. Control of Hazardous Energy, Title 29, Part 1910, Section 147 of the Code of Federal Regulations.
- C. The Contractor shall be familiar with the following guidance documents relative to microbial remediation, which shall be considered as bound herewith in these Technical Specifications.
1. USEPA, Office of Air and Radiation, Indoor Environments Division, Publication, "Mold Remediation in Schools and Commercial Buildings (EPA 402-K-01-001, March, 2001)."
 2. OSHA Safety and Health Bulletin (SHIB) 03-10-10, "A Brief Guide to Mold in the Workplace."
 3. City of New York, Department of Health, Bureau of Environmental & Occupational Disease Epidemiology, "Guidelines on Assessment and Remediation of Fungi in Indoor Environments."
 4. Institute of Inspection, Cleaning and Restoration Certification (IICRC) document S520, "Standard and Reference Guide to Professional Mold Remediation."
 5. UNDERWRITERS LABORATORIES (UL) document 586, "(1996; Rev thru Apr 2000) High-Efficiency, Particulate, Air Filter Units."
- D. The Contractor shall comply with the New Jersey Public Employee Occupational Safety and Health (PEOSH) program, Indoor Air Quality Standard, New Jersey Administrative Code (N.J.A.C.) 12:100-13, which is applicable to the protection of all Trades working in the building or exterior work affecting the interior building environment. Minimum requirements are:
1. Where general ventilation is inadequate to control air contaminants emitted from point sources within work spaces to below the Permissible Exposure Limit, other control measures shall be implemented, such as, but not limited to, negative pressure filtration equipment or an equivalent substitution.
 2. Renovation work and/or new construction that creates dust and particulates, gases, or other harmful substances in quantities hazardous to health shall be controlled by local ventilation or other protective measures for worker/occupant safety.
 3. Renovation work and/or new construction activities in occupied buildings shall be isolated, so as to confine contaminants, dust and debris within the work area. Means of isolation include, but are not limited to, physical barriers (hard construction and/or polyethylene sheeting), work area negative pressure differentials, completing work during minimal periods of occupancy, etc.
 4. Prior to re-occupancy, the work area shall be cleaned and ventilated, as necessary.

5. Occupants/Trades shall be notified at least 24-hours prior, or promptly for emergencies, of work to be performed on the building that may introduce air contaminants.
- E. The Contractor shall comply with all applicable State and Local regulations relative to waste hauling requirements, including N.J.A.C. 7:26.

1.5 CONTRACTOR QUALIFICATIONS

- A. The Contractor shall provide to the Owner a detailed qualification statement. This statement shall include the following criteria at a minimum:
 1. Owners of the firm, address, and telephone numbers.
 2. The resumes of the Field Superintendent and/or Foreman to be assigned to the project.
 3. A comprehensive listing of previous bio-remediation work. As a minimum, five (5) projects completed with a dollar value equal to, or greater than, the bid submitted. Lists should include names, addresses, telephone numbers, and dates of project completion.
 4. A signed statement by the Contractor verifying his/her understanding of the Specifications and requirements.

CONTRACTOR RESPONSIBILITIES

- A. These Technical Specifications are based on current, applicable Federal, State and Local regulations. The Contractor has the responsibility of informing himself / herself fully of the requirements of the Agencies Regulations, guidance documents and shall satisfy completely these Technical Specifications and all referenced regulations as may be amended by said Agencies and guidance documents during the course of this work.
- B. The Contractor shall inspect the Technical Specifications for missing pages or pages partially blank due to mechanical printing errors. Any such omissions will be replaced upon presentation to the Owner. In no case will allowances in Contract prices be made for such omissions.
- C. Use of the Premises
 1. The Contractor shall ensure that emergency escape routes are established in case of fire, or other emergencies. The Contractor shall install appropriate safety barriers and notices at the perimeter of work and maintain the same during the course of work to prevent site access from unauthorized personnel.
 2. Confine operations at the site to the areas permitted under the Contract. Portions of the site beyond areas on which work is indicated are not to be disturbed. Conform to site rules and regulations affecting the work while engaged in the project. Facility security regulations affecting the Contractor shall be strictly adhered to.
 3. Keep existing driveways and entrances serving the premises clear and available to the Facility at all times, unless authorized by the Facility. Do not use these areas for parking or storage of materials.
 4. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to approved areas by the Owner or areas indicated. If additional storage is necessary, obtain and pay for such storage off site.
 5. Lock automotive vehicles, such as passenger cars, trucks and other mechanized or motorized construction equipment, when parked and unattended, so as to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running or the ignition key in place or accessible to unauthorized persons.
 6. Maintain the existing building in a safe manner throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and, if applicable its occupants, during the remediation period.

7. Keep public areas such as hallways, stairs and toilet rooms free from accumulation of waste, rubbish or construction debris.
8. Smoking or open fires will not be permitted within the building enclosure or on the premises.
9. Cooperate fully with the Owner and his/her representatives during site operations to minimize conflicts. Perform the work so as not to interfere with the Facility's operation.

1.7 INTERPRETATION OF THE TECHNICAL SPECIFICATIONS

- A. If questions arise, the Owner and/or Owner's representative shall decide as to the meaning and applicability of any part of the General Conditions, Supplementary Conditions, Special Conditions, Contract Drawings and/or Technical Specifications, and the decision shall be binding and final.
- B. Any work performed after the discovery of a change in conditions, without acceptance by the Owner and/or Owner's representative, shall be at the risk and expense of the Contractor with no liability or cost to the Owner.
- C. All work and materials specified and necessary to make the work complete in all its parts, whether or not they are specifically mentioned in the Technical Specifications, shall be furnished and executed the same as if they were called for by the Technical Specifications without extra compensation.

1.8 COOPERATION

- A. The Contractor shall fully cooperate with the Owner and his/her representatives in fulfilling and completing the requirements of these Technical Specifications and of the Contract.
- B. This Contract may be proceeding concurrently with others on the site specified. The Contractor shall secure and make safe his/her work and avoid damage to the work of any other Contractor. The Contractor shall cooperate with other Contractors in expediting the work of all.
- C. If the Owner, Owner's representative or lawful official presents a written Stop Work Order, immediately and automatically stop all work. Do not recommence work until authorized in writing by the Owner and/or Owner's representative.
- D. Careful coordination throughout the project is absolutely essential. Coordination for job meetings, scheduling, phasing, payment request reviews, required inspections and disposal are key to the Contractor's successful completion of work.

1.9 SUBMITTALS

- A. The following submittals shall be presented at the pre-construction meeting following award and signing of Contract:
 1. Written Respiratory Protection Plan, in accordance with 29 CFR, Parts 1910 and 1926.
 2. Written site-specific Health and Safety Plan.
 3. Written site-specific Spill Response Plan.
 4. All notifications and permits.
 5. A schedule denoting proposed start and completion dates for each phase and/or portion of the project specified herein. The schedule shall reflect the Owner and/or Owner's representative restrictions, such as hours of operation, allowance to work on weekends and/or holidays, etc.
 6. Description of emergency procedures to be followed in the case of injury. Presentation shall include evacuation procedure, and source of medical assistance, including telephone numbers of first aid squad, police, fire, etc.

NOTICE: REQUIRED EMERGENCY PROCEDURES SHALL TAKE PRIORITY OVER ALL OTHER REQUIREMENTS OF THIS SPECIFICATION.

7. Videotape or provide photographic evidence of damage to structure, surfaces, equipment or of surrounding properties which could be misconstrued as damage resulting from the work. Photograph or videotape existing conditions as necessary to document conditions.
 8. Safety Data Sheets (SDS): Submit the Safety Data Sheet, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR, Part 1910.1200).
 9. Copies of the Product Data Sheets for all materials to be utilized applied or installed relative to project completion for microbial remediation. Such documents shall include any and all warranties and guarantees.
- B. Copies of the Contractor's daily log that shall include all of the day occurrences, visitors, special events, Contractor's personnel at the site.

1.10 MATERIALS

- A. Deliver materials to the job site in original, new and unopened packages and containers bearing manufacturer's name and label, and the following information:
1. Name or title of material.
 2. Manufacturer's stock number and date of manufacture.
 3. Manufacturer's name.
 4. Application instructions.
- B. All materials utilized for work area containments, decontamination units, barriers, etc., shall be fire-rated and polyethylene sheeting shall be a minimum of six (6) mil thick.

1.11 UTILITY REQUIREMENTS

- A. Where required, the Contractor shall install temporary electric.
1. The Contractor shall arrange with the Owner for connections of the Contractor's sub-panels to existing electrical panels. All electrical connections shall be performed by the Contractor, utilizing a licensed Electrician. Connection/extension from the point of source shall be the responsibility of the Contractor.
 2. The Contractor shall provide relocatable receptacle outlets equipped with Ground Fault Circuit Interrupters, reset button and pilot light, for plug-in connection of power tools and equipment.
 3. The Contractor shall use only grounded extension cords and shall use hard service cords where exposed to abrasion and traffic. Contractor shall use lengths, or use waterproof connectors, to connect separate lengths of electric cords, if single lengths will not reach areas of work.
- B. Where required, the Contractor shall install temporary lighting.
1. Provide one (1) 200 watt incandescent lamp per 1,000 square feet of floor area, uniformly distributed, for general construction lighting, or equivalent illumination of a similar nature.
 2. In corridors and similar traffic areas provide one (1) 100 watt incandescent lamp every 50 feet. In stairways and at ladder runs, provide lamp illumination for each landing and flight.

3. Provide sufficient temporary lighting to ensure proper workmanship throughout the project by combined use of daylight, general lighting, and portable plug-in task lighting.
 4. Provide lighting in the decontamination unit as required to supply a 50 foot candle minimum light level.
- C. Water is available at the site; the Contractor shall coordinate with the Owner for a water source. The Contractor shall provide a temporary hot water heater for decontamination usage. Provide hot and cold water as required to the decontamination unit. All connections shall be the responsibility of the Contractor.
1. The Contractor shall maintain all temporary water connections, hoses and outlet valves in a leak proof condition throughout the project. Replace any leaking hoses and connections immediately upon discovery.
 2. Where hot water is required, the Contractor shall provide a supply with a minimum temperature of 100 degrees Fahrenheit.
 3. The Contractor shall shut-off water sources, disconnect and drain hoses, and store hoses in the staging area at the end of each shift, or use 55-gallon drums with a pump system that shall be emptied at the end of each shift, when in proximity to occupied or high traffic areas.

PART 2 – DESCRIPTION OF THE WORK

2.1 SCOPE OF WORK

- A. Prior to renovation work, the Contractor shall remove avian feces from and clean breeching, and adjacent surfaces that will be disturbed by the disconnections and reconnections of breeching.
- B. The performance requirements in this Specification Section shall be utilized during microbial remediation related activities.

2.2 GENERAL REMEDIATION/CLEANING REQUIREMENTS

- A. A three (3) stage decontamination unit, consisting of an equipment room, shower room and clean room, shall be installed at a remote location from the work area, leading into the work area. The decontamination unit shall be of pop-up construction and enclosed with two (2) layers of six (6) mil polyethylene sheeting, to minimize any release of dust, particulates, contaminants, etc., during the decontamination process.
- B. A three-flap airlock doorway, constructed of three (3) overlapping sheets of polyethylene sheeting in a Z-formation, shall be installed at the entrance to the work area.
- C. Reagents/biocides for the project shall consist of Fosters ® 40-80 (or equivalent) to be misted during gross removal activities; and a 1:1, 2% trisodium phosphate (TSP) and 5% sodium hypochlorite in water solution shall be utilized for fine/final cleaning of any surfaces to remain.
- D. At the completion of microbial remediation activities, a post remediation visual inspection is to be performed by the Owner's representative, and then the Contractor shall:
 1. Remove all equipment from the work area;
 2. Remove decontamination unit from the site at the completion of specified microbial remediation activities.

2.3 GENERAL ENGINEERING CONTROLS AND DECONTAMINATION UNIT REQUIREMENTS

- A. Referenced herein, are general requirements for engineering controls and decontamination units, relative to the remediation of various environmental issues indicated in these Technical Specifications
- B. Personal Decontamination Unit
 - 1. The Contractor shall provide an adequate decontamination unit consisting of a serial arrangement of rooms or spaces adjoining the work area. Each airlock shall be clearly identified and separated from the other by polyethylene crossover sheet doors designed to minimize particulates, fibers and air transfer as authorized personnel pass between each chamber in and out of the work area. A minimum of two (2) layers of six (6) mil fire-rated polyethylene sheeting shall be required for floors, walls, and the ceiling for constructed decontamination units.
 - 2. Polyethylene crossover sheet doors shall have at least three (3) layers of polyethylene sheeting and be weighted so as to fall into place when people pass through the area. Decontamination chamber doors shall be of sufficient height and width to enable replacement of equipment that may fail and to safely stretcher or carry an injured worker from the site without destruction of the chamber or unnecessary risk to the integrity of the work area. Such doors must be at least three (3) feet wide, and the distance between sets of doors must be at least three (3) feet.
 - 3. The decontamination areas shall consist of the following:
 - a. Clean Room: In this room, authorized personnel remove and leave all street clothes and put on clean disposable coveralls. Appropriate NIOSH approved respiratory protection equipment is also picked up in this area. No contaminated items are permitted in this room.
 - b. Equipment Room: Work equipment, footwear, and all other contaminated work clothing shall be stored here. This is also a change and transit room for authorized personnel.
 - c. Shower Room: To contain hot and cold water, soap, are where respirator is removed.
 - 4. Decontamination Procedures: In addition to those outlined in Article 2.2 above, the Contractor shall ensure all employees:
 - a. HEPA vacuum any dust debris from outer suit and remove it in the work area. Proceed into the equipment room and remove inner protective clothing.
 - b. The person moves to the clean room and removes respirator. Worker shall utilize a wash station provided to clean hands and face, then dress in street clothing prior to exiting. Respirators are picked up, washed thoroughly, and disinfected as required, wrapped and stored in the clean room.
 - c. The Contractor shall ensure that filters in cartridge type respirators used during the preparation and abatement phase of the project are removed, wetted, and discarded as contaminated waste. All new filters shall be in placed in the respirator prior to reuse. For powered air purifying respirators or supplied air respirators, the manufacturer's instructions shall be followed about the proper decontamination sequence.
 - 5. There shall be no smoking, eating, or drinking in any contaminated areas (shower room, equipment room, and work area). Respirators shall be worn in all contaminated areas.
 - 6. Non-disposable footwear shall remain inside the contaminated area until completion of the activity, and shall be thoroughly cleaned at that time.
 - 7. Decontamination units shall be cleaned on a daily basis, at the end of each shift.

2.4 WORK SEQUENCE

- A. Post all work area entry points with hazard warning signs indicating that microbial remediation is being conducted and that unprotected personnel should not enter into the designated work area.
- B. Remove all gross physical materials as specified. Materials shall be spray misted with the specified biocide and bagged in six (6) mil polyethylene disposal bags. Do not generate dust during removal activities, saturate the materials or allow for water/biocide accumulation within the work area for dust control, but not to prohibit growth of spores, so that when bagged and landfilled, these micro-organisms can provide beneficial degradation of waste at a landfill.
- C. Fine clean all horizontal/vertical surfaces by HEPA vacuuming and wet wiping with biocide agents, from the ceiling in a downward progression. Wipe all surfaces with a solution of approximately 1:1, 2% solution of TSP in water and 5% aqueous solution of sodium hypochlorite. Spray mist all surfaces and allow for a half-hour settling period. Pay particular attention to intricate surfaces. Use disposable folded cloths. Wipe surfaces with a clean surface of the cloth one (1) time only. Fold the cloth and continue with a clean surface. Continue cleaning until there is no visible dust, debris or guano residue on the surfaces.
- D. At the completion of fine cleaning activities, thoroughly wipe rinse the surfaces with water. Use damp, clean disposable cloths. Remove all residual trisodium phosphate and sodium hypochlorite. Allow for surfaces to dry. After all surfaces are dry, HEPA vacuum surfaces. **DO NOT DRY SWEEP OR DRY DUST.** Do not use HEPA vacuums on wet surfaces.
- E. Ensure all waste is properly bagged and placed in the on-site waste-container.
- F. Request a visual inspection by the Owner and/or Owner's representative to ensure all visible suspect mold growth/water staining has been removed from the work area, and that the work area is free of all visible dust/debris at the completion of remediation activities. Upon receipt of a satisfactory final visual inspection and post remediation verification air sample results, the Contractor shall demobilized from the site, inclusive of those provisions outlined in Article 2.1 above.

2.5 ADDITIONAL INFORMATION

- A. Anticipate the building will potentially be occupied by other trades and the building Owner during microbial remediation; however, locations of the remediation work shall be unoccupied.
- B. The Owner and/or Prime Contractor shall be responsible for the relocation of all items from the work areas; coordinate these efforts with the Owner and/or Prime Contractor.
- C. The Contractor shall comply with all applicable OSHA regulations, relative to fall protection, operation of boom lifts, etc., where applicable, and the manufacturer's recommendations, which shall be included with the Contractor's Health and Safety Program. Boom lift operations, where applicable, shall be in accordance with the American National Standards Institute (ANSI) A92.2-1969 and 29 CFR, Part 1926.453 – Aerial Lifts. Fall Protection, as per 29 CFR, Part 1926.502 – Fall Protection Systems Criteria and Practices, shall also be followed, in addition to any applicable Federal, State and Local regulations for such activities.
- D. Any combustible fuel powered equipment shall require carbon monoxide alarms and the appropriate Personal Protective Equipment (PPE), including respiratory protection, for authorized personnel within the work area. Alarms that detect elevated carbon monoxide levels shall require for the equipment to be shut-off and the work area evacuated until levels have returned to 0 parts per million. The Contractor's supervisor shall investigate and correct the source of the elevated carbon monoxide levels.
- E. The Contractor's bid shall reflect that the final visual inspection for the work area passes, inclusive of acceptable post remediation verification air sampling. Should a final visual inspection and/or post remediation verification air samples fail, the Contractor shall re-clean the work area, until such a satisfactory inspection is completed. The Contractor shall be responsible for the cost of additional visual inspections if the first inspection for the work area fails, at no additional expense to the Owner or the Owner's representative.

- F. The Contractor shall exercise extreme caution when working adjacent to energized electrical sources (such as wall outlets, switch plates, wires, etc.). The Contractor shall coordinate with the Owner to have all electric de-energized in each work area, as per 29 CFR, Part 1910.147, Control of Hazardous Energy Sources (lock-out/tag-out), OSHA regulations.
- G. The Contractor shall coordinate with the Owner for the use of on-site facilities to allow workers to have lavatory facilities within the building. However, the Contractor shall ensure the designated rest rooms are clean at the end of each shift. Washing facilities shall be provided for with the decontamination facility.
- H. Smoke, heat and fire detector units within the work area shall remain operational. Sensor surfaces shall be covered with a filter pad to permit the unit to function while preventing gross surface contamination. Where present, the Contractor shall ensure that the integrity of the systems are not jeopardized or damaged as a result of any activities performed by the Contractor. Should any units be damaged during the project as a result of mishandling by workers or as a result of contact damage, the Contractor shall pay for all repairs and/or replacements of all damaged equipment at no cost to the Owner or Owner's representative.
- I. The Contractor shall arrange with the Owner for waste removal routes and elevators to be used for such purposes. The Contractor shall place a layer of polyethylene sheeting over watertight carts during waste transfer operations. The polyethylene sheeting shall be incorporated into the waste stream for the project. The Contractor shall install protection so that the interior surfaces of the elevator are not damaged during use.
- J. The Contractor shall have control of work and restricted areas, as designated in the Contract Documents and/or as delineated during a preconstruction meeting.
- K. The Contractor shall provide regular maintenance of staging areas, transportation routes, and other premises utilized during the project. Where transportation routes or other areas utilized by the Contractor (other than work area) may also be utilized by the Owner's/Facility's personnel during the project, the Contractor shall take all steps necessary to ensure that these areas remain clean, free of hazards related to the project, and suitable for passage throughout the duration of the project. The Contractor shall leave all areas clean and contaminant free in accordance with these Technical Specifications for other trades, if applicable, to complete renovations associated with the project.

2.6 WASTE DISPOSAL

- A. All contaminated waste materials shall be placed in disposable, four (4) or six (6) mil polyethylene bags or lockable containers. Contaminated sharp edged items shall be boxed if necessary to prevent puncture, utilizing as a minimum, six (6) mil plastic bags prior to packaging. Plastic bags shall be "goose neck" taped securely to prevent any leakage prior to removal from the contaminated area.
- B. The Contractor shall utilize a locked, secure container if contaminated waste is to be stored outside in unattended areas. Cleaned materials may be treated as regular construction debris. Materials designated with guano are also classified as construction debris. However, for the purpose of these Technical Specifications, materials with guano contamination shall be misted with the prescribed solution of sodium hypochlorite and packaged in six (6) mil polyethylene bags for disposal. Do not overly wet wastes for the bags with the liquid solution or the landfill may not accept the bags with non-absorbed liquid waste.
- C. All waste bags, drums, packages, etc., shall be wet-wiped clean during transfer from the work area to the on-site waste container.
- D. All waste shall be disposed of in accordance with the County waste flow plan, as applicable. The specific landfill facility chosen must be designated by the State of New Jersey, Department of Environmental Protection, as the recipient facility for the community in which the project is located.

- E. The waste hauler must possess a valid solid waste transporter registration issued by the State in which the remediation work is to occur. A licensed solid waste transporter shall be a commercial collector/hauler or the Contractor if so registered.
- F. Prior to final payment the Contractor shall supply appropriate disposal tickets or other documentation which indicate the landfill to which the waste was transported.

PART 3 – HEALTH AND SAFETY REQUIREMENTS

3.1 GENERAL SITE SAFETY REQUIREMENTS

- A. Safety Standards: The Contractor shall comply with applicable Federal, State and Local requirements for protecting the safety of the Contractor’s employees, building occupants and the environment. In particular, all applicable standards of OSHA shall be followed when working in accordance with these Technical Specification. In addition, the Contractor shall comply with all site rules and regulations.
- B. Occupant Safety: No processes or materials shall be employed in such a manner that they will introduce additional hazards into the project site.
- C. The Contractor shall have a written Health and Safety Program available at the site. The Contractor’s Health and Safety Program shall include, but not limited to, Fire Safety, Operating Heavy Equipment, Personal Protective Equipment, Emergency Procedures and Telephone Number Listings, Electrical Safety, etc. The Project Supervisor shall be competent in administering first aid.
- D. The Contractor shall comply with OSHA 29 CFR, Parts 1910 and 1926. If the requirements of this standard and OSHA regulations are not in agreement, then the more strict requirements shall always apply. In the United States, applicable OSHA regulations include, but are not limited to the following:
 - 1. 29 CFR, Part 1910.134 Respiratory Protection
 - 2. 29 CFR, Part 1910.1200 Hazard Communication
 - 3. 29 CFR, Part 1910.147 Control of Hazardous Energy
 - 4. 29 CFR, Part 1926 Sub-part M - Fall Protection
 - 5. 29 CFR, Part 1926 Sub-part F - Fire Protection
 - 6. 29 CFR, Part 1910 Sub-part I - Personal Protective Equipment (Parts 1910.132 to 1910.139)
 - 7. 29 CFR, Part 1926.453 – Aerial Lifts
 - 8. 29 CFR, Part 1926.502 – Fall Protection

3.2 HAZARD COMMUNICATION AND MEDICAL CLEARANCE

- A. Due to the potential elevated airborne bacteria and/or fungal levels, the Contractor shall be responsible for apprizing their supervisor and crew with regard to the potential health risks associated with bacteria and/or fungal exposure and of the proper work procedures which must be followed.
- B. The Contractor shall submit documentation on each individual that may be entering the work area on their behalf, to verify that they have received recent pulmonary function testing (PFT) and respiratory fit testing.
- C. Where in the performance of the work, workers, supervisory personnel, sub-contractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of contaminated items and materials, all personnel shall take appropriate continuous measures as necessary to protect all building occupants from the potential biological hazard of exposure to potential infectious agents. Such measures shall include the procedures and methods described herein and shall be in compliance with all applicable regulations of Federal, State and Local agencies.

- D. The Owner shall notify employees/occupants in the affected areas including a description of the remedial measures being taken. Individuals who exhibit health symptoms that could be related to bioaerosol exposure should be advised to seek medical attention.

3.3 PERSONAL PROTECTIVE EQUIPMENT (PPE)

- A. The Contractor shall provide approved protective clothing and respiratory protection to all Contractor workers and shall provide protective clothing to all official representatives of the Contracting Authority who may inspect the job site.
- B. Protective clothing shall consist of full body coveralls, disposable head covers, rubber boots, rubber gloves, eye protection and, where required, hard hats and safety shoes conforming to OSHA regulations.

3.4 RESPIRATORY PROTECTION

- A. The Contractor shall have a Written Respiratory Protection Plan available at the site in compliance with 29 CFR, Part 1910.134.
- B. Comply with ANSI Z88.2 - 1980 "Practices for Respiratory Protection" and OSHA 29 CFR, Parts 1910 and 1926. **Do not use** single use, disposable or quarter face respirators.
- C. Provide initial fitting of respiratory protection during a respiratory protection course of training set up and administered by a Certified Industrial Hygienist. Fit types of respirators to be worn by each individual. Allow an individual to use only those respirators for which training and fit testing have been provided. Require that each time an air-purifying respirator is put on it be checked for fit with a positive and negative pressure fit test in accordance with the manufacturer's instructions or ANSI Z88.2 (1980).
- D. Supply a sufficient quantity of respirator filters approved for any chemicals the Contractor shall introduce or come in contact with, so that workers can change filters during the work day. Require that respirators be wet-rinsed and filters discarded each time a worker leaves the work area.
- E. Supply, at a minimum, negative pressure full-face air purifying respirators with High Efficiency Particulate Air (HEPA)/organic vapors combination cartridges for those that shall perform all microbial remediation activities.

3.5 ENFORCEMENT

- A. Enforcement of the Contractor's on-site staff to comply with Health and Safety Compliance shall be the sole responsibility of the Contractor's Project Supervisor/Foreman. No other associated parties within the site and/or the project shall be liable for the Contractor's non-compliance with Health and Safety requirements. The exception shall be when the Contractor's actions pose a potential health and safety risk to employees/building occupants and/or for failure for the Contractor to comply with site rules and regulations. If such a risk occurs, the Owner shall Stop Work immediately to rectify the situation.

PART 4 – INSPECTIONS AND AIR MONITORING

4.1 INSPECTIONS

A. PRE-COMMENCEMENT INSPECTION

- 1. Written notification to the Owner's representative shall be made by the Contractor to request a pre-commencement inspection at a minimum of forty-eight (48) hours in advance of the desired date of inspection for each work area.

2. The Owner and/or Owner's representative shall document that the job site is properly prepared and that all containment measures are in place pursuant to these Technical Specifications.
3. If all is in order, the Owner and/or Owner's representative shall issue a written notice to proceed with the work. If the work area is not in order, the Contractor shall perform any needed additional or corrective action as directed before any work is to commence.

B. PROGRESS INSPECTION

1. The Owner and/or Owner's representative shall periodically inspect the work area during all remedial phases to ensure the Contractor's compliance with all applicable Local, State and Federal regulations, and these Technical Specifications.
2. The Owner and/or Owner's representative shall document any non-compliance issues and notify the Project Supervisor/Foreman of any inconsistencies noted during said inspections. Failure of the Contractor to mitigate any non-compliance issues shall warrant a Stop Work Order.

C. FINAL VISUAL INSPECTION

1. The Owner's representative shall inspect the work area(s) to ensure that the work site has been properly cleaned/decontaminated and is free of visible dust and debris as specified.
2. If additional work is necessary, the Contractor shall perform the work as directed by the Owner and/or Owner's representative prior to proceeding further.
3. Upon receipt of a satisfactory final visual inspection, the Contractor shall demobilize all containments, equipment, supplies and waste from the site, including those provisions referenced in Article 2 above. The Owner/Owner's representative shall ensure the job site is left in a neat and satisfactory condition, prior to the Contractor's departure from the site.

END OF SECTION 02 85 00

SECTION 030050 STRUCTURAL CONCRETE

PART 1 GENERAL

1.1 STANDARD REQUIREMENTS

A. Formwork

- a. The design and engineering of the formwork, as well as its construction, are to be the responsibility of the Contractor. All forms are to be tight, adequately constructed, and securely held in place. All forms are to withstand, without deformation, the load of the fresh concrete and the effects of the vibrating process, as well as prevent the leakage of mortar. The alignment of forms is to be carefully undertaken to ensure that the forms are secured to the lines and elevations required. Forms are to be clean and are to be recleaned and repaired for each use. Form surfaces against which concrete is to be placed are to be coated with a nonstaining material to prevent the adhesion of the concrete.
- b. Proper safe shoring, reshoring, and time of stripping of forms, plus number, adequacy, size and location of these shores, reshores and forms shall be in accordance with good construction practice and shall be so designed and constructed that all local Codes are adhered to. It shall be the sole responsibility of the Contractor to provide a safe structure at all times, and to provide safety to human life and property.
- c. All corners, edges and arises are to be constructed with a $\frac{3}{4}$ " chamfer, whether or not shown on the Contract Drawings. Larger bevels and bull-noses shall be constructed as shown. The Contractor is to review the Contract Drawings to determine what other special concrete configurations may be required.
- d. Form design, tolerances of finished lines, and camber to compensate for deflections due to the weight of the fresh concrete shall conform to ACI 347, or as otherwise required.
- e. The Contractor shall provide all chamfers, bevels, "V" scores, construction and expansion joints, waterstops, recesses, notches, reveals, keyways, reglets, inserts, anchors, depressions, ledges, knock-out panels, and temporary cleanout openings of suitably shaped materials in order to produce the cast-in-place concrete work as indicated on the Contract Drawings.
- f. The Contractor shall build into the formwork all plates including sliding plates, floor drains, sleeves, frames, anchors, anchor bolts, shelf angles, flashing, reglets, hangers, recesses, necessary ties, anchors and inserts required to anchor any brick, masonry, precast concrete or other special items.
- g. All forms shall be arranged with joints either vertical or horizontal and having a uniform spacing. All panel faces shall be as large as possible to reduce the number of form joints. Form ties shall be uniformly spaced. Joints and form ties shall be arranged in a geometric pattern acceptable to the Engineer.

B. Cast-In-Place Concrete

- a. All excavation for foundation elements must be completed and inspected by the Engineer before concrete foundation work for the structure is started.

1.2 SUMMARY

- A. The Contractor is to furnish all labor, equipment and materials required to comply with the intent of the Contract Drawings pertaining to concrete work.
- B. The Contractor shall examine the Construction Site and all substrate and conditions under which the work shall be performed. In the case that there are unsatisfactory conditions, the Contractor shall notify the Engineer in writing. The Contractor is not to proceed with the work until unsatisfactory conditions have been corrected to the satisfaction of the Engineer.

1.3 REFERENCES

- A. All work performed and materials installed by the Contractor are to be in strict accordance with the latest requirements of the following Codes and Standards:
 - 1. International Building Code, NJ Edition, 2015
 - 2. American Concrete Institute –
 - a. ACI 117-10 -Specifications for Tolerances for Concrete Construction and Materials and Commentary
 - b. ACI 301-10 - Specifications for Structural Concrete
 - c. ACI 304R-00 - Guide for Measuring, Mixing, Transporting and Placing Concrete
 - d. ACI 305R-10 - Hot Weather Concreting
 - e. ACI 306R-10 - Cold Weather Concreting
 - f. ACI 308R-16 - Guide to External Curing of Concrete
 - g. ACI 309R-05 - Guide for Consolidation of Concrete
 - h. ACI 318-14 - Building Code Requirements for Structural Concrete and Commentary
 - i. ACI 347-14 - Guide to Formwork for Concrete
 - j. ACI 350-06 – Code Requirements for Environmental Engineering Concrete Structures and Commentary
 - k. ACI SP-66 (04) - ACI Detailing Manual
 - 3. American Society for Testing Materials –
 - a. ASTM A192-02- Standard Specification for Seamless Carbon Steel Boiler Tubes for High-Pressure Service
 - b. ASTM A307-14 - Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength
 - c. ASTM A416-16 - Specification for Low-Relaxation, Seven-Wire Steel Strand for Prestressed Concrete
 - d. ASTM A615-16- Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - e. ASTM A1064-16a - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
 - f. ASTM C33-16 - Specification for Concrete Aggregates
 - g. ASTM C39-16 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
 - h. ASTM C94-16 - Specification for Ready-mixed Concrete

- i. ASTM C143-15a - Standard Test Method for Slump of Hydraulic-Cement Concrete
 - j. ASTM C150-16 - Specification for Portland Cement
 - k. ASTM C231-14 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
 - l. ASTM C233-14 - Standard Test Method for Air-Entraining Admixtures for Concrete
 - m. ASTM C260-10a - Standard Specification for Air-Entraining Admixtures for Concrete
 - n. ASTM C309-11 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
 - o. ASTM C494-15 - Standard Specification for Chemical Admixtures for Concrete
 - p. ASTM C1202-12 - Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
 - q. ASTM E329-14a - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
 - w. ASTM F1554-15- Standard Specification for Anchor Bolts, Steel, 36, 55 and 105-ksi Yield Strength
- 4. Army Corp of Engineers - Permeability Testing CRD C48-92
 - 5. American Welding Society – AWS D1.4 -Structural Welding Code - Reinforcing Steel
 - 6. American Water Works Association – AWWA C653 – Standard for Disinfection of Water Treatment Plants
 - 7. Concrete Reinforcing Steel Institute - Manual of Standard Practice
 - 8. FS-SS-S-201A – Sealing Compound for Expansion Joints
- B. In the event of a conflict between the above listed references and these Specifications, the one having the more stringent requirement shall govern.

1.4 SUBMITTALS

- A. Prior to the start of any construction at the Project Site or ordering of any materials associated with the concrete construction, the Contractor is to submit, for review, the proposed construction methods. This is to include, but not necessarily be limited to: form section layout and construction, control of exposed concrete color variation, finishing techniques to be employed, and methods of curing.
- B. Formwork
 - a. The Contractor shall submit shop drawings for fabrication and erection of formwork for specific finished concrete surfaces. Shop drawings shall show the general construction of forms including jointing, special formed joints or reveals, location and pattern of form tie placement, and other items which affect the exposed concrete visually.
 - b. Shop drawing review shall be for the general architectural applications and features only. The design of formwork for structural stability and sufficiency shall be the Contractor's responsibility. The submission of shop drawings shall be in accordance with another Section of the Specifications.

C. Reinforcement

- a. The Contractor is to allow proper time for the review of shop drawings. The Contractor is to allow sufficient time for inspection of reinforcing steel, once placed, before ordering and placing of concrete. Whenever possible, the Engineer will attempt to reduce the amount of time required for the completion of these functions. No work shall be started until the shop drawings have been reviewed by the Engineer.
- b. The Contractor is to submit rebar shop drawings showing all plans, sections, details, elevations, bar schedules and diagrams of all bars, arrangements and assemblies as required for the fabrication and placement in the concrete formwork. Details are to be included for all special reinforcements at openings, and for all support accessories, which must be adequate in strength to hold applied live and dead loads without excessive or permanent displacement of the reinforcement. Shop drawings shall include the additional reinforcement around openings, at corners, and at other locations indicated and bars to have special coatings and/or to be of special steel or special yield strength shall be identified.

D. Cast-In-Place Concrete

- a. Prior to the ordering of any concrete, the Contractor shall submit to the Engineer, for review, a design mix indicating the proposed proportioning of materials to be used for each class of concrete, together with documentation from an approved Testing Laboratory that the proportions proposed meet the specified requirements.
- b. The design mix or mixes shall be prepared by the Producer or Contractor's Testing Laboratory, and shall be prepared in accordance with ACI 318, "Proportioning on the Basis of Field Experience and/or Trial Mixtures". Each required design mix shall reflect the effects of the addition of all proposed or required admixtures. For the purpose of establishing a design mix containing a set-retarding admixture, the temperature may be assumed at 65°F.
- c. The design mix submittal shall include, but is not necessarily limited to the following:
 1. Names of all Suppliers and/or Manufacturers.
 2. Distance, in miles, from the Concrete Plant to the Job Site.
 3. Certification of compliance of materials with ASTM Specifications as here in before specified.
 4. Proposed proportioning of materials required for each design mix submitted for the various required concrete strengths, w/c ratios, and aggregate sizes.
 5. Admixtures required and/or proposed and dosage of each for all temperature ranges proposed.
 6. Sieve analyses for each aggregate size.
 7. Required cylinder test results and curves.
 8. Signed statement that the proposed proportions meet all of the Specification requirements, including required average compressive strength shall consist of a field strength test record, several strength test records, or trial mixtures. All documentation submitted shall conform to the requirements of ACI 318.
- d. All design mixes, for each proposed mix and strength of concrete and maximum coarse aggregate size, shall be submitted to the Engineer at least 15 days prior to the start of the work. The Contractor shall not begin concrete production until the mixes have been reviewed and accepted by the Engineer.

- e. The Contractor is to submit certified reports of tests indicating that the aggregates comply with the Specifications.
- f. All concrete to be placed by pumping shall be proportioned in accordance with ACI 304R, to meet the minimum strength, slump, and air content requirements as specified herein, except that the volume of coarse aggregate per unit volume of concrete may be reduced by 10%. The use of high range water reducing (HRWR) admixtures in pumped concrete is as specified in another Section of these Specifications.
- g. The cost of preparing the design mixes shall be included in the cost to construct the various related items.
- h. Location of all anticipated construction joints.
- i. A finishing schedule indicating the type or types of finishing operations that the various components of the Structure shall receive based on the Contractor's understanding of the Contract Documents.

PART 2 PRODUCTS

2.1 FORMWORK

- A. Formwork is to be made from metal forms, "Exterior" grade waterproof plywood panels, or plastic-coated plywood. All exposed concrete, regardless of specified finish, is to be constructed using plastic-coated plywood panels. Where the use of form lumber is permitted by the Engineer, it is to be dressed on four (4) sides and only selected boards are to be used for form surfaces in contact with concrete. Forms shall appear new and be free of defects that will mar the finished concrete surface.
- B. Form Fasteners
 - a. Only approved form ties and form hangers are to be used. They are to be provided with a waterstop washer not less than $\frac{3}{4}$ " in diameter and be of such a type, that after forms are stripped, the ties can be broken back a minimum of $1\frac{1}{2}$ " from the surface of the concrete or, after bolts are removed, the portion of the tie remaining in the concrete would be no closer than $1\frac{1}{2}$ " to the face of the concrete. Ties are to be fitted with lugs, cones, washers, or other devices within the form which will leave a hole not larger than $\frac{7}{8}$ " in diameter or deeper than $\frac{3}{4}$ ". That portion of the tie which is removed from the concrete is to be coated to assure a break back of $1\frac{1}{2}$ " with a material which will not impair the concrete strength or prevent bonding between the concrete and the hole mortar patch. The spacing of form ties and form hangers is to conform to the Manufacturer's recommendations and the previously specified criterion for a uniform geometric pattern of form ties.
- C. Form Release Agents
 - a. The form release agent shall be "Grifcote LV-50-Plus" as manufactured by Hill and Griffith Company, "Duogard" as manufactured by W. R. Meadows, "SpecStrip Plus" as manufactured by SpecChem, or approved equal.

2.2 REINFORCEMENT

- A. Reinforcing Steel and Accessories

- a. Reinforcing bars are to be deformed, intermediate grade, 60,000 psi minimum yield strength, new billet steel, manufactured in the United States and conforming to the requirements of ASTM A615, Grade 60.
- b. Reinforcing tie wires are to be No. 16 U.S. steel wire gage, black soft annealed wire, conforming to Federal Specifications FS-QQ-W-461G.
- c. Welded wire reinforcement shall be deformed, delivered in flat sheets, and is to conform to the requirements of ASTM A1064. All welded wire reinforcement is to have 70,000 psi minimum yield strength. Testing as indicated in ASTM A1064 is to be undertaken and the results are to be given to the Engineer for his review.

2.3 CAST-IN-PLACE CONCRETE

A. Cement

- a. All cement shall be Type II or Type I/II, Portland cement, of domestic manufacture, and conforming to ASTM C150. All cement is to be delivered in approved containers and stored as directed and specified. Bagged cement is to be plainly marked with name of Manufacturer, the date of manufacture, the type of cement, and the net weight. All cementitious products are to be the product of one Manufacturer.
- b. Bulk deliveries are to be provided with delivery tickets containing data as to name of Manufacturer, date of manufacture, type of cement, and weight.

B. Aggregate

- a. All normal weight aggregates, coarse and fine, shall conform to the requirements of ASTM C33. All aggregates are to be free from any substance that may be deleteriously reactive with the alkalis in the cement in an amount sufficient to cause excessive expansion of the concrete. Tests are to conform to ASTM C227. Aggregate shall be from one source.
- b. Fine aggregates are to consist of washed sand, leaving sharp, hard, uncoated siliceous grains. The fineness modulus must not vary by more than 0.20 throughout the work. Fine aggregates from different sources of supply are not to be mixed or stored in the same stockpile, nor used alternately in the same concrete mix or the same structure.
- c. Maximum size of coarse aggregate shall be 3/8 inch for placements with a maximum thickness of 4 inches. For all other placements use No. 57 (1" to No. 4) maximum with the exception of columns and piers less than 12 inches. The smallest dimension of the entire concrete placement (slab, beam, wall) shall govern the coarse aggregate size.

C. Water

- a. Water for mixing concrete and mortar shall be taken from an approved source and be clear and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substance.

D. Admixtures

- a. All admixtures shall be compatible. Admixtures, which are not submitted with the accepted concrete mix design, shall not be used.
- b. Air-entrainment shall be provided through the addition of an air-entraining admixture conforming to ASTM C260. The admixture is to be "MB-AE90" as manufactured by BASF

The Chemical Company, "Sika Air-260" as manufactured by Sika Corporation, "Eucon Air 40" as manufactured by Euclid Chemical or approved equal. The admixture is to be used in strict accordance with the Manufacturer's recommendations and in such quantity to produce the required air content. All normal weight concrete exposed to the weather or liquid shall contain 6% ($\pm 1\%$) entrained air.

- c. Concrete may contain a water-reducing set controlling admixture conforming to ASTM C494. Acceptable admixtures shall be Daraset 200 / Daratard 17 / WRDA + Hycol – as manufactured by Grace Corp., Pozzutec 20+ / Pozzolith 200N / Pozzolith 100XR - as manufactured by BASF The Chemical Company, or Plastocrete 161LF / Plastiment - as manufactured by Sika Corporation, or approved equal. The admixtures are to be used in strict accordance with the Manufacturer's written recommendations.
- d. Pumped concrete shall contain a high range-water reducing (HRWR) admixture conforming to the requirements of ASTM C494, Type F. The admixture shall be "Rheobuild 1000" as manufactured by BASF The Chemical Company, "Sikament 686" as manufactured by Sika Corporation, "Plastol 341" as manufactured by Euclid Chemical, or approved equal. The admixture shall not contain added chlorides, thiocyanates, (naphthalene or melamine) formaldehydes, or lignins. The admixture shall be used in strict accordance with the Manufacturer's written instructions. Concrete containing an HRWR admixture may include a water-reducing set controlling admixture by the same Manufacturer, otherwise the inclusion of water-reducing set controlling admixture must be based on the Manufacturer's approval. The maximum slump for concrete containing an HRWR admixture shall be 8" unless otherwise directed by the Engineer. Water shall not be added after the introduction of a HRWR into the concrete mix. The Contractor shall have on site additional HRWR, from the same Manufacturer as used at the Plant, for re-dosage no more than twice.
- e. In no case shall the use of calcium chloride in concrete be permitted. Accelerating admixtures are not to be used in any concrete work without the Engineer's review. Frozen materials containing ice or snow are not to be used.

E. Concrete

- a. All concrete placed on the project shall be ready-mixed concrete.
- b. All reinforced concrete shall have a specified 28-day compressive strength of 4,500 pounds per square inch, unless otherwise noted on the Contract drawings. This concrete shall have a minimum cement content of 640 pounds per cubic yard, an air-entraining agent, and may contain an approved set-controlling admixture. Whenever this concrete is placed in any structure or part thereof used to hold, transport or process any portion of the treatment process, the maximum water content shall not exceed 32.3 gallons per cubic yard ($W/Cm=0.42$).
- c. All non-reinforced concrete shall have a specified 28-day compressive strength of 2500 pounds per square inch, unless otherwise noted on the Contract drawings. This concrete shall have a minimum cement content of 490 pounds per cubic yard, a maximum water content of 38.3 gallons per cubic yard ($W/Cm=0.65$) and an air-entraining admixture as required.
- d. All concrete, regardless of specified compressive strength, shall have a slump in the range of 3" to 4" prior to HRWR.

- F. Bonding Agent
- a. The epoxy bonding agent shall be “Armatec 110 EpoCem” as manufactured by Sika Corporation, “MasterEmaco P 124” as manufactured by BASF The Chemical Company, “Duralprep A.C.” as manufactured by Euclid Chemical, or approved equal.
- G. Curing Materials
- a. The liquid membrane-forming curing compound shall conform to the requirements of ASTM C309 Type I, Class B. The curing compound shall contain a fugitive dye. Curing compounds shall conform with all applicable VOC regulations.
- H. Protection Materials
- a. Impervious paper, waterproofing curing paper, and polyethylene film used during curing operations shall conform to ASTM C171. Waterproofing curing paper shall be “Reinforced Poly Wrap,” as manufactured by Holland Manufacturing Company, Inc., “Poly Coated Kraft” as manufactured by Uline, “Reinforced Polyscrim” as manufactured by Danco, or approved equal.
- I. Construction Joints and Expansion Joints
- a. Foam filler material shall be Progress Unlimited, Inc., “Resilient White Closed Cell Cross-Linked Polyethylene/Vinyl Foam Joint Filler,” Code No. FF-7 with 90% recovery factor and with a density of 2.2 pounds per cubic feet, or equal. Fiber filler material shall be equal to “Fibre Expansion Joint” by W.R. Meadows, “FiberFlex” as manufactured by JDR, “Fiber Expansion Joint” as manufactured by Sakrete, or approved equal.
 - b. Where a joint sealing compound is required, the sealant shall be a two-component Polysulfide Sealant equal to “Synthacalk GC2+,” as manufactured by Pecora Corporation, “Tammsflex NS, Tammsflex SL” as manufactured by Euclid Chemical, “Deck-O-Seal” as manufactured by W.R Meadows, or approved equal.
- J. Grout
- a. Pre-mixed non-metallic non-shrink grout for bedding plates and column bases and as otherwise called for on the Contract Drawings shall be as manufactured by the following or approved equal:
 1. Sika Corporation - “SikaGrout 212”
 2. Five Star - “Five Star Grout”
 3. BASF - “Masterflow 100”

PART 3 EXECUTION

3.1 TESTING

- A. Reinforcement Testing
- a. Where reinforcing material is properly identified, mill reports will be accepted. The Contractor shall submit one copy of the Steel Producer's certificates of the mill tests.
 - b. When the Manufacturer's name or the heat identification number of the Manufacturer's chemical analysis is unknown, a Testing Laboratory is to undertake a testing program. At least one tensile and one bending test is to be made on each five tons, or fraction thereof, for each size of reinforcement in each lot. The Testing Laboratory used by the Contractor is to be

acceptable to the Engineer. The Contractor is to pay for all such tests and submit at least one copy of each test made to the Engineer.

- c. Reinforcing steel that fails to meet the requirements of the testing program is to be rejected and removed from the Project Site. The Contractor is to submit new steel for testing and continue to do so until the steel passes the tests. No steel is to be used for reinforcing until satisfactory test reports are received by the Engineer.
- d. In the event that the Engineer requires additional testing of reinforcing materials that have been delivered to the Project Site, the Contractor is to make such materials available in the sizes, lengths, and quantities necessary for testing, at no additional cost.

B. Cast-In-Place Testing

- a. The Owner will designate a Testing Laboratory, which is to perform all testing and provide inspection services when required. The Testing Laboratory is to meet the requirements of ASTM E329 and is to be a laboratory different from that which provided the concrete design mix proportions.
- b. All Concrete test cylinders are to be cast by the Testing Laboratory. All necessary assistance is to be afforded these persons by the Contractor in order to execute this work, at no additional expense to the Owner.
- c. The test cylinders are to be made in accordance with the requirements of ASTM C31. Test cylinders for strength of pumped concrete are to be taken at the point of delivery from the pumping line or at the point of discharge.
- d. A minimum of five test cylinders are to be made for each 20 cubic yards or portion thereof, of concrete deposited, two of which will be tested at age seven days, two to be tested at age twenty-eight days, and the fifth cylinder will be tested, if needed, to confirm strength at an earlier or later day than twenty-eight days. The tests are to be performed by the Testing Laboratory in accordance with the requirements of ASTM C39. Test cylinders are to be made at intervals spaced to provide a representative sampling of the entire placement. A minimum of one set of cylinders will be taken for each day concrete is placed regardless of quantity.
- e. Concrete test cylinders are to be properly marked, showing the name of the Project, the location of the concrete tested, the design strength, and the identification numbers of the cylinders in numerical sequence.
- f. The Contractor shall provide a curing box, on the Project Site, for the safe storage and proper curing of test cylinders in accordance with ASTM C31. The curing box shall be of sufficient size to accommodate the maximum number of test cylinders cast for any daily placement. The curing box shall be insulated, with an insulated hinged cover, and shall store cylinders on Site until transported to the Testing Laboratory. The temperature within the curing box shall be maintained between 60°-80°F, as specified in ASTM 31. Heating devices and/or blankets shall be supplied by the Contractor to maintain the temperature limits. If space heaters are used, care shall be taken so that the cylinders are not overheated. In the case where the cylinders are stored indoors, the cylinders shall be covered with plastic bags, in order to retain the moisture in the cylinders. The curing box shall have a high-low thermometer and the maximum and minimum internal temperatures shall be recorded daily. The location of the

curing box shall be in an area that is free from disturbance and vibration, such as pile driving and traffic. Failure to maintain these conditions may result in additional testing at the cost of the Contractor. No concrete shall be delivered to the Site until the curing box, as described, has been provided. The cylinders shall remain in the curing box a minimum of 24 hours or until transported to the approved Testing Laboratory.

- g. The cylinders shall be transported in such a manner that they will not be jarred, rolled, bounced, or dropped.
- h. If any test cylinders fail to attain the required strength, concrete work is to be terminated until the Engineer and the Contractor meet to determine the cause, and steps are taken to assure that all future concrete work will attain the desired strength. In order to determine what steps are to be taken to achieve the specified requirements, the Engineer will direct additional testing of the unsatisfactory concrete, at the Contractor's expense.
- i. Slump tests are to be performed by the Testing Laboratory, or an authorized representative of the Engineer, in accordance with the requirements of ASTM C143. Excessive slump will be a cause for rejection of the truckload of concrete.
- j. The Testing Laboratory, or an authorized representative of the Engineer, reserves the right to perform air content tests on concrete delivered to the Project Site. This test will be performed in accordance with ASTM C173 or ASTM C231. The results of the air content test shall be noted on the delivery ticket.
- k. If required by the Engineer, an inspector from the Testing Laboratory will be directed to inspect the concrete at the batching plant. The cost of such inspection will be paid by the Contractor.
- l. All test reports are to be submitted to the Engineer on appropriate forms.
- m. All test reports are to include the Project name, name of Contractor, name of concrete testing service, name of concrete supplier, placement location and date, date of test, cylinder numbers, and tests results. Test reports are also to indicate whether or not materials are acceptable for their intended use.

3.2 FORMWORK

- A. Forms are to conform to required shapes, lines, surface scorings, and dimensions of the members, as shown on the Contract Drawings. All joints are to be horizontal or vertical, and uniformly spaced. All panel faces are to be as large as possible to reduce the number of form joints.
- B. Shoring is to be designed to support the weight of concrete and the loads incurred during placing, with due regard to the height of shores. Shoring is to be laterally braced at all splice points. Forms and shores are to be braced or tied so that there is no displacement of formwork during casting and hardening of concrete.
- C. The Contractor is to provide cross bracing for shoring to resist lateral wind forces, and especially against braking, turning and acceleration forces due to any mechanical equipment used in placing the concrete. The Contractor is to be fully responsible for the design of forms and their shores.

- D. Where shoring is supported on the ground, temporary footings of timber, steel or concrete are to be provided which will support the wet concrete without settlement. These footings are to be founded on firm soil, sufficiently below the ground surface so that they will not settle when the ground is wet, or when frozen ground is thawing.
- E. Finished concrete surfaces are not to vary from the theoretical horizontal or vertical planes as specified elsewhere in these Specifications. Where it is necessary to maintain the specified tolerances, the formwork is to be cambered so as to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete and due to construction loads.
- F. Positive adjustment of shores and struts is to be provided by means of wedges or jacks, and all settlement is to be taken up during the concrete placing operation. Adjusting devices are to be securely braced against lateral deflections.
- G. Earthcuts shall not be used as forms for vertical surfaces, unless otherwise specified and shown on the Contract Drawings as an acceptable alternate detail.
- H. The Contractor is to construct and erect formwork for all exposed interior or exterior concrete surfaces in such a manner that, upon completion, a uniform and truly symmetrical pattern of horizontal and vertical joints will be evident. All form ties are to be uniformly spaced in both horizontal and vertical directions. The Contractor is specifically alerted to the intention of this Section of the Specifications with regard to appearance. It is the intention of this Section of the Specifications to do the minimum amount of concrete finishing work and rely upon form liners, where used, and the uniform geometric pattern of the forms and form ties to create the desired esthetic effect.
- I. The Contractor is to meet with the Engineer prior to constructing forms to plan the form arrangement or form pattern.
- J. Accessories
 - a. All insert items are required to be placed in formwork, for the accommodation of other formwork. The Contractor shall place and/or build into the formwork all of these insert items, as required.
- K. Pre-Placement Inspection
 - a. Before placing concrete, the Contractor shall complete and inspect the formwork installation, including forms, form ties, form oil, attached items, etc., reinforcing steel, and items to be embedded or cast in. He shall notify other crafts involved in ample time to permit the installation of their work and cooperate with other trades in setting such work, as required.
 - b. The Contractor shall thoroughly wet all wood forms immediately before placing concrete, as required.
 - c. The Contractor shall coordinate the installation of all joint materials and moisture barriers with the placement of forms and reinforcement.
- L. Form Removal
 - a. All forms are to be removed, cleaned, repaired and stored for subsequent use. If an inspection by the Engineer indicates that the form materials are not satisfactory for reuse, they are to be removed from the Project Site.

- b. No forms are to be removed until the concrete work has gained sufficient strength to support its own weight and normal construction loadings without permanent damage. The Contractor is to provide and place all temporary posts, shores, braces or other devices which might be required for the temporary support of the concrete work. No temporary bracing is to be removed until the concrete work achieves its design strength.
- c. The Contractor is to assume full responsibility for the premature removal of concrete forms. Any concrete which is damaged or does not achieve its design strength as a result of early form removal is to be removed and replaced at no cost to the Owner.
- d. Forms may be removed early upon receipt of satisfactory evidence that the concrete supported thereon has attained sufficient strength to maintain the stability and safety of the structure. Laboratory test reports of job-cured test specimens shall be considered satisfactory evidence. All test specimens taken for the purpose of establishing justification for early form removal shall be made and tested at the expense of the Contractor.
- e. Any spalls or cracks, which occur due to premature form removal, are to be repaired by the Contractor, to the satisfaction of the Engineer.
- f. Form ties are to be broken back immediately after removing the forms. All holes left by such ties are to be filled immediately with mortar consisting of one part Portland cement and two parts sand, of the same type, manufacture and quality as used in the concrete.
- g. If taper ties or she-bolts are used, the Contractor must submit, for the Engineer's review, method of filling the entire tie hole after removal of forms.
- h. Care is to be taken in removing forms, walers, shorings, supports, and form ties to avoid spalling or marring of the concrete work.

M. Re-Use of Forms

- a. Lumber, once used in forms, shall have nails withdrawn, and surfaces to be in contact with concrete shall be thoroughly cleaned before being used again. Plastic coated plywood forms, either patented or Job Site fabricated, shall not be used more than 10 times. Other plywood forms of "Exterior" grade surface shall not be used more than 3 times. The reuse of forms shall be permitted only if the forms, in the opinion of the Engineer, are suitable for the intended purpose. Split, frayed, delaminated or otherwise damaged form facing materials shall not be acceptable. "Patched" forms for exposed concrete surfaces shall not be used unless such forms are inspected by the Engineer. The Contractor shall apply new form coating compound materials to form surfaces as specified for new formwork. When forms are extended for successive concrete placement, the Contractor shall thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. He shall align and secure joints to avoid offsets.

3.3 REINFORCEMENT

A. Fabrication

- a. All reinforcement is to be fabricated to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI "Manual of Standard Practice." In case of fabricating errors, the Contractor shall not re-bend or straighten reinforcement in a manner that

will injure or weaken the material. All reinforcing steel is to be pre-cut and pre-bent off site in an approved fabricating shop by an acceptable subcontractor for reinforcing steel fabrication.

- b. All reinforcing is to be correctly rolled to the proper section and shall be free from all defects. Reinforcing shall have raised symbols to identify the Manufacturer, bar size and grade of steel.
- c. Reinforcement with any of the following defects is not to be permitted in the work:
 - 1. Bar lengths, depths, and bends exceeding specified fabrication tolerances.
 - 2. Bends or kinks not indicated on Contract Drawings or final shop drawings.
 - 3. Bars with reduced cross-section due to excessive rusting, surface defects, or other causes.
- d. All bends or hooks, unless otherwise required, are to be cold formed around pins. All hooks are to conform to the typical details on the Contract Drawings.

B. Delivery, Handling and Storage

- a. All concrete reinforcement is to be delivered to the Project Site bundled, tagged, and marked. Metal tags are to be used to indicate bar size, lengths, and other information corresponding to markings shown on the placement diagrams.
- b. All concrete reinforcing materials are to be stored at the Project Site, to prevent damage and accumulation of dirt or excessive rust.

C. Installation

- a. The Contractor is to comply with the previously specified Codes and Standards and Concrete Reinforcing Steel Institute recommended practice described in "Placing Reinforcing Bars," latest edition, for details and methods of reinforcement placement and supports, and as herein specified.
- b. All reinforcement shall be cleaned prior to installation to remove loose rust and mill scale, earth, ice, and other materials which reduce or destroy the bond with the concrete.
- c. Bar supports shall be provided for reinforcement in foundation elements, slabs on ground, and all framed beams and slabs. Reinforcement shall be positioned, supported, and secured against displacement by formwork, construction, or concrete placement operations. Reinforcement shall be located and supported by metal chairs, runners, bolsters, spacers, and hangers.
- d. Reinforcing steel shall be supported in a manner that will maintain the clear distances between bars and the face of concrete as indicated on the Contract Drawings or mentioned in the Specifications. Supports are to include slab and beam bolsters, low and high chairs, spacers and other devices suitable for the proper spacing, supporting and fastening of reinforcing bars or welded wire reinforcement in place. Consideration is to be given for all loads applied to the reinforcing. Supports for slabs on grade are to include sand plates, laterally welded braces for high chair legs and specially designed steel framed supports for heavy reinforcing.
- e. Reinforcing steel interfering with the location of other reinforcing steel, conduits or embedded items may be moved within the specified tolerances or one bar diameter, whichever is greater. Obtain the approval of the Engineer if greater displacement of bars to avoid interference is needed. Do not cut reinforcement to install inserts, conduits, mechanical openings or other items without the prior approval of the Engineer.

- f. In no case will the use of masonry, stone, or wood be permitted for bar supports. Plastic protected or non-staining legs are to be provided in the case of bar supports being in contact with the formwork of concrete surfaces exposed to view after completion.
- g. Minimum wire sizes and spacing for support accessories are to be as follows:
 - 1. Continuous high chairs or individual high chairs are to have legs of not less than #4 wire. Continuous high chair legs are to be spaced not more than 8" on center. Continuous longitudinal wires are to be not less than #1 wire. The connection of the legs to the continuous wire is to be strong enough to prevent bending of the legs out of the vertical plane or the breaking off of the legs from the continuous longitudinal wire.
 - 2. The Contractor is to vary the support bar diameters and spacing to suit each specific support requirement and detail them to suit the condition of loading.
- h. The Contractor shall not place reinforcing bars more than two (2") inches beyond the last leg of any continuous bar support. The Contractor shall not use supports as bases for runways for concrete conveying equipment and similar construction loads.
- i. All reinforcement shall be secured against displacement by tying with No. 16 gauge, black soft annealed wire at all intersections, and shall be so supported so as to keep all reinforcement away from the exposed surfaces. Whenever the members are reinforced with two curtains of reinforcement, bar spacers securely tied to both curtains shall be provided.
- j. The Contractor shall set all wire ties so that twisted ends are directed away from exposed concrete surfaces.
- k. Tack welding of reinforcement shall not be permitted.
- l. Reinforcement shall be contact lap spliced where practical, with the location of and minimum lap lengths as called for on the Contract Drawings. Where no lap length is noted on plan or section, the minimum lap shall be as per the typical details for tension lap splices. All adjacent splices shall be progressively staggered at 5'-0" on center.
- m. Provide additional reinforcing steel on each side of the opening equivalent to one half of the cross-sectional area of the reinforcing steel interrupted by the opening for opening equal to 12" and up to and including 36", unless indicated otherwise. For openings less than 12", bend reinforcement around opening. For openings, larger than 36", see contract document for specific reinforcement requirements. Extend each end of each bar beyond the edge of the opening or penetration by the tension development length for that bar size.
- n. The Contractor shall install welded wire reinforcement in as long lengths as practicable. The Contractor shall lap adjoining pieces at least one full mesh and lace splices with 16 gauge wire. The Contractor shall offset end laps in adjacent widths to prevent continuous laps. Rolled fabric is not permitted. All fabric shall be delivered in flat sheets.
- o. Where welding is shown on the Contract Drawings or specified, the Contractor shall comply with the requirements of AWS D1.4 for field welding. Prior to field welding, the Contractor shall determine the weldability of reinforcing bars by a laboratory analysis of steel. Only steel conforming to the chemical requirements specified in AWS D1.4 shall be used.

- p. After the reinforcement has been placed, the Contractor shall notify the Engineer as to his readiness to have the reinforcing inspected. Concrete shall not be placed until the reinforcement placement is complete and has been inspected by the Engineer.

3.4 CAST-IN-PLACE CONCRETE

A. Permissible Tolerances and Variations

- a. All concrete shall be in accordance with the tolerances or allowable variations specified in ACI 117.
- b. Tolerances apply to concrete dimensions only and not to the positioning of reinforcing steel, dowels, or embedded items.
- c. The Contractor is to establish and maintain sufficient control points and benchmarks in an undisturbed condition until final completion and acceptance of the Project. Control points and benchmarks are to be used for reference purposes to check tolerances.
- d. Regardless of the tolerances listed above, no portion of any Structure is to extend beyond the legal boundary of the Project.

B. Measuring, Mixing and Transportation

- a. All concrete shall conform to the requirements of ASTM C94 and ACI 304R, except as otherwise specified.
- b. All ready-mixed concrete shall be secured from an approved Supplier having adequate equipment for proportioning, mixing, rigidly controlling, and delivering concrete in the quantities required for the work. The Engineer, or his agents, are to have the right to inspect the Plant and processes of the Supplier at all times. Thirty days in advance of the contemplated use of ready-mixed concrete, the Contractor is to submit the name and qualifications of the Supplier from whom he proposes to secure ready-mixed concrete to the Engineer for review.
- c. All dry materials, fine and coarse aggregate and cement, shall be measured by weight.
- d. The Contractor is to provide suitable automatic weighing equipment so that the fine and coarse aggregates for each batch will be weighted separately.
- e. Water shall be weighed in a separate batcher or measured by volume in a calibrated tank or by water meter. Admixtures shall be measured by volume.
- f. Regardless of how the required materials or quantities are measured, they shall be within the following tolerances; cement, 1%; aggregates, 2%; water, 1%; and admixtures, 3%.
- g. Mixers shall be of the rotary batch type and so made and operated as to insure a thorough mix, homogeneous in composition and uniform in color, with all coarse aggregate completely covered with mortar. The volume of the mixed material per batch shall be governed by the size of the mixer and the composition of the concrete, but shall not exceed the Manufacturer's rated capacity of the mixer. Each mixer shall be equipped with a suitable charging hopper, water storage tank and a water measuring device that is capable of being locked and will permit

the discharge of water only while the mixer is being rotated. All water, except that used for cleaning purposes, is to be admitted to the mixer through the measuring device. Each mixer is to be so equipped as to lock the discharge lever automatically until the batch has been placed in the mixer. The mixer is to be thoroughly washed and cleaned before and after use and be maintained in effective operating conditions at all times. If the mixer is not used for a period of 30 minutes, it is to be thoroughly cleaned before use.

- h. All materials for each batch of concrete, including the water, are to be mixed for at least 1½ minutes, while the drum revolves at the speed for which it was designed, preferably between 12 and 20 RPM. In any case, the aggregate has been completely covered with mortar. Any batch mixed less than 1½ minutes or not completely discharged within 60 minutes after the addition of water is to be discarded at the Contractor's expense. No materials for a batch of concrete are to be placed in the drum of the mixer until the entire previous batch has been discharged.
 - i. The maximum length of time from loading at the ready-mix Supplier's Plant to the discharge of concrete at the Project Site shall not exceed 75 minutes, except that under conditions contributing to quick stiffening of the concrete or when the temperature of the concrete is 85°F or above, this time limit shall be changed to 60 minutes. If retarders are used which have been reviewed by the Engineer, they may increase the time limit to a maximum of 75 minutes. Under very severe conditions, the Engineer may further reduce the time limits or require a reduction of the size of the batches. During these intervals, the concrete shall be agitated continuously.
 - j. Each delivery of concrete to the Project Site shall be accompanied by a certificate showing: weights of materials and brand names as applicable, amount of water, type and quantity of admixture, and date and time of loading.
 - k. When concrete arrives at the Project Site with slump below that suitable for placing, as indicated above, water may be added provided that neither the maximum permissible water-cement ratio nor the maximum slump is exceeded. Also, no water is to be added if a HRWR has already been added. The water is to be incorporated by additional mixing equal to at least one-half of the total mixing time required. An addition of water above that permitted by the limitation on the water-cement ratio is to be accompanied by a quantity of cement sufficient to maintain the proper water-cement ratio. The addition may only be authorized by the Engineer or his representative, and the cost must be borne by the Contractor.
 - l. The use of non-agitating equipment for the transportation of concrete will not be permitted.
- C. Concrete Placement
- a. Concrete is not to be placed until such time as forms, embedded materials, and reinforcement are securely fastened in position along with all other preliminary work has been inspected. Concrete is not to be placed in forms with standing water. If chutes are used, they are to be metal or be metal lined with a slope not to exceed 1 vertical to 3 horizontal.
 - b. Concrete is to be handled from the mixer to the forms in such a manner that no segregation of ingredients will take place. Concrete is to be deposited in layers approximately level and not more than 18" in depth.

- c. All concrete is to be placed in such a manner that it will not drop freely more than 8' and it is to be placed as nearly as practicable in its final position, to minimize segregation of the ingredients.
- d. Concrete for use in slabs and foundation elements may be placed by buggy bucket, ready-mix truck, or pumping methods, provided that the method selected will not cause the specified slump to be exceeded. In general, concrete in the walls is to be placed by means metal drop chute with hoppers. Drop chutes are to be provided in several lengths so that the total length of the chute can be adjusted as the concreting operations progress. Under special conditions, such as heavily reinforced thin walls, concrete is to be deposited through temporary openings in the sides of wall forms with the drop chutes positioned outside of the forms. Temporary openings are to be provided and spaced approximately 8' vertically and 8' horizontally.
- e. Concrete is to be compacted while being placed with the aid of internal mechanical vibrators. Vibrators are to be used in a vertical position only and are to be applied directly to the fresh concrete. The intensity and duration of vibration is to be sufficient to cause the concrete to flow, to compact thoroughly and to completely embed the reinforcement, pipe, conduit, or similar work. Vibration is to be supplemented by hand spading in the corners and angles of forms while the concrete is still plastic and workable. The vibrating equipment is to be of size and type as required. Vibration of forms or reinforcement will not be permitted unless specifically authorized. Under no condition is the vibration process to be continued for such a time period that the aggregate would be segregated from the mix and impair concrete strength. Vibrators are not to be used to convey concrete, work concrete along the forms or otherwise to be used a motive force in handling concrete. Vibrator use shall be in accordance with ACI 309R-05.

D. Cold and Hot Weather Concrete Operation

- a. In general, concreting during cold and hot weather is to be in accordance with the applicable provisions of ACI 318, ACI 306R, and ACI 305R.
- b. For air temperatures between 40°F and 70°F when it is not anticipated that temperature will drop below 40°F no special protection will be required other than the means of maintaining concrete temperatures of at least 50°F, for a period of five (5) days after placing.
- c. Concrete placement is not to be permitted when, in the opinion of the Engineer, the sun, heat, wind, rain, sleet, snow or humidity would prevent proper placement and curing.
 - 1. Cold Weather
 - i. Whenever the temperature is below 40°F, or when it is evident that the temperature will drop below that point, concrete is not to be placed unless the Contractor has submitted, in advance to the Engineer, a detailed plan for taking appropriate precautions during cold weather operations. The plan should address at least all of the concerns enumerated below.
 - ii. The Contractor is to provide equipment for heating concrete aggregates and water and for maintaining freshly placed concrete at a temperature of not less than 50°F nor more than 90°F for a period of five continuous days. Water is not to be heated over 180°F. Concrete work is to be protected by windbreaks, heating and/or insulated blanket covers when necessary. Protection is to be left in place and intact for at least 24 hours after artificial heat is discontinued. The Contractor is to avoid

rapid dry-out of concrete due to overheating and is to avoid thermal shock due to sudden cooling or heating. Forms shall be enclosed with automatic heaters, provided within the enclosures when needed to maintain the required temperature. Automatic heaters, if used, shall be properly vented to the atmosphere. Coverings are to be left in place for the specified curing period.

- iii. When it is necessary to remove the protection temporarily during the process of the work, it is to be done in a manner that causes the least disturbance and allows the protection to be restored as quickly as practicable.
- iv. The Contractor is not to place the concrete on frozen subgrade or on sub-grade containing frozen materials. He is to ascertain that forms, reinforcing steel and adjacent concrete surfaces are entirely free of frost, snow and ice before placing concrete.
- v. All methods proposed for heating, and protecting the concrete are subject to review by the Engineer. Concrete is never to be heated over 90°F nor is any other overheating that would produce a flash set to be permitted.

2. Hot Weather

- i. Whenever the ambient temperature is above 90°F or when it is evident that the temperature will rise above that point, concrete is not to be placed unless the Contractor has submitted, in advance to the Engineer, a detailed plan for taking appropriate precautions during hot weather operations. The plan should address at least all of the concerns enumerated below.
- ii. In general, concrete shall be delivered to the form at the coolest practicable temperature. The Contractor is to cool ingredients before mixing to maintain concrete temperature at time of placement below 85°F. Mixing water may be chilled or chopped ice may be used to control the concrete temperature, provided the water equivalent of the ice is calculated in the total amount of the mixing water such that the water/cementitious ratio remains within requirements.
- iii. The Contractor shall cover all reinforcing steel with water-soaked burlap if it becomes too hot, so that the steel temperature does not exceed the ambient air temperature immediately before embedment in the concrete.
- iv. The Contractor shall wet forms thoroughly before placing concrete. However, no standing water shall remain within the forms at the time of placement.
- v. The Contractor shall adjust the mix to retard the setting time of the concrete, as reviewed by the Engineer, and as noted herein. Sunshades and windbreakers are to be provided when needed, to maintain the required temperatures and minimize excessive drying. Sunshades and windbreakers are to be left in place for the specified curing time.

E. Concrete Curing

- a. Freshly deposited concrete shall be protected from premature drying, excessively hot or cold temperatures, flowing water and mechanical injury. Protective measures shall conform to ACI 308R. The concrete is to be maintained with a minimum moisture loss, at a relatively constant

- temperature, for the period of time necessary for the hydration of the cement and proper hardening of the concrete. Take extreme caution to prevent moisture loss during the 3 to 10 hour period following placing, as the concrete is particularly vulnerable to shrinkage at this time.
- b. As soon as the concrete has been placed and horizontal top surfaces have received their required finish, provision shall be made for maintaining the concrete in a moist condition for at least a 5-day period thereafter. Horizontal surfaces shall be kept covered and intermittent wetted to prevent localized drying.
 - c. The Contractor shall use one of the following methods to insure that the concrete remains in a moist condition for the minimum period stated above.
 - 1. Ponding or continuous fogging or sprinkling.
 - 2. Application of mats or fabric kept continuously wet.
 - 3. Continuous application of steam (under 150°F)
 - 4. Application of sheet materials for curing conforming to ASTM C171.
 - 5. If approved by the Engineer, application of a curing compound.
 - d. Curing compound shall be used only where specifically approved by the Engineer. Curing compound shall not be used on surfaces to receive subsequent coatings such as any surface against which cementitious finishing materials are to be bonded, epoxy coatings or any surface for which the final finishing methods are incompatible with the use of a curing compound. Curing compound shall never be used for curing exposed walls with fluid or earth backfill on the opposite side.
 - e. When permitted, the curing compound shall maintain the concrete in a moist condition for the required time period, and the subsequent appearance of the concrete surface shall not be affected.
 - f. The compound shall be applied in accordance with the manufacturer's recommendations after water sheen has disappeared from the concrete surface and after finishing operations. The rate of application shall not exceed 300 square feet per gallon.
 - g. Curing compound shall be completely removed in accordance with manufacturer recommendations after curing has been completed.
 - h. The Contractor shall keep absorbent wood forms wet until they are removed. After form removal, the concrete shall be cured by one of the methods in paragraph C.
- F. Construction Joints and Expansion Joints
- a. The Contractor is to furnish, install or otherwise construct all joints as indicated or detailed on the Contract Drawings. The use and location of joints is to be subject to the prior review by the Engineer. All joints are to conform to the details shown on the Contract Drawings, and they shall be in accordance with the following criteria:
 - 1. In walls the maximum length of a continuous concrete placement is to be 35'-0". In order to minimize shrinkage cracks, the walls are to be placed in one of the following manners:
 - i. The Contractor shall place alternate wall sections and place the closure sections after the first sections, on each side of the subsequent placements have been cured.

- ii. The Contractor shall place the entire wall length in adjacent sections next to each other, provided that the preceding section has been cured.
2. All corners shall be part of a continuous placement, and should a construction joint be required, the joint shall not be located closer than five feet from a corner.
3. In slabs on the ground, with reinforcement or welded wire fabric reinforcement, the Contractor shall, in order to minimize shrinkage cracks, place the slabs in one of the following manners:
 - i. The Contractor shall place the slab in alternate sections in a checkerboard pattern, with closure sections placed after alternate sections have cured. Each individual section shall be approximately square and shall not be more than 400 sq.ft. in area.
 - ii. The Contractor shall place the slab in strips approximately 15 ft. in width and shall provide contraction joints by means of saw cutting, hand tooling or by inserting preformed plastic or metal strips into the slab after it has been placed. Maximum spacing shall not exceed the width of the concrete placement. Depth of joint shall be 1-1/2 inches in reinforced concrete and 1/3 the thickness of the slab in unreinforced concrete. Adjacent sections shall not be placed until the concrete has cured.
- b. All reinforcing steel and welded wire fabric shall be continued across construction joints. Reinforcing steel shall be discontinuous across expansion joints.
- c. The Contractor shall place mat foundation areas in as large a volume as practicable.
- d. Joints not indicated on the Contract Drawings are to be so made and located as to least impair the strength of the Structure. Construction joints in walls and slabs are to conform to ACI 318.
- e. The Contractor shall submit to the Engineer for review a plan showing the location of his proposed construction joints for each Structure prior to beginning construction of the various Structures.
- f. Construction joints are to consist of keyed joints, except as shown, and are to be installed as specified previously. If the Contractor desires to install additional construction joints, at his own expense, he is to submit working drawings for approval showing the proposed locations and a placement schedule.
- g. Whenever a stoppage of more than 30 minutes occurs in the placing of concrete, construction joints are to be installed.
- h. All construction joints are to have a row of form ties located at a distance of approximately 6" from the joint, to permit aligning and tightening of the forms for subsequent sections.
- i. Expansion joints shall be installed where shown on the Contract Drawings in base slabs and supported slabs and shall be constructed as detailed on the Contract Drawings.
- j. Expansion joints shall be formed by means of a preformed foam or asphalt joint filler consistent with the type of joint as detailed on the Contract Drawings. The joint fillers shall be installed

in strict accordance with the joint details shown on the Contract Drawings and the Manufacturer's recommendations.

- k. Sealant material shall be installed in strict accordance with the Manufacturer's recommendations. A primer compatible with the sealant used shall be applied to all concrete surfaces. Sealants shall be cured the length of time required by the sealant manufacturer.

G. Concrete Finishing

- a. It is the specific intention of this Section of the Specifications to leave all surfaces in a first quality condition, regardless of the method of concrete finishing. Work that does not meet the quality standards implied, or directly specified, or which does not meet with respect to the esthetic quality desired will not be accepted and such work is to be refinished until finally acceptance by the Engineer.
- b. Within 24 hours after the removal of forms, all honeycombing, pockets and open spaces are to be thoroughly wetted and scrubbed with a brush and then be compactly filled with mortar consisting of one (1) part of Portland cement and two (2) parts sand, of the same type and quality as used in the concrete. This operation is to be considered patching. This is to be done on all surfaces even though they will be covered with backfill afterward. All surfaces are to be neatly finished at the edges.
- c. During finishing operations, the sprinkling with dry cement or the addition of water shall be strictly prohibited.
- d. Rubbing and finishing, as defined hereinafter, shall begin not more than 48 hours after form removal, while the concrete is green and can have its surface worked without impairing structural quality or risking future delamination of the textured surface finish.
- e. Before starting the concrete construction of any Structure, the Contractor shall submit to the Engineer, for review, a finishing schedule indicating the type or types of finishing operations that the various components of the Structure shall receive based on the Contractor's understanding of the Contract Documents. The Contractor shall not begin this work until he receives the Engineer's concurrence with the Contractor's schedule.
- f. Concrete surface finishing shall consist of the following defined operations:
 - 1. Patching - Filling of holes, honeycombs, air bubbles of all sizes or other voids within 24 hours of form removal.
 - 2. Rubbing - The method employed to remove unwanted concrete projections or other surface imperfections that generally project outward from the normal plane of the concrete. Mechanical or hand rubbing tools of various types used in the construction industry shall be employed. Bagging shall not be considered as part of the rubbing operations.
 - 3. Finishing - The method employed to complete the final surface finish such as wood float, steel trowel, broom, cork board, burlap bag or other means. In some instances one or more of these treatments might be required to leave the concrete surface ready to receive special surface finishes such as tile, slate, paint or other coatings or materials. Interior concrete surfaces that remain exposed to view, even though painted, shall receive a swirl-applied, sandpaper textured finish developed by stoning, cork board working, and bagging without

removing the textured finish. This finish shall be developed by working the green concrete, and shall not delaminate upon drying. Dust shall be removed prior to any painting.

4. Surfaces to receive a protective coating shall be finished in accordance with manufacturer recommendations. All concrete surface preparations with regards to bonding of the coating to the substrate shall be strictly adhered to.
 - g. During the screening and floating operations, care shall be taken that the surface is free from holes, depressions and high spots. The finished surface shall not fall more than 1/8" from a 10 ft. steel straightedge applied to the surface at any point and shall have no visible unevenness.
 - h. All exterior slabs including walkways, sidewalks, landings, pads at doorways or entrances, walk-on roof decks (including fill areas), or other similar, exterior access areas are to be wood floated and light broom finished.
 - i. Exterior slabs that receive no foot traffic are to be wood-floated.
 - j. Exterior exposed concrete ramps shall receive the same no-slip finish as hereinbefore specified for treads and platforms.
 - k. Finish requirements in process areas shall be such as to produce a dense surface by steel troweling, with smooth features that shall not impede the flow of water or allow the adhesion of solids.
 - l. Where any process area is to be grouted along the floor surfaces, the base surface is to be left rough to receive the grout. Grout used shall be as specified by the equipment Manufacturer, or as directed by the Engineer, shall be of the thickness shown on the Contract Drawings or Manufacturer's approved shop drawings, and shall receive a steel trowel finish unless otherwise finished mechanically.
 - m. The Engineer will make all final decisions with regard to finishes whenever the work to be undertaken may fall into one or more of the categories described above.
 - n. In the event that efflorescence, stains, oil, grease, or any unsightly accumulation of foreign materials are visible on the exposed surfaces of finished concrete, the Engineer may require remedial action to remove these blemishes. Such action may cover all exposed concrete, or when irregular lapping can be avoided, only such parts that are affected by the stains or other unsightly appearances shall be cleaned. Cleaning shall proceed as follows:
 - o. Remove oil and grease with detergents and scrubbing and thoroughly wash with water.
 - p. Only when directed by the Engineer, "Sack-Rub" concrete surfaces as follows:
 1. Mix one-part of Portland cement, adding amounts of white Portland cement necessary to obtain required color, one-part fine industrial sand, an approved bonding agent, and sufficient water to give consistency of heavy cream. After surfaces are prepared and wetted down, rub the mortar thoroughly over the entire surface with clean burlap. After short interval, remove dried grout with dry burlap without removing from pits.

2. Spots or streaks remaining may be honed dry and lightly so as not to change the texture of the concrete.

H. Concrete Protection

- a. After curing compound application or required curing period, concrete slabs are to be covered with a waterproof curing paper. All seams of such paper are to be overlapped at least 4” and sealed with tape. Further protection is to be provided when erecting equipment, by means of planking of sufficient size, or such other protection, as is required. The paper is not to be removed prior to the final cleaning, and in any case, not sooner than 28 days after being placed.

I. Cleaning Up

- a. Cleanup shall be undertaken upon completion of the work in this Section. Upon final completion of all work included herein; all surplus and waste materials resulting from the concrete and cement finishing work, including all tools and implements employed therein, shall be removed from the Project Site. The Structures and all portions of the Project Site affected by work under this Section shall be left in a neat, clean and acceptable condition.

3.5 STORAGE OF MATERIALS

- A. Storage facilities are subject to the inspection by the Engineer. Cement is to be stored well off the ground in a dry, weather tight, adequately ventilated structure with provision to prevent the absorption of moisture. Aggregates are to be stored in a manner to assure good drainage, to preclude the inclusion of foreign matter, and to preserve the gradation. Each size group is to be kept separate by means of bulkheads between the piles.

END OF SECTION

SECTION 051200 STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.1 STANDARD REQUIREMENTS

- A. This Section of the Specifications covers the furnishing and installation of all structural steel framing indicated on the Contract Drawings or as detailed. This Section is to include steel columns and base plates, beams, girders, tubes, channels, angles, braces, gussets and other structural shapes. It is also to include steel framed and hung or fastened lintels, connections, and all such other steel work as might normally be expected to be included in structural steel construction.
- B. All connection methods normally employed in structural steel framing construction, such as welding or bolting, are to be included in this Section of the Specifications.
- C. Shop priming of all structural steel elements is to be compatible with the finished painting system specified Division 07 of these Specifications. The shop priming is to be included as a part of the delivered structural steel.
- D. All current rules and regulations which have been adopted by the American Institute of Steel Construction (AISC) as Industry standards are to be made a part of this Specification except as specifically amended herein.
- E. If any inconsistencies or discrepancies between the Contract Drawings are found, they are to be reported immediately to the Engineer. The Contractor is to furnish the exact sections, weights, and kinds of materials called for, and must follow the exact details, methods and instructions called for by these Specifications and the accompanying Contract Drawings, to their full intent and purpose, unless otherwise agreed to by the Engineer.
- F. Until mill orders are placed, the Engineer reserves the right to change the sections and sizes of materials shown on the Contract Drawings without affecting the conditions of the Contract, provided the character of the work is not materially changed.
- G. The Contractor is to be held responsible for the accurate location of all his metal work including the location of all base plates, bearing plates, anchor bolts or other items used to attach his materials to other construction. He is to engage the necessary services required to lay out the work accurately in the field and establish all grades, levels and locations for his work. He is to see that all items of his work which are to be built into other construction are installed at the proper time, that these items are correctly located and maintained in such a location during the course of construction.
- H. Any misfit due to errors in locations and inaccuracies in the setting of base plates, bearing plates, anchor bolts or other items of attachment of metal work, is to be removed and made good in a manner as the Engineer may direct. Such corrections are to be made at the expense of the Contractor.

1.2 SUMMARY

- A. Section Includes:

1. Structural metal framing

1.3 SUBMITTALS

- A. Shop drawings shall be submitted as per other Sections or Divisions of these Specifications.
- B. The Engineer may require that affidavits be furnished by the Manufacturer or fabricator, certifying that all materials delivered to the Project Site conforms to AISC or these Specifications.

PART 2 PRODUCTS

2.1 STRUCTURAL STEEL

- A. Structural Steel hot-rolled W-shapes shall conform to ASTM A992. Structural Steel hot-rolled S-shapes, C-shapes, MC-shapes, and angles shall conform to ASTM A36.
- B. Plates shall conform to ASTM A36.
- C. Tubular sections shall conform to ASTM A500, Grade B with 46,000psi yield strength.
- D. Pipe shall conform ASTM A53, Grade B with 35,000psi yield strength.
- E. Where stock material is approved for use, it is to conform to the requirements of the “AISC Code of Standard Practice” Part 5 Specifications and Codes of the Manual of Steel Construction, AISC.

2.2 FASTENERS

- A. Unfinished bolts and nuts are to conform to ASTM A307. Grade A bolts shall be used for general applications and Grade B bolts can be used at flanged joints in piping systems with cast iron flanges. Bolts must be supplied with a mark signifying its type and grade.
- B. High strength bolts shall conform to ASTM A325, Type 3. Bolts must be supplied with a mark signifying its type and grade.
- C. High strength nuts shall conform to ASTM A194. All other nuts must conform to ASTM A563.
- D. Washers must conform to either ASTM F436 or ASTM F959. Washers must have manufacture mark.

2.3 ANCHORS

- A. Expansion anchors are to be Type 316 stainless steel wedge type, such as “Kwik Bolt 3” 316 Stainless Steel as manufactured by Hilti, “Trubolt” as manufactured by Red Head, “Wedge-All” as manufactured by Simpson Strong-Tie, or approved equal.
- B. Anchor bolts cast in concrete for aluminum and stainless steel work are to be Type 304 stainless steel headed bolts with stainless steel nuts and washers or as detailed on the Contract Drawings. Anchor bolts for structural steel work, including open web joists, are to conform to ASTM F1554 Grade 36, unless otherwise indicated on the Contract Drawings. Anchor bolts are to be set in pipe sleeves where directed by the Engineer. All anchor bolts are to be set in templates and adequately

braced to prevent misalignment during the placement of concrete. All bolts are to be of such length that at least two (2) threads are exposed after tightening.

- C. All anchors epoxied into concrete are to be Type 304 stainless steel except as otherwise designated. The epoxy material shall be "HIT RE 500 V3" as manufactured by Hilti, "Red Head A7+" as manufactured by Red Head, "SET-XP High-Strength Epoxy Adhesive" as manufactured by Simpson Strong-Tie, or approved equal. A carbide bit shall be used on the drilling of holes for epoxy anchors, in no way shall a diamond-tipped bit be used for this application.

2.4 MONORAIL BEAMS

- A. The Contractor shall furnish, install, and prime paint all steel monorail beams for traveling hoists. Beams shall be of the sizes and weights and shall be supported as shown on the Contract Drawings, complete with trolley stops and other accessories required by the hoist manufacturer.

PART 3 EXECUTION

3.1 CONNECTIONS

- A. Field welding will not be permitted, unless noted on the Contract Drawings or allowed by the Engineer, and then only under the safeguards and certifications required by local laws and authorities having jurisdiction of this work.
- B. All connections for steel framing are to conform to the requirements of the Steel Construction Manual of the American Institute of Steel Construction, Thirteenth Edition. Connections shall be capable of supporting one-half the total uniform load capacity as given in the Maximum Total Uniform Load Tables of Part 3. Design of Flexural Members of the AISC Manual, for the given beam, span and grade of steel specified, unless a larger reaction is shown on the Contract Drawings. Where, due to framing a special connection must be used, it shall be capable of supporting the loading given above. All connections shall have fully pretensioned bolts in bearing unless otherwise designated.
- C. Moment connections are to be as detailed on the Contract Drawings, and are to be provided in addition to standard end connections.
- D. Knife connections, one sided, or other types of eccentric connections will not be permitted where two-sided connections can be used.
- E. No connection is to have fewer than two bolts.
- F. Welding, if used, is to be equivalent in strength to a bolted connection and is to be done in accordance with the current American Welding Society Specifications.
- G. Filler metal for Arc-welding electrodes is to conform to "Specifications for Iron and Steel Arc Welding Electrodes" of the American Welding Society.
- H. In general, shop fabricated connections may be welded or high strength bolted. Fastenings specifically shown on the Contract Drawings are to be used.
- I. Field connections are to be high strength bolted unless welding is indicated.

- J. Holes for the attachment of work by other trades are to be provided as required. Holes are to be punched or drilled; burning will not be permitted.
- K. The bearing ends of columns are to be milled at right angles to the axis of the columns. Abutting surfaces are to be closely fitted.
- L. Assembled parts are to be brought into close contact, and drift pins are to be used only for bringing members into position, not to enlarge or distort holes.
- M. The Contractor is to make a thorough examination of the condition of masonry and concrete work on which his work is in any way dependent for its efficiency according to the intent of these Specifications.
- N. Before starting the installation, he is to notify the Engineer of any defects which affect the satisfactory completion of the work of this Section. The starting of work in connection with structural steel is to imply the acceptance of the underlying surfaces.

3.2 TESTING

- A. Where Slip-Critical Joints are called for on the Contract Drawings, they shall be tested using a Tension Calibrator. The Contractor shall supply the Engineer with required access and sufficient time to test Slip-Critical Joints prior to final approval.

3.3 WELDING

- A. Where welding is specified or detailed on the Contract Drawings, it shall be done in strict accordance with the "Structural Welding Code" AWS D1.1, for procedures, appearance and quality of welds, and for the methods used in correcting welding work.
- B. Welding electrodes shall be E70XX and the electrodes and fluxes shall conform to "Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding," AWS A5.1.
- C. All welding shall be done by qualified welders with current AWS welding certificates. When required by the Engineer, copies of these certificates shall be presented.
- D. The Engineer may require that certifications be provided stating that all welded work meets the requirements as specified herein. These certificates are to be presented to the Owner through the Owner's representatives. Such certifications are to include individual qualified welder's certificates.

3.4 ERECTION

- A. In general, the Contractor shall comply with the AISC Specifications and "Code of Standard Practice"; and as specified hereinbefore. The Contractor shall set all structural steel work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. He shall brace temporarily or anchor temporarily in formwork where work is to be built into concrete, masonry or similar construction. The Contractor shall also provide and install all necessary shoring bracing and temporary supports required during erection to ensure the stability of steel erected before final field connections have been made.

- B. The Contractor shall furnish anchor bolts and other connections required for securing structural steel to foundations and other in-place work. He shall also furnish templates and other devices as necessary for presetting bolts and other anchors to accurate locations.
- C. The Contractor shall clean concrete and masonry bearing surfaces and roughen to improve bond. He shall also clean the bottom surfaces of all base plates. Loose and attached base plates for structural members shall be set on wedges or other adjusting devices. The Contractor shall tighten all anchor bolts after the supported members have been positioned and plumbed. He shall not remove wedges or shims, but if they are protruding, shall cut off same flush with the edge of the base plates prior to packing with grout. The Contractor shall pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. He shall finish all exposed surfaces, protect all installed materials, and allow for the proper curing.
- D. All columns are to be set true and plumb and temporarily braced wherever necessary. All other framework is to be in proper alignment and at the levels required by the Contract Drawings.
- E. The following error is permissible when erecting structural steel framing:
 - 1. Individual pieces will be considered plumb or true when the error does not exceed 1 part in 500.
- F. The Contractor shall not enlarge unfair holes in members by burning or by the use of drift pins, except in secondary bracing members. He shall ream holes that must be enlarged to admit bolts. Enlargement by burning will not be permitted.
- G. The Contractor shall not use gas cutting torches in the field of correcting fabrication errors in the structural framing. Cutting shall be permitted only on secondary members which are not under stress, as acceptable to the Engineer. He shall finish gas-cut sections equal to a sheared appearance when permitted.
- H. As erection progresses, the work is to be securely bolted up to take care of all dead load, wind and erection stresses.
- I. Field bolts in work which will be exposed to the weather upon completion are to be stainless steel.
- J. The Contractor shall splice members only where indicated.
- K. The Contractor shall remove all temporary members and connections when permanent members are in place and final connections have been made.
- L. Should any difficulties be encountered that are not covered by the Contract Drawings and these Specifications, the Contractor is to notify the Engineer and receive his instructions, and Contract Drawings, if necessary, before proceeding with the work. No cutting of sections, either flanges, webs, stems or angles is to be done by the Contractor without the consent of the Engineer unless this cutting is particularly specified or shown on the Contract Drawings.

3.5 REMOVAL OF EQUIPMENT

- A. Upon completion of this work, the Contractor shall remove from the Project Site all temporary supports and other equipment to avoid delaying work of other trades.

END OF SECTION 051200

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal ladders.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Metal ladders.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
 - 1. Metal ladders.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Aluminum Ladders: Aluminum ladders shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- C. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- D. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- E. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 1. Provide stainless-steel fasteners for fastening aluminum.
- B. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.

2.4 MISCELLANEOUS MATERIALS

- A. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.6 METAL LADDERS

- A. General:
 - 1. Comply with ANSI A14.3
- B. Aluminum Ladders:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Alco-Lite Industrial Products.
 - b. O'Keeffe's Inc.
 - c. Precision Ladders, LLC.
 - d. Or approved equal.
2. Space siderails 24 inches apart unless otherwise indicated.
3. Siderails: Continuous extruded-aluminum channels or tubes, not less than 2-1/2 inches deep, 3/4 inch wide, and 1/8 inch thick.
4. Rungs: Extruded-aluminum tubes, not less than 3/4 inch deep and not less than 1/8 inch thick, with ribbed tread surfaces.
5. Fit rungs in centerline of siderails; fasten by welding or with stainless-steel fasteners or brackets and aluminum rivets.
6. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted aluminum brackets.

2.7 ALUMINUM FINISHES

- A. As-Fabricated Finish: AA-M12.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- D. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 1. Cast Aluminum: Heavy coat of bituminous paint.
 2. Extruded Aluminum: Two coats of clear lacquer.

END OF SECTION 055000

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire Retardant Treated (FRT) wood blocking and nailers.

1.3 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. SPIB: The Southern Pine Inspection Bureau.
 - 4. WCLIB: West Coast Lumber Inspection Bureau.
 - 5. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - 2. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
 - 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 - 1. Fire-retardant-treated wood.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
- B. Blocking attachments to existing construction shall comply with ANSI/SPRI/FM 4435/ES1, Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 3. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive

combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Treatment shall not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
3. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664 and design value adjustment factors shall be calculated according to ASTM D6841. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.

- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat all rough carpentry unless otherwise indicated.

2.3 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 1. Blocking.
- B. For items of dimension lumber size, provide Construction or No. 2 and the following species:
 1. Douglas fir- larch; NLGA.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 1. Provide fasteners of Type 304 stainless steel.
- B. Power-Driven Fasteners: NES NER-272.
- C. Wood Screws: ASME B18.6.1.
- D. Lag Bolts: ASME B18.2.1.
- E. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete

as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 1. Use inorganic boron for items that are continuously protected from liquid water.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire Retardant Treated (FRT) Roof sheathing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
 - 2. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5516.
 - 3. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 - 1. Fire-retardant-treated plywood.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

- A. Plywood: DOC PS 1.
- B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- C. Factory mark panels to indicate compliance with applicable standard.

2.2 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior, Structural I sheathing.
 - 1. Span Rating: Not less than 16/0.
 - 2. Nominal Thickness: Not less than 3/4 inch.

2.3 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
 - 3. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D5516 and design value adjustment factors shall be calculated according to ASTM D6305. Span ratings after treatment shall be not less than span ratings specified. For roof sheathing and where high-temperature fire-retardant treatment is indicated, span ratings for temperatures up to 170 deg F shall be not less than span ratings specified.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
- E. Application: Treat all plywood.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For roof sheathing, provide fasteners of Type 304 stainless steel.
- B. Nails: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
 - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Roof Sheathing:

- a. Nail to wood framing.
- b. Space panels 1/8 inch apart at edges and ends.

END OF SECTION 061600

SECTION 073113 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Asphalt shingles.
2. Underlayment.
3. Self-Adhered modified bitumen membranes

B. Related Sections:

1. Section 061000 "Rough Carpentry" for wood framing.
2. Section 076200 "Sheet Metal Flashing and Trim" for metal roof penetration flashings, counterflashings and flashings.

1.3 DEFINITION

- A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of asphalt shingle indicated.
 1. Include similar Samples of trim and accessories involving color selection.
- C. Samples for Verification: For the following products, of sizes indicated, to verify color selected:
 1. Asphalt Shingle: Full size.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.

- B. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for asphalt shingles.
- C. Warranties: Sample of special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of asphalt shingle to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain shingles from the existing warranted roof manufacturer.
- C. Fire-Resistance Characteristics: Where indicated, provide asphalt shingles and related roofing materials identical to those of assemblies tested for fire resistance per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
 - 1. Exterior Fire-Test Exposure: Class A; ASTM E 108 or UL 790, for application and roof slopes indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.
 - 1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.
- B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install asphalt shingles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - 1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

1.10 WARRANTY

- A. Special Warranty: Standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Manufacturing defects.
 - b. Structural failures including failure of asphalt shingles to self-seal after a reasonable time.
 - 2. Maintain the existing roofing system warranty.
- B. Special Project Warranty: Roofing Installer's Warranty, or warranty form at end of this Section, signed by roofing Installer, covering the Work of this Section, in which roofing Installer agrees to repair or replace components of asphalt shingle roofing that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Multitab-Strip Asphalt Shingles: ASTM D 3462, glass-fiber reinforced, mineral-granule surfaced, and self-sealing. (The existing roof system is under warranty. Match the existing roof system shingles.)
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. GAF Materials Corporation.
 - b. CertainTeed Corporation.
 - c. Owens Corning.
 - d. Or approved equal.
 - 2. Tab Arrangement: Three tabs, regularly spaced.
 - 3. Cutout Shape: Square.
 - 4. Butt Edge: Straight cut.
 - 5. Strip Size: Manufacturer's standard.
 - 6. Algae Resistance: Granules treated to resist algae discoloration.
 - 7. Color and Blends: Match the existing adjacent asphalt shingles.

2.2 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226, Type I, asphalt-saturated organic felts, nonperforated.

- B. Self-Adhering Sheet Underlayment, High Temperature: Minimum of 30- to 40-mil- thick, slip-resisting, polyethylene-film-reinforced top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release paper backing; cold applied.
1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
 3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. WIP 250HT by Carlisle Coatings & Waterproofing, Inc.
 - b. Grace Ultra by Grace, W. R. & Co. - Conn.
 - c. Blueskin PE200HT by Henry Company.
 - d. Or approved equal.

2.3 MODIFIED BITUMEN MEMBRANE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. GAF Materials Corporation: Liberty SBS Self-Adhering Roofing System.
 2. CertainTeed Corporation: Flintlastic SA.
 3. Owens Corning: DeckSeal Self-Adhered Roofing System.
 4. Or approved equal.
- B. Modified Bitumen Membrane Base Ply: Smooth-surfaced modified asphalt sheet, consisting of a reinforcing mat impregnated and coated with Styrene-Butadiene-Styrene (SBS) modified bitumen, with the back surface of the sheet coated with a modified asphalt adhesive layer, formulated for self-adhering application.
1. “Liberty Base/Ply Sheet (SA Base)” GAF Materials Corp.
 2. “Flintlastic SA PlyBase SBS” CertainTeed Corporation
 3. “DeckSeal SA Base/ Ply” Owens Corning
 4. Or approved equal.
- C. Modified Bitumen Membrane Cap Ply: Fire-rated, ceramic granule-surfaced modified asphalt sheet, consisting of a reinforced mat impregnated and coated with Styrene-Butadiene-Styrene (SBS) modified bitumen, with back surface of the sheet coated with a modified asphalt adhesive layer, formulated for self-adhering application
1. “Liberty Cap Sheet”, GAF Materials Corp.
 - a. Color: Granules to match adjacent GAF shingles.
 2. “Flintlastic SA Cap”, CertainTeed Corporation
 - a. Color: Granules to match adjacent CertainTeed shingles.
 3. “DeckSeal SA SBS Cap”, Owens Corning
 - a. Color: Granules to match adjacent Owens Corning shingles.
 4. Or Approved Equal.
 - a. Color: Granules to match adjacent shingles.

2.4 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
- B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch- diameter, ring shank, sharp-pointed, with a minimum 3/8-inch- diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.
 - 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
- C. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, 1-inch minimum diameter.
- D. Modified Bitumen Flashing Fastener: A carbon steel fastener with electro galvanized yellow chrome coating, with 1-1/4" long, .106" diameter barbed shank, diamond point and 1"x 1" galvanized square metal cap. Subject to compliance with requirements, provide one of the following or approved equal.
- E. Asphalt Primer: ASTM D 41/D 41M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through asphalt shingles.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
- B. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides a minimum of 2 inches over underlying course. Lap ends a minimum of 4 inches.

Stagger end laps between succeeding courses at least 72 inches. Fasten with felt underlayment nails.

1. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than 3 inches (75 mm) in direction to shed water. Lap ends of felt not less than 6 inches (150 mm) over self-adhering sheet underlayment.
 2. Install fasteners at no more than 36 inch o.c.
- C. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated on Drawings, lapped in direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.

3.3 FLASHING INSTALLATION

- A. General: Install metal flashings and other sheet metal to comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."
1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Step Flashings: Install with a headlap of 2 inches and extend over the underlying asphalt shingle and up the vertical surface. Fasten to roof deck only.

3.4 ASPHALT SHINGLE INSTALLATION

- A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Install courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- C. Install asphalt shingles by single-strip column or racking method, maintaining uniform exposure. Install full-length first course followed by cut second course, repeating alternating pattern in succeeding courses.
- D. Fasten asphalt shingle strips with a minimum of six roofing nails located according to manufacturer's written instructions.
1. When ambient temperature during installation is below 50 deg F, seal asphalt shingles with asphalt roofing cement spots.

3.5 MODIFIED BITUMEN MEMBRANE BASE PLY INSTALLATION

- A. Application of modified bitumen membrane base ply shall immediately follow installation of the plywood sheathing.
- B. Starting at the low point of the roof, install base ply sheets perpendicular to the slope of the substrate.
 - 1. Apply self-adhering sheets to the mechanically attached plywood sheathing.
 - a. Roll out sheets and allow to relax for a minimum of 30 minutes.
 - b. Fully bond base play membrane on horizontal roof surface only.
 - 2. Apply sheets free of wrinkles, creases or fishmouths.
 - 3. Exert sufficient pressure on the roll during application to ensure prevention of air pockets.
 - 4. Accurately align sheets, without stretching, and maintain uniform 4” (min.) side and 6” (min.) end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.
 - a. Repair tears and voids in laps and lapped seams not completely sealed.
 - 5. Roll base sheet into place with weighted lawn or linoleum roller.

3.6 MODIFIED BITUMEN MEMBRANE CAP PLY INSTALLATION

- A. Prior to installation of modified bitumen membrane cap ply, ensure that entire surface of modified bitumen base ply membrane is clean and acceptable to the manufacturer for cap ply installation.
 - 1. Repair all defects in modified bitumen membrane base ply before proceeding with cap ply installation.
- B. Starting at the low point of the roof, install cap sheets perpendicular to the slope of the substrate.
 - 1. Apply self-adhering sheets to the self-adhered base ply sheets.
 - a. Roll out sheets and allow to relax for a minimum of 30 minutes.
 - b. Fully bond base play membrane on horizontal roof surface only. Extend base ply membrane over the fascia metal roof edge flange. (Metal edge must be primed.)
 - 2. Apply sheets free of wrinkles, creases or fishmouths.
 - 3. Exert sufficient pressure on the roll during application to ensure prevention of air pockets.
 - 4. Accurately align sheets, without stretching, and maintain uniform 4” (min.) side and 6” (min.) end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.
 - a. Repair tears and voids in laps and lapped seams not completely sealed.
 - 5. Roll base sheet into place with 50-pound weighted roller.

3.7 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS <Insert name> of <Insert address>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 - 1. Owner: <Insert name of Owner>.
 - 2. Address: <Insert address>.
 - 3. Building Name/Type: <Insert information>.

4. Address: <Insert address>.
5. Area of Work: <Insert information>.
6. Acceptance Date: <Insert date>.
7. Warranty Period: <Insert time>.
8. Expiration Date: <Insert date>.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. Lightning;
 - b. Fire;
 - c. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - d. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - e. Vapor condensation on bottom of roofing; and
 - f. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall

become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.

6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this **<Insert day>** day of **<Insert month>**, **<Insert year>**.

1. Authorized Signature: **<Insert signature>**.
2. Name: **<Insert name>**.
3. Title: **<Insert title>**.

END OF SECTION 073113

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Formed steep-slope roof sheet metal fabrications.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: For sheet metal flashing and trim.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
 - 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
 - 4. Include details for forming, including profiles, shapes, seams, and dimensions.
 - 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 - 6. Include details of termination points and assemblies.
 - 7. Include details of roof-penetration flashing.
 - 8. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
 - 9. Include details of special conditions.
 - 10. Include details of connections to adjoining work.
 - 11. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.6 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

- B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
 - 1. As-Milled Finish: Mill.
- C. Stainless-Steel Sheet: ASTM A 240, Type 304, dead soft, fully annealed; with smooth, flat surface.
 - 1. Finish: 2D (dull, cold rolled).

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- C. Solder:
 - 1. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
- D. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 2. Obtain field measurements for accurate fit before shop fabrication.

3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- G. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- H. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- I. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- J. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.
- K. Do not use graphite pencils to mark metal surfaces.

2.5 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
1. See drawings.
- B. Counterflashing: Fabricate from the following materials:
1. See drawings.
- C. Roof-Penetration Flashing: Fabricate from the following materials:
1. See drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners[, **solder**], protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 - 5. Torch cutting of sheet metal flashing and trim is not permitted.
 - 6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 - 1. Coat concealed side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 3/4 inch for wood screws.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not use torches for soldering.
 2. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 3. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

3.3 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in receivers and fit tightly to base flashing.
- C. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.4 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.5 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Roof curbs.

- B. Related Sections:

- 1. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, and miscellaneous sheet metal trim and accessories.

1.3 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

1.5 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation.
 - 1. Mill-Phosphatized Finish: Manufacturer's standard for field painting.
- B. Aluminum Sheet: ASTM B 209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.
 - 1. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 2. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.
- C. Aluminum Extrusions and Tubes: ASTM B 221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.
- D. Stainless-Steel Sheet and Shapes: ASTM A 240/A 240M or ASTM A 666, Type 304.
- E. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.

2.2 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Fire-Retardant-Treated Lumber by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898.
- C. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- D. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
- E. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- F. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.
- G. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.3 ROOF CURBS

- A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, stepped integral metal cant raised the thickness of roof insulation, and integrally formed deck-mounting flange at perimeter bottom.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Roof Products Inc.
 - b. Curbs Plus, Inc.
 - c. LM Curbs.
 - d. Or Approved Equal
- B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
- C. Material: Zinc-coated (galvanized) steel sheet, 0.052 inch thick.
 1. Finish: Mill phosphatized.
- D. Construction:
 1. Insulation: Factory insulated with 1-1/2-inch- thick glass-fiber board insulation.
 2. Liner: Same material as curb, of manufacturer's standard thickness and finish.
 3. Factory-installed wood nailer at top of curb, continuous around curb perimeter.
 4. Fabricate curbs to minimum height of 12 inches unless otherwise indicated.
 5. Top Surface: Level around perimeter with roof slope accommodated by sloping the deck-mounting flange.
 6. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions.
 - 1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
 - 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
 - 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
 - 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 - 1. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Roof Curb Installation: Install each roof curb so top surface is level.
- D. Seal joints with elastomeric sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.

- B. Clean exposed surfaces according to manufacturer's written instructions.
- C. Clean off excess sealants.
- D. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes sealants not specified elsewhere for the following applications, including those specified by reference to this section:
 - 1. Exterior joints in the following vertical surfaces and non-traffic horizontal surfaces.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

1.5 QUALITY ASSURANCE

- A. Installer Qualification: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

- B. Store and handle materials in compliance with manufacturer’s written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
- B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of Contract Documents.
 - 1. Special Installer’s Guarantee: All work under this Section shall be guaranteed under the Contractor’s Guarantee for a period of two (2) years.
- B. Special Manufacturer’s Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified in the sealant schedules at the end of Part 3.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer’s full range for this characteristic.

2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant in the Elastomeric Joint-Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.
- B. Additional Movement Capability: Where additional movement capability is specified in the Elastomeric Joint Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width at the time of installation and remain in compliance with other requirements of ASTM C 920 for uses indicated.
- C. Stain-Test-Response Characteristics: Where elastomeric sealants are specified in the Elastomeric Joint-Sealant Schedule to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

2.4 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

2.5 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry
 - 3. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install sealants by proven techniques to comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 ELASTOMERIC JOINT-SEALANT SCHEDULE

- A. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Building Systems; Sonolastic NP1.
 - b. Pecora Corporation; Dynatrol I-XL.
 - c. Sika Corporation, Construction Products Division; Sikaflex - 1a.
 - d. Or Approved Equal

END OF SECTION 079200

SECTION 089119 - FIXED LOUVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fixed, extruded-aluminum louvers.

1.3 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades (i.e., the axes of the blades are horizontal).
- C. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- D. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
 - 1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
 - 2. Show mullion profiles and locations.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.
- B. Windborne-debris-impact-resistance test reports.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
 - 1. Wind Loads: Determine loads based on a uniform pressure of 20 lbf/sq. ft., acting inward or outward.
- B. Windborne-Debris-Impact Resistance: Louvers located within 30 feet of grade shall pass enhanced-protection, large-missile testing requirements in ASTM E 1996 for Wind Zone 2 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than louvers indicated for use on Project.
- C. Seismic Performance: Louvers, including attachments to other construction, shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

- D. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- F. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.
- G. Louvers shall be warrantied for a period of 5 years after substantial completion.

2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal, Wind-Driven-Rain-Resistant Louver:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Ruskin Company; Tomkins PLC.
 - b. Greenheck Fan Corporation.
 - c. Industrial Louvers, Inc.
 - d. Or approved equal.
 - 2. Louver Depth: 7 inches.
 - 3. Frame and Blade Nominal Thickness: Not less than 0.080 inch.
 - 4. Louver Performance Ratings:
 - a. Free Area: Not less than 56%.
 - b. Air Performance: Not more than 0.10-inch wg static pressure drop at 600-fpm free-area intake velocity.
 - c. Wind-Driven Rain Performance: Not less than 99 percent effectiveness when subjected to a rainfall rate of 3 inches per hour and a wind speed of 29 mph at a core-area intake velocity of 497 fpm.
 - 5. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.4 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
 - 1. Screen Location for Fixed Louvers: Interior face.
 - 2. Screening Type: Bird screening.
- B. Secure screen frames to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches from each corner and at 12 inches o.c.

- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
 - 1. Metal: Same type and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
 - 2. Finish: Mill finish unless otherwise indicated.
 - 3. Type: Rewirable frames with a driven spline or insert.
- D. Louver Screening for Aluminum Louvers:
 - 1. Bird Screening: Flattened, expanded aluminum, 5/8 by 0.040 inch thick.

2.5 BLANK-OFF PANELS & SAFING

- A. Blank Off panels shall be 0.050" thick aluminum sheet metal.
- B. Insulated Safing shall be provided on the inside of each louver which is not covered by the plenums or equipment attached to the shaft or louver. Safing shall consist of a two inch thick rigid fiberglass board type insulation sandwiched between two 16 gauge minimum sheet metal. Insulation shall be secured to the sheets with adhesive. All edges of the panels shall be provided with a 16 gauge minimum channel secured in place with sheetmetal screws six inches on centers. Insulated sandwich panels shall be removable type with maximum space of 18 inches, and supported on 3 x 3 x 1/4" angle. Provide intermediate supports. The sheets, channels and hardware used for the safing shall be aluminum. The Contractor shall submit details of construction to the engineer for review. Panel finish shall be the same finish as applied to the louvers.

2.6 MATERIALS

- A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
 - 1. Use hex-head or Phillips pan-head screws for exposed fasteners unless otherwise indicated.
 - 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
 - 3. For color-finished louvers, use fasteners with heads that match color of louvers.
- D. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed for masonry, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

2.7 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.
 - 1. Continuous Vertical Assemblies: Fabricate units without interrupting blade-spacing pattern.
- C. Maintain equal louver blade spacing to produce uniform appearance.
- D. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 - 1. Frame Type: Channel unless otherwise indicated.
- E. Include supports, anchorages, and accessories required for complete assembly.
- F. Provide extended sills for recessed louvers.
- G. Join frame members to each other and to fixed louver blades with fillet welds, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.8 ALUMINUM FINISHES

- A. Finish louvers after assembly.
- B. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: As selected from manufacturer's full range.
- C. The Louver finish shall be warrantied for a period of 5 years after substantial completion.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
 - 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 089119

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Metal framing systems.
 - 4. Thermal-hanger shield inserts.
 - 5. Fastener systems.
 - 6. Equipment supports.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of the Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 ACTION SUBMITTALS

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

- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:
 - 1. Trapeze pipe hangers.
 - 2. Metal framing systems.
 - 3. Equipment supports.
- C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Detail fabrication and assembly of trapeze hangers.
 - 2. Design Calculations: Calculate requirements for designing trapeze hangers.

1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.7 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
 - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - 2. Galvanized Metallic Coatings: Pre-galvanized or hot dipped.
 - 3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
 - 4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - 5. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.2 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
2. Standard: MFMA-4.
3. Channels: Continuous slotted steel channel with in turned lips.
4. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.
6. Metallic Coating: Hot-dipped galvanized.

2.4 THERMAL-HANGER SHIELD INSERTS

- A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.
- B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.
- C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Expansion Anchors: Insert-wedge-type, stainless- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.6 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.7 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, no shrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Non-staining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

2.8 Supports for Pipelines with Thermal Expansion:

- A. Pipe rolls for single rod hangers: Stainless steel frame construction, ductile iron roller and stainless steel roller rod provided with threaded nuts; vertical adjustment permitted; for pipe sizes 6 inches or less unless otherwise approved.
- B. Pipe rolls for double rod hangers: Ductile iron roller, stainless steel roller rod, malleable iron threaded sockets which permit vertical adjustment.

2.9 Pipe Insulation Protection

- A. Contractor shall furnish steel protection saddles on all supports for insulated pipe.
 - 1. For pipe sizes less than 12 inches in diameter, provide saddles of No. 14 U.S. gauge stainless steel curved 180 degrees for use with roller hangers or structural trapeze hangers and of No. 16 U.S. gauge stainless steel curved 120 degrees for use in clevis hangers. Saddles shall be at least 12-inches long. Saddle gripping side edges shall be turned up at least to the thickness of insulation.
 - 2. For pipe 12 inches in diameter and larger, provide saddles of No. 12 U.S. gauge stainless steel with a welded centerplate to provide three-edge support. Saddles shall be at least as long as the pipe diameter, provide 120 degree coverage and have edge and centerplate depths equal to the insulation thickness.

- 2.10 Before placing the saddles, saddles shall be filled with either insulating cement or high density insulation cut to fit. For vapor barrier insulation, the barrier must be maintained; contact between hanger and support and bare pipe will not be permitted.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

RECOMMENDED HANGER SPACING AND ROD SIZE FOR STEEL PIPE

Nominal Pipe Size (inches)	Maximum Span* (feet)	Recommended Hanger Rod Sizes (single rod – inches)	Recommended Hanger Rod Sizes (double rod – inches)	Maximum Load Per Hanger (lbs.)
3/4"	7	3/8"	3/8"	300
1"	7	3/8"	3/8"	300
1 1/4"	7	3/8"	3/8"	300
1 1/2"	9	3/8"	3/8"	300
2"	10	3/8"	3/8"	325
2 1/2"	11	1/2"	3/8"	350
3"	12	1/2"	3/8"	400
3 1/2"	13	1/2"	3/8"	450
4"	14	5/8"	1/2"	850
5"	16	5/8"	1/2"	950
6"	17	3/4"	5/8"	1075
8"	19	7/8"	5/8"	1350
10"	22	7/8"	5/8"	1750
12"	23	7/8"	3/4"	2200
14"	25	1"	7/8"	2500
16"	27	1"	7/8"	3075
18"	28	1"	7/8"	3700
20"	30	1 1/4"	1"	4425
24"	32	1 1/4"	1"	6050

Based on MSS SP-69 Table 3 & 4.

*For hanger spacing greater than 10'-0", many codes require pipe hangers to be spaced a maximum of every 10' (3.048 meters) regardless of size. Check local codes. Local codes apply.

Spacing and capacities are based on water filled pipe plus 50 lbs. /ft. dead load. Closer hanger spacing may be required where additional valves and fittings increase the load.

RECOMMENDED HANGER SPACING AND ROD SIZE FOR COPPER TUBING

Nominal Tubing Size (inches)	Maximum Span* (Feet)	Recommended Hanger Rod Sizes (inches)
1/2"	5	3/8"
3/4"	5	3/8"
1"	6	3/8"
1 1/4"	7	3/8"
1 1/2"	8	3/8"
2"	8	3/8"
2 1/2"	9	1/2"
3"	10	1/2"
3 1/2"	11	1/2"
4"	12	1/2"
5"	13	1/2"
6"	14	5/8"
8"	16	3/4"

Based on MSS-SP-69, Table 3 & 4.

*For hanger spacing greater than 10'-0", many codes require pipe hangers to be spaced a maximum of every 10' (3.048 meters) regardless of size. Check local codes. Local codes apply.

Spacing and capacities are based on water filled pipe plus 50 lbs./ft. dead load. Closer hanger spacing may be required where additional valves and fittings increase the load.

- C. Tubing less than 1-inch diameter: In accordance with best piping practice and ASME B31.1, and as approved by the Engineer.

Additional supports shall be placed immediately adjacent to any change in piping direction, at equipment, and on both sides of valves, expansion joints and couplings.

- D. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

- E. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

- F. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

- G. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
 2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 077200 "Roof Accessories" for curbs.
- H. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- I. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- J. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- K. Install lateral bracing with pipe hangers and supports to prevent swaying.
- L. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- M. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- O. Insulated Piping:
1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.

- e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
- 5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
- 6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.1 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.2 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

- B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal as specified in Division 1 of the Specification Sections.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports, metal trapeze pipe hangers and metal framing systems and attachments for general service applications.
- F. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.
- G. Use padded hangers for piping that is subject to scratching.
- H. Use thermal-hanger shield inserts for insulated piping and tubing.
- I. Horizontal-Piping Hangers and Supports, Vertical-Piping Clamps, Hanger Rods Attachments, and Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

Horizontal-Piping Hangers and Supports			
Type	MSS	NPS	Use
Adjustable, Steel Clevis Hangers	Type 1	NPS 1/2 to NPS 30	For suspension of non-insulated or insulated, stationary pipes
Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps	Type 3	NPS 3/4 to NPS 36	For suspension of pipes, requiring clamp flexibility and up to 4 inches of insulation
Steel Pipe Clamps	Type 4	NPS 1/2 to NPS 24	For suspension of cold and hot pipes if little or no insulation is required
Adjustable Pipe Saddle	Type 38	NPS 2-1/2 to	For stanchion-type support for

Supports		NPS 36	pipes if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange
Adjustable Roller Hangers	Type 43	NPS 2-1/2 to NPS 24	For suspension of pipes, from single rod if horizontal movement caused by expansion and contraction might occur
Vertical-Piping Clamps			
Extension Pipe or Riser Clamps	Type 8	NPS 3/4 to NPS 24	For support of pipe risers
Carbon- or Alloy-Steel Riser Clamps	Type 42	NPS 3/4 to NPS 24	For support of pipe risers if longer ends are required for riser clamps
Hanger-Rod Attachment			
Steel Turnbuckles	Type 13	-	For adjustment up to 6 inches for heavy loads
Steel Clevises	Type 14	-	For 120 to 450 F piping installations
Swivel Turnbuckles	Type 15	-	For use with MSS Type 11, split pipe rings
Malleable-Iron Sockets	Type 16	-	For attaching hanger rods to various types of building attachments
Steel Weldless Eye Nuts	Type 17	-	For 120 to 450 F piping installations
Building Attachments			
Steel or Malleable Concrete Inserts	Type 18	-	For upper attachment to suspend pipe hangers from concrete ceiling
Top-Beam C-Clamps	Type 19	-	For use under roof installations with bar-joist construction, to attach to top flange of structural shape. Provide retaining strap
Welded Beam Attachments	Type 22	-	For attaching to bottom of beams if loads are considerable and rod sizes are large
C-Clamps	Type 23	-	For structural shapes

Steel-Beam Clamps with Eye Nuts	Type 28	-	For attaching to bottom of steel I-beams for heavy loads
Linked-Steel Clamps with Eye Nuts	Type 29	-	For attaching to bottom of steel I-beams for heavy loads, with link extensions
Malleable-Beam Clamps with Extension Pieces	Type 30	-	For attaching to structural steel
Welded-Steel Brackets (light)	Type 31	-	For support of pipes from below or for suspending from above by using clip and rod - up to 2" pipe
Welded-Steel Brackets (med)	Type 32	-	For support of pipes from below or for suspending from above by using clip and rod - 2 to 4" pipe
Welded-Steel Brackets (heavy)	Type 33	-	For support of pipes from below or for suspending from above by using clip and rod - over 4" pipe

J. Supports for Vertical Piping:

1. Riser clamp shall be placed under hub, fitting or coupling with approved solid bearing on steel sleeve.
2. Where riser clamps are used with plastic piping they shall be modified so as not to exert any compressive forces on the pipe.
3. Vertical piping shall be supported at each floor and between floors by stays or braces to prevent rattling and vibration. Maximum spacing shall not exceed 25 feet.
4. Base elbows or welded equivalent shall be provided at vertical piping bases.
5. Top support shall have a horizontal connection, and provide for pipe expansion.

K. Pipelines installed under plumbing work shall be spaced in conformity with the requirements of the International Building Code or as specified in the Specifications.

L. Pipelines installed under plumbing work shall be spaced in conformity with the requirements of the International Building Code or as specified in the Specifications Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

M. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

N. Use powder-actuated fasteners instead of building attachments where required in concrete construction.

O. Hanger rods shall be attached to existing concrete structures using stainless steel expansion anchors.

END OF SECTION 230529

SECTION 230548 - VIBRATION AND WIND CONTROLS FOR HVAC

PART 1 - GENERAL

1.1 Description

A. Scope:

1. Contractor shall provide all professional services, labor, materials, tools, equipment, and incidentals as shown, specified, and required to design, furnish, and install vibration control, and wind control for process mechanical, hvac, plumbing, fire protection, electrical, instrumentation and control, and architectural components.
2. Extent of components requiring controls are described in this section and as required by laws and regulations. The work includes:
 - a. Vibration Controls for Components.
 - b. Wind Controls for Components.
3. The Work excludes:
 - a. Seismic controls are not required for this project. Information contained in this specification pertaining to seismic controls shall not apply for this project.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before, the vibration, and wind controls Work.

C. Related Sections:

1. Section 055000 - Metal Fabrications.
2. Section 235123 – Breeching, Chimney and Stacks

1.2 References

A. Standards referenced in this Section are:

1. AWS D1.1, Structural Welding Code – Steel.
2. AWS D1.2, Structural Welding Code – Aluminum.
3. AWS D1.3, Structural Welding Code – Sheet Steel.
4. AWS D1.6, Structural Welding Code – Stainless Steel.
5. National Roofing Contractors Association (NRCA) Standards.

1.3 Definitions

A. The following definitions are used in this Section:

1. Certificate of compliance: certificate provided by component manufacturer indicating that component has been tested or analyzed in accordance with laws and regulations, including applicable building code, and is capable of resisting design forces defined in laws and regulations.
2. Components: Process Mechanical, HVAC, plumbing, electrical, instrumentation and control, architectural, and other non-structural equipment, systems, and elements permanently attached to structures, including supporting structures and attachments.
3. Component Assembly: Component assembled by Contractor from individual components of different Suppliers.
4. Controls: Vibration Control, and Wind Control.
5. Controls Design Engineer: Professional Engineer responsible for Vibration Control, and Wind Control.
6. Essential Facility: Buildings and other structures intended to remain operational in event of extreme environmental loading from flood, wind, snow, or earthquakes.
7. Failure: Separation of an attachment between Components, or Components and structure, vertical permanent deformation greater than 1/8-inch, horizontal permanent deformation greater than 1/4-inch, or failure of the equipment to perform its function.
8. Hazardous Contents: Material that is highly toxic or potentially explosive in sufficient quantity to pose significant life-safety threat to personnel working in building or the general public if an uncontrolled release were to occur.
9. Importance Factor (Ip): Factor that accounts for degree of hazard to human life and damage to property.
10. Isolated Component: Component indirectly connected to structure through Control designed to prevent transmission of Component vibration to structure.
11. Lateral Forces: Horizontally applied forces resulting from wind or seismic event, combined with operational horizontal forces. Wind and seismic forces are considered separately.
12. Life Safety Systems: All systems involved with fire protection including sprinkler piping, water service piping, jockey pumps, fire pumps, fire dampers, smoke dampers, smoke exhaust systems, control panels and fire alarm panels associated with fire protection Components, and Components in Essential Facilities necessary for keeping the Essential Facility Operational.
13. Non-Isolated Component: Component that is connected to structure in such a way that allows transmission of Component vibration to structure.
14. Operational: Capable of providing intended function.
15. Process Mechanical: All mechanical Components that are not part of HVAC, plumbing and fire protection Components.
16. Seismic Control: Seismic restraining systems.
17. Seismic Use Group: Classification assigned to building based on use defined in applicable building code.
18. Vibration Control: Vibration isolating systems.
19. Wind Control: Wind restraining systems.

1.4 Quality Assurance

A. Qualifications:

1. Supplier:
 - a. Minimum of five years of experience producing Controls substantially similar to those specified in the Contract Documents and able to provide evidence of at least five installations in satisfactory operation for at least five years in the United States.
 - b. Design and analysis delegated through Supplier shall be performed by a registered Professional Engineer licensed in the State of New Jersey.

2. Controls Design Engineer:
 - a. Engage registered Professional Engineer licensed in the state of New Jersey, who has a minimum of five years of experience in providing engineering services for Vibration, and Wind Controls.
 - b. Submit qualifications data and include professional liability insurance certificate in amount of at least \$1,000,000 per claim/aggregate with maximum deductible of \$100,000.
 - c. Responsibilities include:
 - 1) Reviewing performance and design criteria for Controls specified in the Contract Documents.
 - 2) Determining sizes and locations of Controls.
 - 3) Preparing or supervising preparation of design calculations and related drawings, Shop Drawings and submittals, testing plan development, test result interpretation, and comprehensive engineering analysis verifying compliance of Controls with the Contract Documents.
 - 4) Signing and sealing all calculations, design drawings, and Shop Drawings.
 - 5) Certifying that:
 - a) Design of Controls was performed in accordance with performance and design criteria stated in the Contract Documents.
 - b) Design conforms to Laws and Regulations, and to prevailing standards of practice.
 - 6) Provide installation instructions and drawings.
 - 7) Provide field quality control in accordance with Paragraph 3.3 of this Section.

3. Installer:
 - a. Engage an experienced installer to perform the Work of this Section who specializes in installing Controls similar to that required for this Project.
 - b. Submit name and qualifications to Engineer with the following information on a minimum of three completed, successful projects:
 - 1) Names and telephone numbers of Owners, and Architects or Engineers responsible for project.
 - 2) Approximate cost of Control Work for which installer was responsible.

4. Welder:

- a. Qualify welding processes and welding operators in accordance with AWS D1.1, D1.2, D1.3, and D1.6 as appropriate for material to be welded.
- b. Provide certification that welders employed on or to be employed for the Work have satisfactorily passed AWS qualification tests within previous 12 months. Ensure that all certifications are current.

1.5 Submittals

A. Informational Submittals: Submit the following:

1. Shop Drawings:

- a. Detailed schedules of flexible and rigidly mounted Components to receive Controls. Schedules shall be numbered and include Contract Drawing number references where Component is located.
- b. Fabrication details of Component bases including dimensions, structural member sizes, support point locations, and weight distribution.
- c. Specific details of Controls and anchorages, including number, size, and locations for each Component.
- d. Details of suspension and support for ceiling-hung Components.
- e. Details of attachment methods where walls, floors, slabs, or supplementary steel work are used for restraint attachment.
- f. Location of all attachment and support points and forces transferred to supporting structure at each location, as a result of each load combination of static forces and Lateral Forces.
- g. Detailed piping, ductwork, and conduit restraining system layout drawings showing their attachment to building or structure. Include dimensions, size, and location of restraints and attachment connections. Coordinate with system layout shop drawings provided under other sections, as applicable.

2. Product Data:

- a. Supplier and model of Controls.
- b. Supplier's literature, performance data, weight, illustrations, specifications, identification of materials of construction, dimensions of individual parts, and finishes.
- c. Setting drawings, templates, and directions for installation of anchor bolts and other anchorages.

3. Certifications:

- a. Provide completed Professional Design Services Performance Certification on Attachment A to this Section.
- b. Controls Design Engineer's professional liability insurance certificate per Paragraph 1.4.A.2.b of this Section.

4. Delegated Design Submittals:

- a. Information required to clearly demonstrate basis of design for Controls, including calculations, design dimensions, approach and assumptions, and Laws and Regulations on which design of Controls and anchorage is based. Design documents prepared by Controls Design Engineer shall bear the seal and original signature and date of the Controls Design Engineer. State of Engineer's registration, name, and license number shall be clearly legible on the seal.
5. Test Reports:
 - a. Component test reports to confirm statements made on Certificate of Compliance, for Components where a Certificate of Compliance is required.
 - b. Test reports substantiating seismic restraint designs when calculations are not used.
 6. Supplier's Instructions:
 - a. Instructions for shipping, storage protection, handling, and installation.
 - b. Routine maintenance requirements prior to start up.
 7. Field Quality Control Submittals:
 - a. Supplier's Field Reports: Submit reports confirming that Controls have been installed in accordance with Supplier's recommendations and approved Shop Drawings and submittals.
 - b. Controls Design Engineer Report: Submit report confirming that Controls have been installed in accordance with the Controls design. Report shall bear the professional engineering seal, date, and original signature of the Controls Design Engineer.
 8. Qualifications Statements: Submit qualifications for:
 - a. Supplier.
 - b. Controls Design Engineer.
 - c. Installer.
 - d. Welder.
- B. Closeout Submittals:
1. Operation and Maintenance Data:
 - a. Submit complete operation, and maintenance manuals, including, test reports, maintenance data and schedules, description of operation, and spare parts information.

PART 2 - PRODUCTS

2.1 System Performance

A. System Description:

1. Schedules in Part 3 of this Section describe Components that are to receive Vibration Control and systems to receive Wind Control.
2. Tables in Part 3 and performance criteria specified in Paragraph 2.1.C of this Section describes Controls to be provided on Components and systems described in the schedules. Tables are general in nature and may include certain Components that may not be specified in the schedules to receive Controls, while the schedules are Project-specific.
3. Where components are subject to wind, design component and related anchorage to supporting structure to resist wind loads per applicable building code using wind load factors indicated on structural drawings. Using guy wires is allowed for assisting in support of components if compatible with the building/roof structure.
4. Design of Components, including Vibration Controls provided by Component Supplier if required, and associated anchorage to supporting structure, are delegated through Supplier. Design shall resist seismic forces according to requirements of Laws and Regulations using load factors. Design shall demonstrate that Component is capable of transferring Project-specific forces (at minimum) applied at Component's center of gravity, and center of gravity of Component's major elements, to supporting structure without losing structural integrity.
5. Interconnection design of Component Assemblies, including Vibration Controls if required, and anchorage to supporting structure, shall be by Controls Design Engineer. Design of individual Components within assembly to resist vibration forces is responsibility of individual Component Supplier. Component Assembly design shall resist vibration forces according to requirements of Laws and Regulations using load factors. Design shall demonstrate that Component Assembly is capable of transferring Project-specific forces (at minimum) applied at Component's center of gravity, and center of gravity of Component's major elements, to supporting structure without losing structural integrity. Coordinate design with each Supplier of Components used in the assembly and obtain approval of each Supplier prior to providing Shop Drawings for Component Assembly.
6. Equivalency: Products or methods specified for Controls are not intended to limit use of other products or methods of equivalent or superior quality and effectiveness.

B. Design Criteria:

1. Analyses for anchorage shall include calculated dead loads, Lateral Forces, and capacity of materials utilized for connections to Components and structure. Analysis for anchorage shall include anchoring methods, bolt diameter, embedment, and weld requirements. Design Controls to accept, without failure, forces acting through Component's center of gravity and distributed relative to Component's mass distribution.

2. Design Wind Controls to accept, without failure, wind forces acting on Component's exposed wind surface area. Analyses for wind forces shall consider Lateral Forces applied on a minimum of two orthogonal axes in two directions per axis. Overturning moments may result in uplift forces that exceed gravitational forces at ground level that shall be incorporated into analysis. Wind controls shall be designed for 131 mile per hour wind speeds.

C. Performance Criteria:

1. Design and provide Components to maintain structural integrity and to provide continuous load path to transfer Lateral Forces through elements of Component and through anchorage to supporting structure.
2. Internally Isolated Components, when provided in lieu of external isolation and restraint systems, shall conform to requirements of this Section.
3. Curb or roof rail-mounted Components shall be attached to the curb or rails that shall, in turn, be attached to supporting structure, creating continuous load path for vertical and Lateral Forces. Sheet metal screw attachment is unacceptable.
4. Where location and characteristics of elements of supporting structure are not appropriate for supporting Component and transferring vertical and Lateral Forces, notify Engineer in writing.
5. Where changes in specified Components or location of Components are proposed by Contractor for convenience of Contractor and accepted by Engineer, modifications to supporting structure required by such changes shall be responsibility of Contractor at no additional cost to Owner. Design of modification shall consider all vertical and Lateral Forces and be signed, dated, and sealed by Controls Design Engineer.

2.2 Manufacturers

A. Provide products of one of the following:

1. Vibration Mountings and Controls, Inc.
2. Mason Industries.
3. Kinetics Noise Control.
4. Amber/Booth Company, Inc.
5. Or approved equal.

2.3 VIBRATION ISOLATION TYPES

A. Type A: Spring Isolator - Free Standing

1. Spring isolators shall be free standing and laterally stable without housing, and complete with a molded neoprene cup or 1/4-inch neoprene acoustical friction pad between baseplate and support.
2. Mountings shall have leveling bolts rigidly bolted to the Component.
3. Spring diameters shall be no less than 0.8 of compressed height of spring at rated load.
4. Springs shall have minimum additional travel to solid equal to 50 percent of rated deflection.

5. Product and Manufacturer: Provide one of the following:

- a. ASC, manufactured by Vibration Mountings and Controls.
- b. SLF, manufactured by Mason Industries.
- c. FSD, manufactured by Kinetics Noise Control.
- d. Or approved equal.

B. Type B: Seismically Restrained Spring Isolator

1. Restrained spring mountings shall have Type A spring isolator within rigid housing that includes vertical limit stops to prevent spring extension when weight is removed. Housing shall serve as blocking during erection. Remove steel spacer after adjustment. Installed and operating heights are equal. Provide minimum clearance of 1/4-inch around restraining bolts and internal neoprene deceleration bushings to avoid interfering with spring action. Limit stops shall be out of contact during normal operation. Because housings shall be bolted or welded in position, provide an internal isolation pad. Design housing to resist seismic forces.
2. Product and Manufacturer: Provide one of the following:
 - a. AWRS, ASCM, manufactured by Vibration Mountings and Controls.
 - b. SLR, manufactured by Mason Industries.
 - c. FLSS, manufactured by Kinetics Noise Control.
 - d. Or approved equal.

C. Type C: Combination Spring/Elastomer Hanger Isolator (30-degree Type)

1. Hangers shall consist of rigid steel frames containing minimum 1.25-inch thick neoprene elements at top and steel spring with general characteristics specified for Type A. Neoprene element shall have neoprene bushings projecting through steel box.
2. Spring diameters and hanger box lower hole sizes shall be large enough to allow hanger rod to swing through a 30-degree arc from side to side before contacting rod bushing and short-circuiting the spring.
3. Submittals shall include hanger drawing showing 30-degree capabilities.
4. Hanger locations requiring pre-compression for holding piping at fixed elevation shall be pre-compressed by manufacturer.
5. Product and Manufacturer: Provide one of the following:
 - a. RSH30, manufactured by Vibration Mountings and Controls.
 - b. 30N, manufactured by Mason Industries.
 - c. SRH, manufactured by Kinetics Noise Control.
 - d. Or approved equal.

D. Type D: Elastomer Double Deflection Hanger Isolator

1. Molded neoprene element, minimum 1.25-inch thick, with Projecting bushing lining rod clearance hole. Static deflection at rated load shall be minimum of 0.35 inches.

2. Steel retainer box encasing neoprene mounting capable of supporting Component up to four times rated capacity of element.
3. Product and Manufacturer: Provide one of the following:
 - a. RHD, manufactured by Vibration Mountings and Controls.
 - b. HD, manufactured by Mason Industries.
 - c. RH, manufactured by Kinetics Noise Control.
 - d. Or approved equal.

E. Type E: Combination Spring/Elastomer Hanger Isolator

1. Spring and neoprene elements in a steel retainer box with the features as specified in this Section for Type C and Type D isolators.
2. Hanger locations requiring pre-compression for holding piping at fixed elevation shall be pre-compressed by manufacturer.
3. Thirty-degree angularity feature is not required.
4. Product and Manufacturer: Provide one of the following:
 - a. RSH, manufactured by Vibration Mountings and Controls.
 - b. DNHS, manufactured by Mason Industries.
 - c. SRH, manufactured by Kinetics Noise Control.
 - d. Or approved equal.

F. Type F: Seismically Restrained Elastomer Floor Isolator

1. Neoprene mountings shall have minimum static deflection of 0.2 inches and all-directional seismic capability. Mount shall consist of two separated and opposing molded neoprene elements. Elements shall prevent central threaded sleeve and attachment bolt from contacting casting during normal operation. Shock absorbing neoprene materials shall be compounded to bridge-bearing specifications.
2. Product and Manufacturer: Provide one of the following:
 - a. RSM, manufactured by Vibration Mountings and Controls.
 - b. BR, manufactured by Mason Industries.
 - c. MB, manufactured by ISOTECH, Inc.
 - d. Or approved equal.

G. Type G: Pad Type Elastomer Isolator (Standard)

1. One layer of 3/4-inch thick neoprene pad consisting of two-inch square modules.
2. Use load distribution plates as required.
3. Provide bolting for seismic compliance. Provide neoprene and duck washers and bushings to prevent short circuiting.
4. Product and Manufacturer: Provide one of the following:
 - a. Maxiflex, manufactured by Vibration Mountings and Controls.
 - b. Super W, manufactured by Mason Industries.
 - c. RSP, manufactured by Kinetics Noise Control.

d. Or approved equal.

H. Type H: Pad Type Elastomer Isolator (High Density)

1. Laminated canvas duck and neoprene, minimum 1/2-inch thick, with loading capacity of 1,000 psi.
2. Use load distribution plate as required.
3. Bolting as required for seismic compliance. Provide neoprene and duck washers and bushings to prevent short circuiting.
4. Product and Manufacturer: Provide one of the following:
 - a. Fabriflex, manufactured by Vibration Mountings and Controls.
 - b. HL, manufactured by Mason Industries.
 - c. NDF, manufactured by Kinetics Noise Control.
 - d. Or approved equal.

I. Type I: Thrust Restraints

1. Spring element similar to that specified for Type A isolator shall be combined with steel angles, backup plates, threaded rod, washers, and nuts to produce a pair of devices capable of limiting movement of Components to 1/4-inch.
2. Restraint shall be easily converted in field from compression type to tension type.
3. Unit shall be factory pre-compressed.
4. Product and Manufacturer: Provide one of the following:
 - a. RSHTR, manufactured by Vibration Mountings and Controls.
 - b. WBI \ D, manufactured by Mason Industries.
 - c. HSR, manufactured by Kinetics Noise Control.
 - d. Or approved equal.

J. Type J: Pipe Anchors

1. Provide all-directional acoustical pipe anchor, consisting of two sizes of steel tubing separated by minimum 1/2-inch thick 60-durometer neoprene.
2. Allowable loads on isolation material shall not exceed 500 psi. Balance design for equal resistance in all directions.
3. Product and Manufacturer: Provide one of the following:
 - a. MDPA, manufactured by Vibration Mountings and Controls.
 - b. ADA, manufactured by Mason Industries.
 - c. KPA, manufactured by Kinetics Noise Control.
 - d. Or approved equal.

K. Type K: Pipe Guides

1. Pipe guides shall consist of telescopic arrangement of two sizes of steel tubing separated by minimum 1/2-inch thick 60-durometer neoprene.

2. Height of guides shall be pre-set with shear pin to allow vertical motion induced by pipe expansion and contraction. Shear pin shall be removable and re-insertable to allow selection of pipe movement.
3. Guides shall be capable of minimum 1-5/8-inch motion in both directions
4. Product and Manufacturer: Provide one of the following:
 - a. PG, manufactured by Vibration Mountings and Controls.
 - b. VSG, manufactured by Mason Industries.
 - c. KRG, manufactured by Kinetics Noise Control.
 - d. Or approved equal.

L. Type L: Isolated Pipe Hanger System

1. Provide pre-compressed spring and elastomer isolation hanger combined with pipe support into one assembly. Replaces standard clevis, single or double rod roller, or double rod fixed support.
2. Provide with spring element specified for Type A, with steel lower spring retainer and upper elastomer retainer cup with integral bushing to insulate support rod from isolation hanger.
3. Neoprene element under lower steel spring retainer shall have integral bushing to insulate support rod from steel spring retainer.
4. Design and construct hangers to support loads over three times the rated load without Failure.
5. System shall be pre-compressed to allow for rod insertion and standard leveling.
6. Product and Manufacturer: Provide one of the following:
 - a. CIH, CIR, TIH, PIH, manufactured by KRG/D, manufactured by Kinetics Noise Control.
 - b. KRG/D, manufactured by Kinetics Noise Control.
 - c. 30NCC, manufactured by Mason Industries
 - d. Or approved equal.

2.4 Restraint Types

A. Type I: Spring Isolator, Restrained

1. Refer to vibration isolation Type B.
2. Product and Manufacturer: Provide one of the following:
 - a. ASCM, AWR, manufactured by Vibration Mountings and Controls.
 - b. SLR, SLRS, manufactured by Mason Industries.
 - c. FLS, manufactured by Kinetics Noise Control.
 - d. Or approved equal.

B. Type II: Seismically Restrained Elastomer Floor Isolator

1. Refer to vibration isolation Type F.
2. Product and Manufacturer: Provide one of the following:

- a. RSM, manufactured by Vibration Mountings and Controls.
- b. BR, manufactured by Mason Industries.
- c. MB, manufactured by ISOTECH, Inc
- d. Or approved equal.

C. Type III: All-Directional Snubber

1. All-directional snubbers shall consist of interlocking steel members restrained by one piece molded neoprene bushing of bridge bearing neoprene. Bushing shall be replaceable and minimum of 1/4-inch thick. Rated loadings shall not exceed 1,000 psi. Minimum air gap of 1/8-inch shall be incorporated in snubber in all directions before contact is made between rigid and resilient surfaces. Snubber end caps shall be removable to allow inspection of internal clearances. Neoprene bushings shall be rotated to insure no short circuits exist before systems are activated.
2. Product and Manufacturer: Provide one of the following:
 - a. Type SR, manufactured by Vibration Mountings and Controls.
 - b. Z1225, manufactured by Mason Industries.
 - c. ER, manufactured by ISOTECH, INC.
 - d. Or approved equal.

D. Type IV: Floor or Roof Anchorage

1. Rigid attachment to structure utilizing wedge-type anchor bolts, anchored plates machine screw, bolting or welding. Powder shots are unacceptable.
2. Product and Manufacturer: Provide one of the following:
 - a. FA, manufactured by Vibration Mountings and Controls.
 - b. SSB, manufactured by Mason Industries.
 - c. SB-250, manufactured by VMC Group.
 - d. Or approved equal.

E. Type V: Cable Restraints

1. Cable Restraints shall consist of steel aircraft cables sized to resist loads with minimum safety factor of 2.0, and arranged to provide all directional restraint. Cable end connections shall be steel assemblies that swivel to final installation angle and utilize two clamping bolts to provide proper cable engagement. Cables shall not bend across sharp edges. Single arm braces with resilient bushings can be substituted for cable restraints. Deck fitting shall have two through-bolts for attachment.
2. Product and Manufacturer: Provide one of the following:
 - a. SCR, manufactured by Vibration Mountings and Controls.
 - b. SCB, manufactured by Mason Industries.
 - c. SCR, manufactured by The VMC Group.
 - d. Or approved equal.

F. Type VI: Rigid Arm Brace

1. Solid braces shall consist of steel angles or channels to resist loads with minimum safety factor of 2.0, and arranged to provide all directional restraint. Solid brace end connectors shall be steel assemblies that swivel to final installation angle and utilize two through-bolts to provide attachment.
2. Product and Manufacturer: Provide one of the following:
 - a. SAB, manufactured by Vibration Mountings and Controls.
 - b. SSB, manufactured by Mason Industries.
 - c. SAB, manufactured by The VMC Group.
 - d. Or approved equal.

G. Type VII: Internal Clevis Cross Brace

1. Internal clevis cross braces at seismic locations shall be pre-cut pipe sized for internal clevis dimensions.
2. Product and Manufacturer: Provide one of the following:
 - a. ICB, manufactured by Vibration Mountings and Controls.
 - b. CCB, manufactured by Mason Industries.
 - c. A668, manufactured by Portland Bolt.
 - d. Or approved equal.

2.5 Component Bases

A. General

1. All curbs and roof rails shall be anchored to building structural steel for resisting Lateral Forces. Fastening to metal deck is unacceptable.

B. Type B 1: Integral Structural Steel Base

1. Rectangular bases are preferred for all Components.
2. Centrifugal refrigeration machines and pump bases may be T- or L-shaped when there are space constraints. When the pump has pump-mounted suction and discharge fittings, base of pump shall include required supports.
3. All perimeter members shall be steel beams with minimum depth equal to 1/12 of the longest dimension of base.
4. Base depth need not exceed 12 inches provided that deflection and misalignment is within acceptable limits as determined by Supplier.
5. Height-saving brackets shall be employed on all mounting locations to provide minimum base clearance of two inches.
6. Product and Manufacturer: Provide one of the following:
 - a. WFB, manufactured by Vibration Mountings and Controls.
 - b. MSL, WSFL, manufactured by Mason Industries.
 - c. APVB66, manufactured by Simpson
 - d. Or approved equal.

C. Type B 4: Seismic Non-Isolated Curbs

1. Curbs shall conform to Type B-3 curbs except spring isolation is not required.
2. Product and Manufacturer: Provide one of the following:
 - a. Model P6000. Type RPFMA/SRPFMA where Option No. 1 or Option No. 2 is specified, manufactured by Vibration Mountings and Controls.
 - b. RRC, manufactured by Mason Industries.
 - c. LMCurbs manufacturer.
 - d. Or approved equal.

2.6 Materials of Construction And Finishes

- A. Controls including all miscellaneous structural steel and appurtenances shall be constructed of Type 316 stainless steel.
- B. Miscellaneous steel angles, supports, and appurtenances shall be cleaned and prime-coated in the shop and field-painted.
- C. Hardware in corrosive areas shall be Type 316 stainless steel. Hardware in non-corrosive areas shall be galvanized steel.
- D. Neoprene and elastomer parts shall be resistant to ultraviolet radiation and constructed from high grade materials suitable for exposure to high concentrations of hydrogen sulfides, mercaptans, chlorine, and moisture in air.

2.7 Identification

- A. Provide each Control device with Type 316 stainless steel tag embossed or engraved with serial number cross-referenced to Component schedule.

2.8 Miscellaneous Metal

- A. Miscellaneous metal fabrications shall be per Section 05 50 00 - Metal Fabrications.

PART 3 - EXECUTION

3.1 Inspection

- A. Examine areas and conditions under which Control Work is to be performed and notify Engineer in writing of conditions detrimental to proper and timely completion of Work. Do not proceed with Work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.
- B. Coordinate anchorage of Components to receive Controls with installation locations. Examine roughing-in of reinforcing and cast-in-place anchor bolts to verify locations before installation.

3.2 Component Installation

- A. Install Controls in accordance with Supplier's written instructions and Shop Drawings and submittals accepted by Engineer.
- B. Rigid connections between Components and building structure shall not be made in a manner that degrades performance of Control systems.
- C. Do not rigidly connect Isolated Components to building structure.
- D. Bracing may occur from flanges of structural beams, upper truss chords in bar joist construction, and concrete inserts or cast-in-place anchor bolts. Component support shall not overstress the structure.
- E. Install cable restraints with minimum slack to avoid short-circuiting associated Component.
- F. Install cable assemblies without slack on Non-Isolated systems. Solid braces may be used in place of cables on rigidly attached systems except where single arm braces incorporate resilient bushings.
- G. At locations where restraints or solid braces are located, brace support rods as required to accept compressive loads.
- H. Minimum operating clearance under all Isolated Component bases shall be two inches.

3.3 Field Quality Control

- A. Controls Design Engineer Services:
 - 1. Controls design engineer shall check controls installation before controls and related equipment are placed into operation.
 - 2. Controls design engineer shall make at least one visit to the site.
 - 3. After controls installation is complete, controls design engineer shall inspect completed controls work and certify in writing to contractor that all systems are installed in accordance with design. Contractor shall submit control design engineer's report to engineer, certifying correctness of the work.
- B. Supplier's Services:
 - 1. Supplier shall check Controls installation before Controls and related equipment are placed into operation.
 - 2. Supplier shall make at least one visit to the Site.
 - 3. After installation of Controls is complete, Supplier shall inspect completed Controls Work and certify in writing to Contractor that Controls are installed in accordance with Supplier's recommendations and Shop Drawings and submittals accepted by Engineer. Contractor shall submit Supplier's report to Engineer certifying correctness of the Work.

3.4 Adjusting

- A. After entire system is started and under full operating load, adjust Controls so that Controls operate as designed.

3.5 Cleaning

- A. Remove debris from beneath Components and in and around the vibration isolator.

3.6 SUPPLEMENTS

- A. Supplements listed below, following the “End of Section” designation, are a part of this Section:

- 1. Controls Schedules:

- a. Schedule of HVAC Components for Vibration Control.
- b. Schedule of HVAC Components for Wind Control.

- 2. Controls Tables:

- a. Table 23 05 48-A - HVAC and Process Mechanical System Components.
- b. Table 23 05 48-F - Minimum Deflection Guide.

- 3. Attachment 23 05 48-A – Professional Design Services Performance Certification.

END OF SECTION 23 05 48

CONTROLS SCHEDULES FOR SECTION 23 05 48

Section 23 05 48		
Schedule of HVAC Components for Vibration Control		
Item No.	Component	Notes
1	32" Ø flue	1.
2	38" Ø flue	1.
3	66"x44" flue	1.
4	48"x48" draft damper	1.
5	16" FRG valve	1.
6		
7		
8		
9		
10		

NOTES:

1. Vibration Controls shall be factory installed by the unit manufacturer in accordance with Section 23 05 48.

Section 23 05 48		
Schedule of HVAC Components for Wind Control		
Item No.	Component	Notes
1	32" Ø flue	1
2	38" Ø flue	1
3	66"x44" flue	1
4		
5		
6		
7		
8		
9		
10		

NOTES:

SECTION 23 05 48 TABLES

Abbreviations for Tables 23 05 48-A, 23 05 48-B, 23 05 48-C, and 23 05 48-D:

ISOL	Vibration Isolator
DEFL	Deflection
RESTR	Seismic Restraint
MTNG	Mounting
MDG	Minimum Deflection Guide – Table 23 05 48-F

General Notes (G) for Tables 23 05 48-A, 23 05 48-B, 23 05 48-C, and 23 05 48-D:

- Note G1: For variable speed Components with an operating speed below 600 rpm, select isolation deflection from Table 23 05 48-F, Minimum Deflection Guide.
- Note G2: Determine static deflection based on Table 23 05 48-F, Minimum Deflection Guide.
- Note G3: Deflections indicated are minimum at actual load and shall be selected for Supplier's nominal 5-, 4-, 3-, 2- and 1-inch deflection spring series; rpm is defined as lowest operating speed of Component.
- Note G4: Single stroke compressors may require inertia bases with thickness greater than 14-inch maximum specified for Base B-2. Inertia base mass shall be sufficient to maintain double amplitude for 1/8-inch.
- Note G4: For floor-mounted fans, substitute base Type B-2 for Class 2 or 3 and fan having static pressure over five inches of water column.
- Note G5: Indoor utility sets with wheel diameters less than 24 inches need not have deflections greater than 0.75 inches.
- Note G6: For Components with multiple motors, horsepower classification applies to largest single motor.

Reference Notes (R) for Tables 23 05 48-A, 23 05 48-B, 23 05 48-C, and 23 05 48-D:

- Note R1: For roof applications, use base Type B-5.
- Note R2: Curb Type B-3 shall use sound barrier RPFMA when there is no concrete underneath rooftop units. Curbs can be used for return plenums. (See Option No. 1 under Type B-3 base in Paragraph 2.5 of this Section.)

Note R3: Where curbs require supply and return sound attenuation package, use Type SRRFMA. (See Option No. 2 under Type B-3 base in Paragraph 2.5 of this Section.)

Note R4: Units may not be capable of point support. Refer to separate Specification Section for Component. If base is not specified in that Section and external isolation is required, provide Type B-1 base under this Section for entire unit.

Note R5: Use Type B-6 where Non-Isolated seismic support is required.

Note R6: Use Type B-4 where Non-Isolated seismic curbs are used.

TABLE 23 05 48-A - HVAC and PROCESS MECHANICAL SYSTEM COMPONENTS

COMPONENT	HP, CLASS, OR SIZE	MTN G	Mounted on Soil Supported Slab				Mounted on Suspended Slab and Floor or Roof System			
			ISOL	DEFL (in.)	BAS E	REST R	ISOL	DEFL (in.)	BASE	REST R
	>1 HP	Flr	B	0.75	---	IV	B	See MDG	---	IV
		Clg	E	0.75	---	V	E	See MDG	---	V
Curb Mtd. Equip. (Non-Isol.)		Roof	---	---	---	IV	---	---	B-6	IV

Table 23 05 48-F – MINIMUM DEFLECTION GUIDE	
rpm	MINIMUM REQUIRED DEFLECTION (inches)
Less than 400	3.5
401 to 600	2.5
601 to 900	1.5
Over 900	0.75

ATTACHMENT 23 05 48-A

Professional Design Services Performance Certification

1. My name is _____.

2. My New Jersey professional engineering license number is _____.

3. My license expires _____, 20____.

4. The Project for which I have performed professional design services is described as _____.

5. The Specification Section(s) under which I have performed my services is/are _____.

6. The name and address of the individual or entity for whom I have performed professional design services is:

7. I hereby certify that, to the best of my knowledge, information, and belief, I have performed or supervised performance of the professional design services hereunder, and that said services have been performed in accordance with Laws and Regulations and in accordance with the standard of care currently expected of

professional engineers/architects performing similar services for Projects of similar size and complexity in New Jersey.

Date

Signature

Type or Print Name

Name of Firm

Street Address

[PROFESSIONAL SEAL]

City/State/Zip Code

Telephone: _____ Fax: _____

END OF SECTION 23 05 48

SECTION 232113 - PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes pipe and fitting materials and joining methods for the following:
 - 1. Steel pipe and fittings.
 - 2. Joining materials.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of the following:
 - 1. Pipe.
 - 2. Fittings.
 - 3. Joining materials.

1.3 QUALITY ASSURANCE

- A. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature unless otherwise indicated:
 - 1. Air-Vent Piping: 200 deg F.
 - 2. Condensate-Drain Piping: 200 deg F.
 - 3. Safety-Valve-Inlet and -Outlet Piping: Equal to the pressure of the piping system to which it is attached.

2.2 STEEL PIPE AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; welded and seamless, Grade B, and wall thickness as indicated in "Piping Applications" Article.
- B. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125 and 250 as indicated in "Piping Applications" Article.

- C. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300 as indicated in "Piping Applications" Article.
- D. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in "Piping Applications" Article.
- E. Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, Classes 25, 125, and 250; raised ground face, and bolt holes spot faced as indicated in "Piping Applications" Article.
- F. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
 - 1. Material Group: 1.1.
 - 2. End Connections: Butt welding.
 - 3. Facings: Raised face.

2.3 JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness unless otherwise indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
- B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- C. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

PART 3 - EXECUTION

3.1 PIPING INSTALLATIONS

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- C. Install piping free of sags and bends.
- D. Install fittings for changes in direction and branch connections.

- E. Select system components with pressure rating equal to or greater than system operating pressure.
- F. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
- G. Install piping at a uniform grade of 0.2 percent upward in direction of flow.
- H. Reduce pipe sizes using eccentric reducer fitting installed with level side up.
- I. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.
- J. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.
- K. Install flanges in piping, NPS 2-1/2 and larger, at final connections of equipment and elsewhere as indicated.

3.2 HANGERS AND SUPPORTS

- A. Comply with requirements in Section 230529 "Hangers and Supports for HVAC Piping and Equipment" for hanger, support, and anchor devices. Comply with the following requirements for maximum spacing of supports.
- B. Comply with requirements in Section 230548 "Vibration and Wind Controls for HVAC" for vibration control.

3.3 PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

END OF SECTION 232113

SECTION 235123 - BREECHINGS, CHIMNEYS, AND STACKS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Manufactured chimneys for natural gas fired, oil fired, and landfill gas fired equipment.

1.2 REFERENCES

- A. ANSI Z95.1 (NFPA 31) – Standard for the Installation of Oil Burning Equipment
- B. ANSI Z228.1 (NFPA 54) – The National Fuel Gas Code
- C. ASHRAE – Handbook, equipment Volume, Chapter “Chimney, Gas, Vent, and Fireplace Systems”
- D. NFPA 211 – Standard for Chimneys, Fireplace, Vents, and Solid Fuel – Burning Appliances
- E. SMACNA – HVAC Duct Construction Standards – Metal and flexible
- F. UL 103 – Standard for Factory Built Low Heat Chimney

1.3 DEFINITIONS

- A. Breeching: The conduit conveying flue gas from the appliance to the chimney.
- B. Chimney: A structure containing one or more vertical or nearly vertical passageways for conveying flue gases to the outside.
- C. Vent: A flue gas conveying system intended for use only with certain gas, liquid, or pellet fuel-fired appliances that do not produce flue gas outlet temperatures higher than a value specified in the listing vent standards.
- D. Vent Connector: The pipe that connects a fuel-burning appliance to a gas vent or Type L vent.
- E. Venting System: A continuous, open passageway from the flue collar or draft hood of a fuel-burning appliance to the outside atmosphere for the purpose of removing flue gases.

1.4 SUBMITTALS

- A. Delegated-Design Submittal: Each breeching, chimney and stack shall be designed, and signed and sealed by the licensed Professional Engineer currently registered in the New Jersey and responsible for their preparation, and all draft calculations be provided for review.
- B. Shop Drawings

1. Each submittal shall be completed in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
2. Partial, incomplete, or illegible submissions will be returned to the Contractor without review for resubmission.
3. Shop drawing shall include but not be limited to:
 - a. Equipment specifications and data sheets identifying all materials used and method of fabrication.
 - b. Complete assembly, layout, installation drawings with clearly marked dimensions, showing connections at equipment. The licensed Professional Engineer currently registered in the State of New Jersey shall seal the drawings.
 - c. Hangers and support details, spacing, and concrete insert drawings.
 - d. Draft Calculations for each breeching and stack system.
 - e. Wind and structural calculations sealed by a licensed Professional Engineer currently registered in the State of New Jersey.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in the manufacture of products specified in this Section with minimum three years documented experience.

1.6 REGULATORY REQUIREMENTS

- A. Conform to applicable ANSI Z223.1 code for installation of natural gas burning appliances and equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Cleaver Brooks Venting Systems
- B. Ampco
- C. Selkirk Metalbestos.

2.2 LISTED, DOUBLE WALL METAL STACKS

- A. Provide double wall positive pressure metal stacks. Stacks shall be listed by Underwriter's Laboratories as a "1400°F. Chimney" for continuous operation at 1400°F. and intermittent operation at 1800°F. and as a "Building Heating Appliance Chimney" for continuous operation at 1000°F. and intermittent operation at 1400°F. in accordance with UL 103 and in compliance with NPFA 211.
- B. Fabricate with minimum 1-inch annular space filled with high-temperature, ceramic-fiber insulation between inner shell and outer jacket walls.

1. Construct inner liner of 20-gauge for sizes 06"ID through 36"ID and 18-gauge for sizes 38"ID through 48"ID, with continuous laser welding. Material shall be type 316L stainless steel.
 2. Construct outer shell of 24-gauge for sizes 06"ID through 24"ID and 20-gauge for sizes 26"ID through 48"ID. Material shall be type 304 stainless steel.
- C. Provide all required accessories each bearing factory applied UL Label, including but not limited to:
1. Expansion Joints: Provide for each vent one at each change of direction or as suggested by manufactures installation instructions. Provide support. Anchoring by installer.
 2. Flanged boiler kit.
 3. Drain section
 4. Adjustable length section.
 5. Ventilated thimble.
 6. Wall mounted support assembly.
 7. Breaching clean outs every 15'-0'.
- D. Boiler stack and breeching components, supports and terminations shall be factory prefabricated.
- E. All fittings, accessories, supports, etc. shall be provided by the boiler stack and breeching manufacturer to ensure a complete and functioning system. Also, all access ports required for monitoring of all emissions required by this contract shall be provided by the manufacturer.
- F. The inner pipe and outer jacket shall be joined at the factory and shipped as a factory assemblies unit. Pipe which has the outer jacket attached during the field installation will not be approved.
- G. The inner joints shall be sealed by use of V-bands and approved sealant.
- H. The stack and breeching shall comply with national safety standards and all building codes when installed according to the manufacturer's installation instructions. The portion of the stack extending above the roof must terminate as required by local code, and as required in NFPA 211.
- I. Lighting Protection
1. Lightning Protection shall be provided and designed to meet the standards of NFPA Code 78 (latest edition) 3-11.8 "Chimneys" and 5-11 "Metal Stacks". The manufacturer shall provide 2 grounding pads at each base of the stack. Other lightning protection materials shall be provided under Division 16 – Electrical.

2.03 UNLISTED, DOUBLE WALL METAL STACKS

- J. Provide unlisted double wall positive pressure metal stacks. Stacks shall be furnished and installed in accordance with NFPA 211. Factory welded square and rectangular double wall self-supported stack equivalent to 56" ID diameter. The sections of the stack shall be up to 50 feet in length.
- K. Structural shell made of AISI 316L Stainless Steel with minimum thickness of 10 gauge (0.123 in.).

L. A minimum of 2" of high temperature mineral fiber insulation shall be installed over the entire height of the structural shell.

M. Outer jacket made of 304 stainless steel 24 gauge (0.024 in.) shall cover the entire surface of the insulation

N. Accessories:

1. False bottom plate @ 5° with a 2" diameter SCH40 NPT drain or other means to drain bottom.
2. Structural reinforcement around openings for flue connection.
3. All reinforcements needed to prevent deformation of the stack.
4. Base plate or support plate made of ASTM-A36 carbon steel.
5. ASTM-A307 anchor bolts installed according to the manufacturer's instructions.
6. Velocity cone at the top of the stack designed to increase the velocity of the exhaust gases.
7. Lifting lugs, unloading lugs and temporary braces.
8. Sampling ports flanged and capped (2 x 4" diameter @ 90° c/c).
9. Fabric or metal type expansion joints c/w flanges.

O. Optional accessories:

1. Additional air pollution control test ports with and continuous monitoring system device.
2. Butterfly or multi-blade louver motorized damper.

P. Clearances and supports:

1. Unlisted metal chimney shall have clearances from buildings and structures and adequate supports as required in NFPA 211.

Q. Lighting Protection

1. Lightning Protection shall be provided and designed to meet the standards of NFPA Code 78 (latest edition) 3-11.8 "Chimneys" and 5-11 "Metal Stacks". The manufacturer shall provide 2 grounding pads at each base of the stack. Other lightning protection materials shall be provided under Division 16 – Electrical.

PART 3 - EXECUTION

3.1 INSTALLATION OF LISTED, DOUBLE WALL METAL STACKS

- A. Install tri-fuel (natural gas, #2 fuel oil & landfill gas) boiler vents in accordance with manufacturer's instructions.
- B. Install in accordance with recommendations of ASHRAE – Handbook, Equipment Volume, Chapter "Chimney, Gas, Vent, and Fireplace Systems," and ANZI Z223.1, (NFPA 54).

- C. Provide high temperature sealant for joints.
- R. Provide connections in flue and breeching with removable plugs for flue gas sampling and testing as required but not limited to the following:
 - 1) Two 3/8 inch diameter holes are provided in the breeching, approximately 4 inches apart and placed so that the one closest to the boiler is approximately one breeching diameter downstream from the boiler outlet. Since these holes must be used for the measurement of boiler outlet gas temperature, percentage of O₂ and smoke reading, it is important that they be placed in the system such that air infiltration from a barometric damper, etc., does not affect the composition of the combustion gases.
 - 2) Two 3/8 inch diameter holes are provided in the breeching placed one on each side of any power operated draft regulator damper, approximately one breeching diameter from the centerline of the damper. Note that the location of one or both of these holes may, of necessity, be in the boiler outlet.
 - 3) All test holes are a minimum of one breeching diameter from any flow disturbance such as a bend, expansion or contraction.
 - 4) Any insulation is neatly removed from approximately a 4" × 4" area surrounding any
 - 5) test hole in the breeching.
 - 6) All test holes are kept closed with a sheet metal screw or other acceptable method when not being used for testing purposes. All test holes must be marked in such a way that their location can be readily determined.
- D. Install breechings with minimum of joints. Align accurately at connections with internal surfaces smooth.
- E. Install breechings from building structure, rigidly with suitable ties, braces, hangers, and anchors to hold to shape and prevent buckling. Support vertical vent
- F. to adjacent structural surfaces, or at floor penetrations. Refer to SMACNA HVAC duct Construction Standards – Metal and Flexible for equivalent duct support configuration and size.
- G. Install concrete inserts for supporting vent in coordination with formwork.
- H. Pitch breechings with positive slope up from fuel-fired equipment to chimney or stack.
- I. Inner pipe joints shall be sealed by use of V-Bands and Sealant as outlined in the installation instructions and supplied by the manufacturer.
- J. Chimneys extending above roof surfaces must terminate as required by local code, or as required in NFPA 211.
- K. Level and plumb chimneys.
- L. Clean breeching and chimney during and after of the installation, removing dust and debris.
- M. At appliances, provide slip joints permitting removal of appliances without removal or dismantling of breechings or chimneys. Remove all debris or obstruction from interior of boiler stack.
- N. All parts exposed to the outer atmosphere that are fabricated from aluminized steel shall be protected by a minimum of one base coat and one finish coat of paint, such as series 4200-4300

Heat Resistant paint manufactured by Rust-O-Leum Corporation, or equivalent. Paint to be supplied and applied by installing contractor.

3.2 INSTALLATION OF UNLISTED, DOUBLE WALL METAL STACKS

- A. Install tri-fuel (natural gas, #2 fuel oil & landfill gas) boiler vent in accordance with manufacturer's instructions.
- B. The stack along with all necessary accessories (anchor bolts, structural supports for the base and wall, roof flashing, opening for the drain, etc.) shall be delivered and installed during the erection of the assembly, to ensure the proper and safe function of the stack.
- C. The stack shall be mounted and secured braces. The vertical leveling shall not exceed 1" per 50 feet. Leveling of the stack base plate shall be by the stack erector.
- D. All sections passing through building walls must be insulated. While also respecting clearance requirements of combustible materials, in accordance with NFPA-211.
- E. Foresee the necessary vertical and horizontal supports for the stack and the flues.
- F. All electric arc and resistance welds will conform to section IX of the ASME-BPVC.
- G. All joints will be completely welded and fully penetrated. Certified welders shall do all field welding.
- H. The stack erector shall use special care in unloading and handling all materials from truck. The erector shall handle all materials in such a way as to minimize damage and to avoid scarring or damaging the paint or the outer jacket.
- I. Provide connections in stack with removable plugs for stack gas sampling and testing.
- J. Provide supports and hardware to install all stack mounted instruments, accessories.

3.3 FIELD ACCEPTANCE TESTING

- 1. All tests shall be witnessed by the Engineer.
- 2. These tests shall conclusively prove compliance with the contract specifications.
- 3. Measurements shall be made of flow rate and temperature.
 - 1. Net stack temperature.
 - 2. Stack draft.
 - 3. Outdoor ambient temperature.
- 4. Tests shall be run at 100% of rated boiler capacity, on Land Fill Gas. The duration of each test shall be not less than 60 minutes, beginning only after equilibrium conditions have been achieved. Under no conditions will test results obtained during non-equilibrium flows or temperatures be acceptable. Readings shall be taken and recorded at the start, middle and end of each test.
- 5. The contractor shall supply all measuring devices required to perform the tests.
- 6. Every flowmeter, pressure gauge and thermometer used in the test shall be calibrated shortly before testing commences. Where applicable, said calibration shall be certified and NIST traceable. Pressure and temperature at the natural gas flowmeter shall be measured and recorded. Certification indicating the heating value of the fuel being burned shall be obtained from the supplier of the fuel.

7. At least one month prior to the witnessed field testing, the Contractor shall submit a detailed test procedure to the Engineer for review. This procedure shall include:
 1. Test form including all formulae required to calculate performance.
 2. List of all test instruments, including manufacturer and model no.
8. The Contractor shall make provision to transfer the heat produced during testing to some suitable heat sink. Such provision may include the furnishing of hoses, adaptors, etc. to transfer cooling water from an appropriate source and back again.
9. The boilers and new flues will be tested for emissions using protocols approved by the NJ Department of Environmental Protection (DEP), by a third party, hired by the others. The contractor shall provide assistance for the emissions testing. The emissions testing will not occur until all of the new flues are installed, tested for operation and accepted.
10. Following the field tests, the manufacturer shall assemble all recorded data, calculations and final results into a well-organized format, and the Contractor shall submit these to the Engineer for review.

3.4 MANUFACTURER'S REPRESENTATIVE

- A. The Contractor shall provide the services of a qualified manufacturer's technical representative who shall adequately supervise the installation and testing of all equipment furnished under this Contract.
- B. As a minimum, the services of the manufacturer's representative shall be provided for a period of not less than 4 days as follows:
 1. At least 4 trips of up to 1 day each during installation, testing of the flue equipment.
- C. Any additional time required to achieve and maintain successful installation and operation shall be at the expense of the Contractor. The manufacturer's representative shall sign in and out at the office of the Resident representative on each day he is at the project. Travel to and from Site will not be included when measuring manufacturer's representative's time.

END OF SECTION 235123

SECTION 264113 - LIGHTNING PROTECTION FOR STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes lightning protection for building components.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For air terminals and mounting accessories.
 - 1. Layout of the lightning protection system, along with details of the components to be used in the installation.
 - 2. Include indications for use of raceway, data on how concealment requirements will be met, and calculations required by NFPA 780 for bonding of grounded and isolated metal bodies.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer and manufacturer. Include data on listing or certification by UL.
- B. Certification, signed by Contractor, that roof adhesive is approved by manufacturer of roofing material.
- C. Field quality-control reports.
- D. Comply with recommendations in NFPA 780, Annex D, "Inspection and Maintenance of Lightning Protection Systems," for maintenance of the lightning protection system.
- E. Other Informational Submittals: Plans showing dimensioned as-built locations of grounding features, including the following:
 - 1. Ground rods.
 - 2. Ground loop conductor.
- F. Lightning Protection System As-Built Drawings.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Certified by UL, trained and approved for installation of units required for this Project.
- B. System Certificate:
 - 1. UL Master Label.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 780, "Definitions" Article.

1.6 COORDINATION

- A. Coordinate installation of lightning protection with installation of other building systems and components, including electrical wiring, supporting structures and building materials, metal bodies requiring bonding to lightning protection components, and building finishes.
- B. Coordinate installation of air terminals attached to roof systems with roofing manufacturer and Installer.
- C. Flashings of through-roof assemblies shall comply with roofing manufacturers' specifications.

PART 2 - PRODUCTS

2.1 LIGHTNING PROTECTION SYSTEM COMPONENTS

- A. Comply with UL 96 and NFPA 780.
- B. Roof-Mounted Air Terminals: NFPA 780, Class I, copper unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. East Coast Lightning Equipment Inc.
 - b. ERICO International Corporation.
 - c. Harger.
 - d. Heary Bros. Lightning Protection Co. Inc.
 - e. Independent Protection Co.
 - f. Preferred Lightning Protection.
 - g. Robbins Lightning, Inc.
 - h. Thompson Lightning Protection, Inc.
 - i. Or approved equal.
 - 2. Air Terminals More than 24 Inches (600 mm) Long: With brace attached to the terminal at not less than half the height of the terminal.
- C. Main and Bonding Conductors: Copper.

- D. Ground Rods: Copper-clad steel, sectional type; [3/4 inch (19 mm) in diameter by 10 feet (3 m) long.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install lightning protection components and systems according to UL 96A and NFPA 780.
- B. Install conductors with direct paths from air terminals to ground connections. Avoid sharp bends.
- C. Cable Connections: Use crimped or bolted connections for all conductor splices and connections between conductors and other components. Use exothermic-welded connections in underground portions of the system.
- D. Air Terminals on Single-Ply Membrane Roofing: Comply with roofing membrane and adhesive manufacturer's written instructions.
- E. Bond extremities of vertical metal bodies exceeding 60 feet (18 m) in length to lightning protection components.
- F. The lightning protection system shall not interfere with or cause harm to the existing underground utilities.

3.2 CORROSION PROTECTION

- A. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture unless moisture is permanently excluded from junction of such materials.
- B. Use conductors with protective coatings where conditions cause deterioration or corrosion of conductors.

3.3 FIELD QUALITY CONTROL

- A. Notify Engineer at least 48 hours in advance of inspection before concealing lightning protection components.
- B. UL Inspection: Meet requirements to obtain a UL Master Label for system.
- C. LPI System Inspection: Meet requirements to obtain an LPI System Certificate.

3.4 TESTING

- A. The contactor shall provide one (1) year of lightning protection system testing. The one (1) year of testing shall begin after acceptance of the system.

END OF SECTION 264113

CONTRACTOR USE OF THE PREMISES

Woodbine Developmental Center – Engineering Department

A. GENERAL SITE REGULATIONS

UNLESS OTHERWISE SPECIFIED IN THE SOW, THE FOLLOWING REPRESENTS THE GUIDELINES FOR WORK PERFORMED AT WOODBINE DEVELOPMENTAL CENTER.

1. Contractors and their Employees are authorized to be on grounds only during the performance of work related to the project.
2. The speed limit is 15 mph on grounds. Yield to all pedestrian traffic. Resident population is severely handicapped, some are blind, some are deaf; many do not possess good pedestrian skills.
3. Do not give anything to a resident. This includes food, money and cigarettes.
4. It is not permitted to photograph any resident.
5. Smoking is permitted in designated areas only. Matches and cigarette butts pose a life threatening danger to some of our residents and must be disposed in an appropriate receptacle.
6. Contractor will be responsible to police the construction area keeping it free of debris and litter.
7. Vehicles and operating equipment is to be off and secure whenever not in use. All tools and equipment are to be secured at the end of the work day. If kept on site, they must be stored within a fenced work staging area. WDC will not assume responsibility for any missing articles.
8. To minimize the disruption to unexcavated areas and enhance the protection of fragile underground utilities, ground mats are to be used if heavy equipment (cranes, tractor trailers, dumpsters) is expected to travel over or operate from unpaved areas.
9. Active construction, staging and equipment storage areas are to be fenced and secured (6 foot chain link preferred) at all times to prevent residents and employees from wandering inside.
10. Possession and/or consumption of alcoholic beverages or drugs are prohibited, by law, anywhere on State property.
11. Please Note: As available, prints of the site's utilities may have been provided by the facility. Understand that the prints are general and that we have encountered situations where they are not accurate. Contractor should determine the actual location of any utility within the construction zone.

B. HOURS OF WORK

1. Work will occur Monday through Friday only. Any work on Saturday, Sunday, or state Holiday must be approved by the project coordinator and the WDC Engineering Office. A two day (48 hour) notice is required.
2. Project work will not begin before 7:30am.
3. WDC Engineering Office is to be notified whenever project work is to occur beyond 4:30pm. A two day (48 hour) notice is required. Approval for ongoing work which is required to be completed that day should be sought by project manager/site foreman as soon as he becomes aware of the need. Facility will work with project manager to accommodate unanticipated needs.
4. No work will occur past dusk without 48 hours notice and approval of the WDC Engineering Office.
5. The facility requires a minimum of 48 hours notice for any contractor operation such as large material deliveries, power tie-ins, etc, that will impact or potentially disrupt facility operations.

EXHIBIT - A

EXHIBIT - B

SUMMARY OF WARRANTIES

Specification 073113 – Asphalt Shingles – Materials – Maintain existing asphalt shingle roof warranty.

Specification 073113 – Asphalt Shingles – Roofing Installer - Materials & Workmanship– 2 years from Substantial Completion

Specification 076200 – Sheet Metal Flashing & Trim – Finish Warranty - 5 years from Substantial Completion

Specification 079200 – Joint Sealants – Manufacturer’s Warranty - 10 years from Substantial Completion

Specification 079200 – Joint Sealants – Installer’s Warranty - 2 years

Specification 089119 – Fixed Louvers – Manufacturer’s Warranty - 5 years from Substantial Completion

Specification 089119 – Fixed Louvers – Finish Warranty - 5 years from Substantial Completion

Specification 235123 – Breechings, Chimneys, & Stack – Round Metal Flue – Defects in Material and Workmanship - 1 year from date of delivery.

Specification 235123 – Breechings, Chimneys, & Stack – Round Metal Flue – 15 year Limited Warranty – based on installation and use conditions.

Specification 235123 – Breechings, Chimneys, & Stack – Custom Rectangular Flue – Defects in Material and Workmanship - 1 year from date of delivery.

EXHIBIT C



ENVIRONMENTAL CONNECTION INC

A Vertical Technologies Corporation

**Report
(Revision 1-A)**

Hazardous Material Testing
Power House
Woodbine Developmental Center
1175 Dehirsch Avenue
Woodbine, New Jersey 08270
DPMC Project #M1514-00

Prepared For:

Mott MacDonald
111 Wood Avenue South
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Prepared By:

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Issued: October 8, 2018

EC Project #: 18137-01



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SECTION 1.0 EXECUTIVE SUMMARY

Environmental Connection, Inc., (EC) was contracted by Mott MacDonald of Iselin, New Jersey to perform Hazardous Materials Testing of the Powerhouse building located on the Woodbine Developmental Center campus in Woodbine, New Jersey. The goal of the testing was to identify all Asbestos Containing Materials (ACMs), Polychlorinated Biphenyl (PCB) containing caulks/glazings, and Lead-Based Paints (LBP) that may be impacted by the planned Powerhouse Stack Replacement and Building Upgrades project (NJ DPMC Project M1514-00). The assessment was performed on June 12, 2018, by Roland Jones and Jordan Reed, both of whom are United States Environmental Protection Agency (USEPA) accredited Asbestos Building Inspectors. The LBP inspection was performed by Mr. Reed, a State of New Jersey Department of Health licensed LBP Inspector.

During the inspection, EC collected 31 samples of 17 suspect asbestos containing materials. Three (3) of the materials sampled contain asbestos concentrations greater than 1% by weight. One (1) material was previously tested and confirmed to contain asbestos. The confirmed asbestos containing materials are listed below.

Woodbine Developmental Center – Powerhouse

1. Caulk associated with Stack Support Metal Bands
2. Breaching Seam Gasket
3. Breaching Door Gasket
4. Interior Window Glazing

Analysis also revealed one material, exterior window caulk, that contains less than 1% asbestos content by weight. Per USEPA regulations this material is not considered asbestos containing, but is subject to certain requirements of 29 CFR, Part 1926.1101, the OSHA Asbestos in Construction Standard. EC's inspectors quantified the identified asbestos containing materials as part of the assessment. Section 2.0 of this report documents the results of the asbestos containing materials inspection portion of the assessment.

Eight (8) Lead paint coated building components were discovered during the lead-based paint inspection. Section 3.0 of this report discusses the methodology and summarizes the results of the lead-based paint inspection.

EC's inspectors also collected three (3) samples of suspect PCB containing caulk and glazing. Analysis revealed none of the caulk and glazing materials tested contained concentrations of PCBs greater than 50 parts per million (ppm), the USEPA threshold for PCB Bulk Waste. Section 4.0 of this report summarizes the results of the PCB sampling.

During the assessment, the inspectors noted avian feces on building components and equipment throughout the powerhouse. The inspectors quantified fecal matter in the area likely to be impacted by the renovation. The following sections detail the findings of our environmental assessment.

Revisions to the scope of work, distributed September 18, 2018, altered the amount of hazardous materials that will be impacted by the proposed renovation. All work relative to repair of building



foundation concrete, repair of the building façade, and replacement of windows were removed from the project scope of work.

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 inspection for asbestos containing materials was performed in accordance with 40 CFR, Part 763, AHERA/ASHARA, and encompassed accessible interior and exterior spaces. Samples of suspect materials were collected in sufficient quantity as mandated by 40 CFR, Part 763.87(a). The 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 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 via Transmission Electron Microscopy (TEM) analysis when PLM analysis yields results of less than 1% asbestos by weight or “None Detected” for asbestos fibers. TEM uses electron imaging to identify asbestos fibers at a higher magnification than possible via PLM.

Results for PLM and TEM analysis methods are reported in percentage by weight. According to the USEPA, materials containing greater than 1% asbestos content by weight are classified as asbestos containing materials. The analytical results are summarized in the table below.

Table 1 - Analytical Results Summary Woodbine Developmental Center - Powerhouse 1175 Dehirsch Avenue Woodbine, New Jersey			
ID #	Material	PLM Results	TEM Results
01	Band Caulk associated with Stack Exterior	17% Chrysotile	N/A
02	Gray/Green Shingle Roofing	None Detected	None Detected
02-A	Tar Paper assoc. with Gray/Green Shingle Roofing	None Detected	None Detected
03	Interior Gypsum Roof Deck	None Detected	N/A
04	Mortar associated with Powerhouse Brick	None Detected	N/A
05	Mortar associated with Stack Brick	None Detected	N/A
06	White Block Pipe Insulation	None Detected	N/A
07	Gasket at Breeching Seams	65% Chrysotile	N/A
08	Gasket at Breeching Door	15% Chrysotile	N/A
09	Silver Paint on Metal Breeching	None Detected	N/A
10	Exterior Window Caulk*	None Detected	0.54% Chrysotile
11	Interior Window Glazing	Previously Confirmed ACM	N/A



Table 1 - Analytical Results Summary Woodbine Developmental Center - Powerhouse 1175 Dehirsch Avenue Woodbine, New Jersey			
ID #	Material	PLM Results	TEM Results
12	Powerhouse Brick	None Detected	N/A
13	Mortar Coating on Stack Ledges	None Detected	N/A
14	Stack Brick	None Detected	N/A
15	Mortar at Top of Stack	None Detected	N/A
16	Debris from Stack Clean-out Hatch	None Detected	N/A

N/A – Not Applicable | * - Trace Asbestos Containing Material

Laboratory analysis revealed three (3) materials that contain greater than 1% asbestos content by weight. EC’s inspectors quantified the identified asbestos containing material as part of the inspection. The location and approximate total quantity of identified and assumed asbestos containing materials is included in the following table.

Table 2 – Asbestos Containing Material Quantity Woodbine Developmental Center - Powerhouse 1175 Dehirsch Avenue Woodbine, New Jersey		
Material	Location	Quantity
Bond Caulk associated with Stack Exterior	Stack Exterior	520 LF
Gasket at Breeching Seams	Boiler Breeching	36 LF
Gasket at Breeching Door	Boiler Breeching	20 LF
Interior Window Glazing	Interior	4,225 LF

SF – Square Feet | LF – Linear Feet

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 1.0 milligram of lead per square centimeter (mg/cm²). 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. To mitigate health hazards, demolition and other construction related work 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”, which defines construction work as work for alteration and/or



repair, including demolition or salvage of structures, removal or encapsulation of materials containing lead.

EC utilized a portable X-Ray Fluorescence (XRF) device manufactured by RMD, Inc., of Watertown, Massachusetts (RMD LPA-1 Analyzer Serial #1390), to detect the presence of lead within the paint films and other finished surfaces (stains, varnishes, and shellacs). The device bombards the testing surface with X-ray energy, generated by a radioactive source. The energy excites electrons in the testing surface causing them to emit X-Ray energy. The X-Ray energy emitted by the electrons is analyzed by the XRF device. Based on analysis of the X-ray energy emitted by the electrons, the device is able to determine the presence and concentration of an element, in this case Lead, in the testing surface. Results are reported in milligrams per square centimeter.

The USEPA Department of Housing and Urban Development (HUD) and New Jersey Administrative Code (N.J.A.C.) 5:17, define any film which contains greater than 1.0 milligram of lead per square centimeter (mg/cm²) as lead-based paint. EC performed the screening to characterize the surfaces and building components within the structures of the maintenance yard and to determine if any coatings are lead based. EC grouped similar building components with the like paint histories for testing purposes. The results of the Lead-Based Paint Inspection are summarized in Table 3 below.

If the XRF analyzer indicated an inconclusive reading, or if a surface was unable to be screened utilizing the XRF analyzer, a representative paint chip sample was collected. The paint was scraped from the surface and collected in a non-electrostatic centrifugal tube. Each sample included all paint layers present down to the surface of the substrate. The sample was then submitted to EMSL Analytical, Inc., of Cinnaminson, New Jersey, for analysis via USEPA Method SW-846 7000B Flame Atomic Absorption Spectrophotometry (AAS). EMSL is accredited by the American Industrial Hygiene Association (AIHA) and participates in the National Lead Laboratory Accreditation Program (NLLAP). No inconclusive readings were collected during the inspection.

Table 3 – Lead-Based Paint Building Components Woodbine Developmental Center - Powerhouse 1175 Dehirsch Avenue Woodbine, New Jersey		
Component	Color	Quantity
Boiler Room Walls	Gray	2,100 SF
Window Mullions	Black	5,040 SF
Metal Fire Door to Locker Room	Red	90 SF
Locker Room Door Frame to Exterior	Tan	10 SF
Locker Room Door to Exterior	Tan	24 SF
Lintel between Boiler Room and Generator Room	Brown	12 SF
Louvers	Red	180



Table 3 – Lead-Based Paint Building Components Woodbine Developmental Center - Powerhouse 1175 Dehirsch Avenue Woodbine, New Jersey		
Component	Color	Quantity
Louver Frame	Red	96

SF – Square Feet | LF – Linear Feet

Eight (8) lead-based paint coated components were discovered during the inspection. The XRF field inspection data sheets are included in Appendix III.

SECTION 4.0 POLYCHLORINATED BIPHENYL INSPECTION

PCBs were widely utilized between 1929 and 1977 in the United States as coolants and lubricants in electrical equipment (i.e., capacitors, transformers, light ballasts), plasticizers, surface coatings, inks, adhesives, flame retardants, pesticides, paints and carbonless duplicating paper, for their insulating properties, chemical stability and relative non-flammability. PCB products were banned in the United States in 1977. However, many PCB containing products remain in service to this day. The United States Environmental Protection Agency (USEPA) has classified PCBs as a possible human carcinogen.

Recently, PCBs in caulk have become a prevalent regulatory issue within the United States, prompted by studies conducted in Finland. The Finland investigation revealed a correlation between PCBs in caulk and that of airborne PCBs and PCBs in blood of construction workers coming in contact with such materials. The United States Environmental Protection Agency (USEPA) regulates disposal of caulking that contains greater than 50 parts per million (ppm) under the Toxic Substances Control Act (TSCA) and PCB regulations, 40 CFR, Part 761.

EC inspected the powerhouse for the presence of caulk and glazing suspected of containing Polychlorinated Biphenyls (PCBs). EC collected samples of suspect PCB containing caulks utilizing a razor knife. A minimum of one (1) gram of material was collected and placed directly into a sampling jar. The sample was then labeled and submitted to the laboratory for analysis. Samples were analyzed by EMSL Analytical, Inc., of Cinnaminson, New Jersey, in accordance with USEPA SW-846 Method 8082. Detailed PCB sampling laboratory analytical reports and associated Chains of Custody documentation are attached within Appendix IV.

None of the samples contained PCBs in concentrations greater than the 50 parts per million threshold established by the USEPA. The reporting limit indicates the lowest detectable concentration for the analysis method utilized. The reporting limit is determined by the original mass of the sample and is therefore a dependent variable of the samples mass. Aroclor was the proprietary/commercial name given to PCB containing mixtures. The mixtures were further defined by their unique composition. The four (4) digit number following Aroclor refers to the composition of the mixture. The first two digits denote the number of carbon atoms present in the two phenyl rings. The second two digits indicate the mass percentage of Chlorine atoms in the mixture.



Table 4– Polychlorinated Biphenyl Analytical Results Woodbine Developmental Center - Powerhouse 1175 Dehirsch Avenue Woodbine, New Jersey			
Material	Analyte	Reporting Limit	Results
Band Caulk associated with Stack Exterior	Aroclor 1016	0.85 mg/Kg	ND
	Aroclor 1221	0.85 mg/Kg	ND
	Aroclor 1232	0.85 mg/Kg	ND
	Aroclor 1242	0.85 mg/Kg	ND
	Aroclor 1248	0.85 mg/Kg	ND
	Aroclor 1254	0.85 mg/Kg	2.4
	Aroclor 1260	0.85 mg/Kg	ND
	Aroclor 1262	0.85 mg/Kg	ND
Window Caulk	Aroclor 1016	0.95 mg/Kg	ND
	Aroclor 1221	0.95 mg/Kg	ND
	Aroclor 1232	0.95 mg/Kg	ND
	Aroclor 1242	0.95 mg/Kg	ND
	Aroclor 1248	0.95 mg/Kg	ND
	Aroclor 1254	0.95 mg/Kg	2.1
	Aroclor 1262	0.95 mg/Kg	ND
	Aroclor 1268	0.95 mg/Kg	ND
Window Glazing	Aroclor 1016	0.85 mg/Kg	ND
	Aroclor 1221	0.85 mg/Kg	ND
	Aroclor 1232	0.85 mg/Kg	ND
	Aroclor 1242	0.85 mg/Kg	ND
	Aroclor 1248	0.85 mg/Kg	ND
	Aroclor 1254	0.85 mg/Kg	ND
	Aroclor 1260	0.85 mg/Kg	ND
	Aroclor 1262	0.85 mg/Kg	ND
	Aroclor 1268	0.85 mg/Kg	ND

ND – None Detected

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 be advised that quantities referenced herein are estimates/approximations. Should a previously unidentified suspect material be discovered during the demolition process that material should be treated as an asbestos containing material until otherwise determined by appropriate sampling and analysis, in accordance with 40 CFR, Part 763, and N.J.A.C. 8:60 and 12:120, inclusive of utilizing



USEPA accredited Asbestos Building Inspectors to collect the appropriate number of samples and an AIHA accredited laboratory that is a NVLAP participant.

SECTION 6.0 CONCLUSIONS AND RECOMMENDATIONS

Review of historical sampling data and the Hazardous Material Testing performed in the Powerhouse located on the Woodbine Developmental Center Campus on June 12, 2018, revealed four (4) asbestos containing materials and multiple Lead-based paint coated components that may be impacted by the planned renovation activities defined in the Scope of Work issued by the New Jersey Department of Treasury Division of Property Management and Construction on February 5, 2018. No caulks/glazings with PCB concentrations greater than 50 ppm were identified during the testing. *Revisions to the scope of work, distributed September 18, 2018, altered the amount of hazardous materials that will be impacted by the proposed renovation. All work relative to repair of building foundation concrete, repair of the building façade, and replacement of windows were removed from the project scope of work.* Based on the results of our inspection and in consideration of the revised scope of work, EC offers the following recommendations.

- Removal of asbestos containing stack band caulk and breeching gasket materials should be performed in accordance with 29 CFR 1926.1101 (the OSHA Standard for Asbestos in Construction). A New Jersey Department of Labor licensed Asbestos Contractor must be employed to remove the asbestos containing material(s), in accordance with N.J.A.C. 8:60 and 12:120.
- Employ a USEPA accredited Asbestos Project Designer to develop Plans and Specifications for the asbestos abatement tailored to the scheduled renovations.
- Utilize a New Jersey Department of Labor licensed Asbestos Contractor to abate the asbestos containing materials that will be impacted by the renovation activities in accordance with federal and New Jersey requirements for asbestos abatement in public buildings. Please be advised that the types and quantities of asbestos containing materials identified in this report do not require an asbestos abatement permit and do not fall under the governance of N.J.A.C. 5:23-8, commonly referred to as Sub-Chapter 8. If the scope of work changes, compliance requirements must be re-evaluated.
- Perform air monitoring in accordance with federal and New Jersey requirements for asbestos abatement in public buildings. EC recommends daily air monitoring during abatement activities in addition to clearance air monitoring at the completion of abatement.
- Should any previously unidentified suspect materials be discovered during the renovation process, all work should cease until the materials are sampled by an accredited asbestos building inspector.
- Lead safe work practices specifications should be included in the renovation design documents. As per OSHA, the Contractor is required to have a site-specific Lead Health and Safety Plan. The



Lead Health and Safety Plan shall include worker protection, engineering controls and decontamination procedures, as outlined in 29 CFR, Part 1926.62. In addition, as required by OSHA, individuals who will disturb lead-based paint shall be provided exposure monitoring by the Contractor.

- EC recommends that specifications for the clean-up of avian feces be incorporated into the renovation design documents.

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

Respectfully Submitted:
ENVIRONMENTAL CONNECTION, INC.

A handwritten signature in blue ink, appearing to read "Jordan Reed".

Jordan Reed
Project Manager

APPENDIX I

ASBESTOS ANALYTICAL REPORTS AND CHAIN OF CUSTODY

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



EMSL Analytical, Inc.

200 Route 130 North Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675 / (856) 786-5974
<http://www.EMSL.com> / cinnasblab@EMSL.com

EMSL Order ID: 041817693
Customer ID: ENVI65
Customer PO:
Project ID:

Attn: Roland Jones
Environmental Connection, Inc.
120 North Warren Street
Trenton, NJ 08608
Phone: (609) 392-4200
Fax:
Collected:
Received: 6/12/2018
Analyzed: 6/18/2018
Proj: 18137-01 / ACM Inspection / Woodbine Dev. Ctr. Powerhouse

Summary Test Report for Asbestos Analysis in Accordance with N.J.A.C. 8:60 and 12:120 via EPA 600/R-93/116

Client Sample ID: 01RJ061218 **Lab Sample ID:** 041817693-0001

Sample Description: Stack Exterior/Bond Caulk

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
TEM Grav. Reduction	6/14/2018	White	0.0%	83.0%	17.0% Chrysotile	

Client Sample ID: 02RJ061218 **Lab Sample ID:** 041817693-0002

Sample Description: Stack Exterior/Bond Caulk

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
TEM Grav. Reduction	6/14/2018					Positive Stop (Not Analyzed)

Client Sample ID: 03RJ061218 **Lab Sample ID:** 041817693-0003

Sample Description: Roof/Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/14/2018	Black	15%	85%	None Detected	
TEM Grav. Reduction	6/18/2018	Black	0.0%	100%	None Detected	

Client Sample ID: 03ARJ061218 **Lab Sample ID:** 041817693-0003A

Sample Description: Roof/Tar Paper

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/14/2018	Black	20%	80%	None Detected	
TEM Grav. Reduction	6/18/2018	Black	0.0%	100%	None Detected	

Client Sample ID: 04RJ061218 **Lab Sample ID:** 041817693-0004

Sample Description: Roof/Shingle

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	Black	15%	85%	None Detected	

Client Sample ID: 04ARJ061218 **Lab Sample ID:** 041817693-0004A

Sample Description: Roof/Tar Paper

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	Black	20%	80%	None Detected	

Client Sample ID: 05RJ061218 **Lab Sample ID:** 041817693-0005

Sample Description: Powerhouse Ceiling/Gypsum Deck

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/14/2018	White	15%	85%	None Detected	



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EMSL Order ID: 041817693
Customer ID: ENVI65
Customer PO:
Project ID:

Summary Test Report for Asbestos Analysis in Accordance with N.J.A.C. 8:60 and 12:120 via EPA 600/R-93/116

Client Sample ID: 06RJ061218 **Lab Sample ID:** 041817693-0006
Sample Description: Powerhouse Ceiling/Gypsum Deck

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	White	15%	85%	None Detected	

Client Sample ID: 07RJ061218 **Lab Sample ID:** 041817693-0007
Sample Description: Powerhouse Boiler Room/Block Insulation

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/14/2018	Tan	35%	65%	None Detected	

Client Sample ID: 08RJ061218 **Lab Sample ID:** 041817693-0008
Sample Description: Powerhouse Boiler Room/Block Insulation

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/14/2018	Tan	30%	70%	None Detected	

Client Sample ID: 09RJ061218 **Lab Sample ID:** 041817693-0009
Sample Description: Powerhouse Boiler Room/Block Insulation

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	Tan	25%	75%	None Detected	

Client Sample ID: 10RJ061218 **Lab Sample ID:** 041817693-0010
Sample Description: Powerhouse Breeching/Gasket Seams

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/14/2018	Tan/Silver	0%	35%	65% Chrysotile	

Client Sample ID: 11RJ061218 **Lab Sample ID:** 041817693-0011
Sample Description: Powerhouse Breeching/Gasket Seams

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/14/2018					Positive Stop (Not Analyzed)

Client Sample ID: 12RJ061218 **Lab Sample ID:** 041817693-0012
Sample Description: Powerhouse Breeching/Gasket at Door

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/14/2018	Tan	0%	85%	15% Chrysotile	

Client Sample ID: 13RJ061218 **Lab Sample ID:** 041817693-0013
Sample Description: Powerhouse Breeching/Gasket at Door

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/14/2018					Positive Stop (Not Analyzed)



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EMSL Order ID: 041817693
Customer ID: ENVI65
Customer PO:
Project ID:

Summary Test Report for Asbestos Analysis in Accordance with N.J.A.C. 8:60 and 12:120 via EPA 600/R-93/116

Client Sample ID: 14RJ061218 **Lab Sample ID:** 041817693-0014
Sample Description: Powerhouse Breaching/Silver Paint

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
TEM Grav. Reduction	6/14/2018	Silver	0.0%	100%	None Detected	

Client Sample ID: 15RJ061218 **Lab Sample ID:** 041817693-0015
Sample Description: Powerhouse Breaching/Silver Paint

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
TEM Grav. Reduction	6/14/2018	Silver	0.0%	100%	None Detected	

Client Sample ID: 16RJ061218 **Lab Sample ID:** 041817693-0016
Sample Description: Powerhouse Exterior/Window Caulk

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/14/2018	White	20%	80%	None Detected	
TEM Grav. Reduction	6/18/2018	White	0.0%	99.5%	0.54% Chrysotile	

Client Sample ID: 17RJ061218 **Lab Sample ID:** 041817693-0017
Sample Description: Powerhouse Exterior/Window Caulk

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	White	25%	75%	None Detected	

Client Sample ID: 18RJ061218 **Lab Sample ID:** 041817693-0018
Sample Description: Stack/Mortar

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	Gray	0%	100%	None Detected	

Client Sample ID: 19RJ061218 **Lab Sample ID:** 041817693-0019
Sample Description: Stack/Mortar

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	Gray	0%	100%	None Detected	

Client Sample ID: 20RJ061218 **Lab Sample ID:** 041817693-0020
Sample Description: Stack/Mortar

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	Gray	0%	100%	None Detected	

Client Sample ID: 21RJ061218 **Lab Sample ID:** 041817693-0021
Sample Description: Stack/Mortar

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	Gray	0%	100%	None Detected	



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EMSL Order ID: 041817693
Customer ID: ENVI65
Customer PO:
Project ID:

Summary Test Report for Asbestos Analysis in Accordance with N.J.A.C. 8:60 and 12:120 via EPA 600/R-93/116

Client Sample ID: 22RJ061218 **Lab Sample ID:** 041817693-0022
Sample Description: Powerhouse/Mortar

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	Gray	0%	100%	None Detected	

Client Sample ID: 23RJ061218 **Lab Sample ID:** 041817693-0023
Sample Description: Powerhouse/Mortar

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	Gray	0%	100%	None Detected	

Client Sample ID: 24RJ061218 **Lab Sample ID:** 041817693-0024
Sample Description: Powerhouse/Brick

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	Red	0%	100%	None Detected	

Client Sample ID: 25RJ061218 **Lab Sample ID:** 041817693-0025
Sample Description: Powerhouse/Brick

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	Red	0%	100%	None Detected	

Client Sample ID: 26RJ061218 **Lab Sample ID:** 041817693-0026
Sample Description: Stack/Mortar

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	Gray	0%	100%	None Detected	

Client Sample ID: 27RJ061218 **Lab Sample ID:** 041817693-0027
Sample Description: Stack/Mortar

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	Gray	0%	100%	None Detected	

Client Sample ID: 28RJ061218 **Lab Sample ID:** 041817693-0028
Sample Description: Stack/Brick

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	Red	0%	100%	None Detected	

Client Sample ID: 29RJ061218 **Lab Sample ID:** 041817693-0029
Sample Description: Stack/Brick

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	Red	0%	100%	None Detected	



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EMSL Order ID: 041817693
Customer ID: ENVI65
Customer PO:
Project ID:

Summary Test Report for Asbestos Analysis in Accordance with N.J.A.C. 8:60 and 12:120 via EPA 600/R-93/116

Client Sample ID: 30RJ061218 **Lab Sample ID:** 041817693-0030
Sample Description: Stack Cleamont/Debris

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	Gray/Green	0%	100%	None Detected	

Client Sample ID: 31RJ061218 **Lab Sample ID:** 041817693-0031
Sample Description: Stack Cleamont/Debris

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/15/2018	Gray/Green	0%	100%	None Detected	

Analyst(s):

Debbie Little	TEM Grav. Reduction (3)
Gregory Barry	PLM (15)
Matthew Dare	TEM Grav. Reduction (3)
Nancy Stalter	PLM (12)

Reviewed and approved by:

Benjamin Ellis, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. This test report must not be used to claim product endorsement by NVLAP or any agency of the U.S. Government. EMSL bears no responsibility for sample collection activities or analytical method limitations. The laboratory is not responsible for the accuracy of results when requested to physically separate and analyze layered samples. PLM alone is not consistently reliable in detecting asbestos in floor coverings and similar NOBs.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NVLAP Lab Code 101048-0, AIHA-LAP, LLC-IHLAP Lab 100194, NYS ELAP 10872, NJ DEP 03036

Report amended: 06/20/2018 06:49:34 Replaces initial report from: 06/15/2018 07:03:44 Reason Code: Data Entry-Change to Project

041817693



ENVIRONMENTAL CONNECTION INC

A Vertical Technologies Corporation

AHERA Survey Form 04

CLIENT : Mott MacDonald
 PROJECT : ACM Inspection
 BUILDING : Woodlane Dev Ctr., Powerhouse
 DATE : June 12, 2018
 TECHNICIAN : R. Jones / J. Reed
 PROJECT # : 18137-01

ASBESTOS ANALYSIS OF BULK MATERIALS

SAMPLE	HOMO. AREA ID	ROOM NUMBER	NOB (Y or N)
01RJO61218	01 - Bond Caulk	Stack - Exterior	TEM NOB only
02RJO61218	01 - Bond Caulk	Stack - Exterior	TEM NOB only
03RJO61218	02 - Shingle	Roof	PLM → TEM NOB
04RJO61218	02A - Tar Paper	Roof	PLM → TEM NOB
04RJO61218	02 - Shingle	Roof	PLM
04ARJO61218	02A - Tar Paper	Roof	PLM
05RJO61218	03 - Gypsum Deck	Powerhouse Ceiling	PLM
06RJO61218	03 - Gypsum Deck	Powerhouse ceiling	PLM
07RJO61218	06 - Block Insulation	Powerhouse - Boiler Rm	PLM
08RJO61218	06 - Block Insulation	Powerhouse - Boiler Rm	PLM
09RJO61218	06 - Block Insulation	Powerhouse - Boiler Rm	PLM
10RJO61218	07 - Gasket-Seams	Powerhouse Breaching	PLM
11RJO61218	07 - Gasket-Seams	Powerhouse Breaching	PLM
12RJO61218	08 - Gasket-Door	Powerhouse Breaching	PLM
13RJO61218	08 - Gasket-Door	Powerhouse Breaching	PLM
14RJO61218	09 - Silver Paint	Powerhouse breaching	TEM NOB only
15RJO61218	09 - Silver Paint	Powerhouse breaching	TEM NOB only
16RJO61218	10 - Window Caulk	Powerhouse Exterior	PLM → TEM NOB

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 JUN 12 2018
 4:01 PM
 SHANNONSON

CHECK EACH BOX THAT APPLIES

- Point Count Sample if <10% Asbestos by Weight
 NOB's - EPA TEM-NOB if Sample(s) are None Detected or <1% via PLM
 Stop at First Positive Homo. Area ID Code
 6 hr. TAT
 24 hr. TAT
 5 Day TAT
 Other: 48 Hours

31211

CHAIN OF CUSTODY RECORD (CCR)

RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR CCR
<i>[Signature]</i>	6-12-18		<i>[Signature]</i>	6/12/18	400p	

COMMENTS:
 F:\Templates\ACM\Form - AHERA Survey Form 04



ENVIRONMENTAL CONNECTION INC

A Vertical Technologies Corporation

AHERA Survey Form 04

CLIENT : Matt MacDonald
 PROJECT : ACM Inspection
 BUILDING : Woodbine Dev. Ctr, Powerhouse

DATE : June 12, 2018
 TECHNICIAN : R. Jones / J. Reed
 PROJECT # : 18137-01

ASBESTOS ANALYSIS OF BULK MATERIALS

SAMPLE	HOMO. AREA ID	ROOM NUMBER	NOB (Y or N)
17RJ061218	10-Window Caulk	Powerhouse Exterior	PLM
18RJ061218	12-Mortar	Stack	PLM
19RJ061218	12-Mortar	Stack	PLM
20RJ061218	13-Mortar	Stack	PLM
21RJ061218	13-Mortar	Stack	PLM
22RJ061218	04-Mortar	Powerhouse	PLM
23RJ061218	04-Mortar	Powerhouse	PLM
24RJ061218	12 ¹² Brick	Powerhouse	PLM
25RJ061218	15 ¹⁵ Brick	Powerhouse	PLM
26RJ061218	15-Mortar	Stack	PLM
27RJ061218	15-Mortar	Stack	PLM
28RJ061218	14-Brick	Stack	PLM
29RJ061218	14-Brick	Stack	PLM
30RJ061218	16-Debris	Stack Cleanout	PLM
31RJ061218	16-Debris	Stack Cleanout	PLM

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 CINNAMINSON, NJ
 2018 JUN 12 P 4:01

CHECK EACH BOX THAT APPLIES

- Point Count Sample if <10% Asbestos by Weight
 NOB's - EPA TEM-NOB if Sample(s) are None Detected or <1% via PLM
 Stop at First Positive Homo. Area ID Code
 6 hr. TAT
 24 hr. TAT
 5 Day TAT
 Other _____

CHAIN OF CUSTODY RECORD (CCR)

RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR CCR

COMMENTS:

F:\Templates\ACM\Form - AHERA Survey Form 04


APPENDIX II
PHOTOGRAPHS

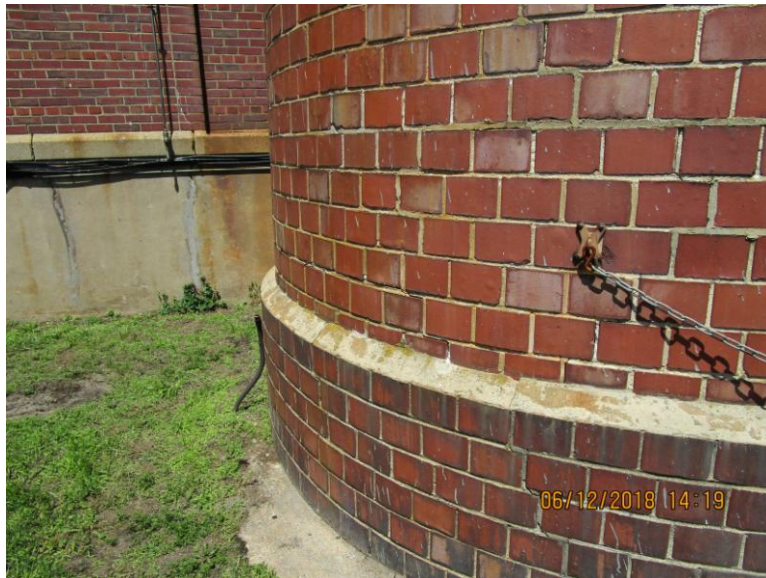


Photograph 1 – Powerhouse Exterior



Photograph 2 – Powerhouse Exterior
Caulk associated with Stack Bands (ACM)


 ENVIRONMENTAL CONNECTION INC	Site Photographs	
	Date Taken	June 12, 2018
	Client	Mott MacDonald
	Location	Woodbine Developmental Center - Powerhouse
EC Project # 18137-01	Address	1125 Dehirsch Avenue, Woodbine, New Jersey



Photograph 3 – Mortar at base of Stack (Non-ACM)
 Stack Brick (Non-ACM)
 Mortar associated with Stack Brick (Non-ACM)



Photograph 4 – Clean out at Base of Stack (Non-ACM)


 ENVIRONMENTAL CONNECTION INC	Site Photographs	
	Date Taken	June 12, 2018
	Client	Mott MacDonald
	Location	Woodbine Developmental Center - Powerhouse
EC Project # 18137-01	Address	1125 Dehirsch Avenue, Woodbine, New Jersey



Photograph 5 –Window Caulk (Non-ACM) (No PCB’s)



Photograph 6 – Tan Door to Locker Room (LBP)


 ENVIRONMENTAL CONNECTION INC	Site Photographs	
	Date Taken	June 12,2018
	Client	Mott MacDonald
	Location	Woodbine Developmental Center - Powerhouse
EC Project # 18137-01	Address	1125 Dehirsch Avenue, Woodbine, New Jersey



Photograph 7 – Boiler Room Interior General View



Photograph 8 – Boiler Breaching Seam Gasket (ACM)


 ENVIRONMENTAL CONNECTION INC	Site Photographs	
	Date Taken	June 12, 2018
	Client	Mott MacDonald
	Location	Woodbine Developmental Center - Powerhouse
EC Project # 18137-01	Address	1125 Dehirsch Avenue, Woodbine, New Jersey



Photograph 9 – Boiler Breaching Door Gasket (ACM)



Photograph 10 – Calcium Silicate Pipe Insulation (Non-ACM)


 ENVIRONMENTAL CONNECTION INC	Site Photographs	
	Date Taken	June 12, 2018
	Client	Mott MacDonald
	Location	Woodbine Developmental Center - Powerhouse
EC Project # 18137-01	Address	1125 Dehirsch Avenue, Woodbine, New Jersey



Photograph 11 – Gray Paint on Concrete Walls (LBP)



Photograph 12 – Red Paint on Fire Door (LBP)


 ENVIRONMENTAL CONNECTION INC	Site Photographs	
	Date Taken	June 12,2018
	Client	Mott MacDonald
	Location	Woodbine Developmental Center - Powerhouse
EC Project # 18137-01	Address	1125 Dehirsch Avenue, Woodbine, New Jersey



Photograph 13 – Window Mullions (LBP)



Photograph 14 – Bird feces on building components throughout.

 ENVIRONMENTAL CONNECTION INC	Site Photographs	
	Date Taken	June 12, 2018
	Client	Mott MacDonald
	Location	Woodbine Developmental Center - Powerhouse
EC Project # 18137-01	Address	1125 Dehirsch Avenue, Woodbine, New Jersey

APPENDIX III
LEAD BASED PAINT INSPECTION DATA



ENVIRONMENTAL CONNECTION INC

A Vertical Technologies Corporation

Date: June 12, 2018
Client: Mott MacDonald
Building: WDC Powerhouse
Address: 1175 Dehirsch Avenue

Page: 1 of 4
Unit #: 1
Job#: 6-12-18-12-45
XRF Serial #: 1390
EC#: 18137-01

XRF LEAD BASED PAINT INSPECTION DATA SHEET

Sample #	Test Location/Room Equivalent	Substrate	Component	XRF Value	Classification (pos., neg., inc.)	Condition/ Comments
1	Calibration	-	-	1.0	-	-
2	Calibration	-	-	1.0	-	-
3	Calibration	-	-	1.0	-	-
4	Boiler Area	Concrete	Floor	-0.4	Neg.	Intact
5	Boiler Area	Concrete	Floor	-0.3	Neg.	Intact
6	Generator Room	Concrete	Floor	-0.4	Neg.	Intact
7	Generator Room	Concrete	Floor	-0.2	Neg.	Intact
8	Boiler Room Wall A	Concrete	Wall	>9.9	Pos.	Flaking
9	Boiler Room Wall B	Concrete	Wall	>9.9	Pos.	Intact
10	Boiler Room Wall C	Concrete	Wall	>9.9	Pos.	Intact
11	Boiler Room Wall D	Concrete	Wall	>9.9	Pos.	Intact
12	Boiler Room Wall A	Metal	Ladder to Cat Walk	-0.1	Neg.	Intact
13	Boiler Room Wall C		Ladder to Cat Walk	-0.2	Neg.	Intact

Lead Inspector/Risk Assessor: Jordan Reed

Substrate: SR = Sheetrock C = concrete B = Brick W = Wood PL = Plaster CB = Cinderblock M = Metal

Component: W = Wall F = Floor C = Ceiling Wd = Window WF = Window Frame WC = Window Casing WM = Window Mullion WS = Window Sill WSH = Window Sash
D = Door DF = Door Frame DC = Door Casing DJ = Door Jamb H = Header CB = Covebase T = Trim CR = Chair Rail S = Stairs Ri = Riser Ru = Runner SM Stair Mullion



ENVIRONMENTAL CONNECTION INC

A Vertical Technologies Corporation

Date: June 12, 2018
Client: Mott MacDonald
Building: WDC Powerhouse
Address: 1175 Dehirsch Avenue

Page: 2 of 4
Unit #: 1
Job#: 6-12-18-12-45
XRF Serial #: 1390
EC#: 18137-01

XRF LEAD BASED PAINT INSPECTION DATA SHEET

Sample #	Test Location/Room Equivalent	Substrate	Component	XRF Value	Classification (pos., neg., inc.)	Condition/Comments
14	Boiler Room Wall C	Metal	Catwalk Railing	-0.2	Neg.	Intact
15	Boiler Room	Metal	Flange Below Breaching	-0.1	Neg.	Rusting
16	Boiler Room Wall B	Metal	Window Mullion	>9.9	Pos.	Rusting
17	Boiler Room Wall B	Metal	Window Mullion	>9.9	Pos.	Rusting
18	Boiler Room	Metal	Breaching	-0.2	Neg.	Flaking
19	Boiler Room	Metal	Breaching	-0.2	Neg.	Intact
20	Boiler Room	Metal	Support Column	0.0	Neg.	Intact
21	Boiler Room	Metal	Support Column	0.0	Neg.	Intact
22	Boiler Room	Metal	Door to Locker Room	4.5	Pos.	Intact
23	Operator Office Wall A	Sheetrock	Wall	-0.1	Neg.	Intact
24	Operator Office	Wood	Door Frame	-0.0	Neg.	Intact
25	Boiler Room	Metal	Door to Locker Room	4.4	Pos.	Intact
26	Boiler Room Wall B	Metal	Wall – Ladder Cage	-0.2	Neg.	Intact

Lead Inspector/Risk Assessor: Jordan Reed

Substrate: SR = Sheetrock C = concrete B = Brick W = Wood PL = Plaster CB = Cinderblock M = Metal

Component: W = Wall F = Floor C = Ceiling Wd = Window WF = Window Frame WC = Window Casing WM = Window Mullion WS = Window Sill WSH = Window Sash
D = Door DF = Door Frame DC = Door Casing DJ = Door Jamb H = Header CB = Covebase T = Trim CR = Chair Rail S = Stairs Ri = Riser Ru = Runner SM Stair Mullion



ENVIRONMENTAL CONNECTION INC

A Vertical Technologies Corporation

Date: June 12, 2018
Client: Mott MacDonald
Building: WDC Powerhouse
Address: 1175 Dehirsch Avenue

Page: 3 of 4
Unit #: 1
Job#: 6-12-18-12-45
XRF Serial #: 1390
EC#: 18137-01

XRF LEAD BASED PAINT INSPECTION DATA SHEET

Sample #	Test Location/Room Equivalent	Substrate	Component	XRF Value	Classification (pos., neg., inc.)	Condition/Comments
27	Boiler Room	Metal	Ladder	-0.1	Neg.	Chipping
28	Locker Room	Concrete	Floor	-0.4	Neg.	Chipping
29	Locker Room	Cinderblock	Wall	-0.1	Neg.	Intact
30	Locker Room	Cinderblock	Wall	-0.3	Neg.	Intact
31	Locker Room	Cinderblock	Wall	-0.2	Neg.	Intact
32	Locker Room	Wood	Door Frame	3.1	Pos.	Intact
33	Locker Room	Wood	Door	1.4	Pos.	Intact
34	Powerhouse Exterior Wall B	Metal	Door	0.1	Neg.	Intact
35	Powerhouse Exterior Wall B	Metal	Door Frame	-0.0	Neg.	Intact
36	Powerhouse Exterior Wall D	Metal	Window	0.0	Neg.	Chipping
37	Powerhouse Exterior Wall A	Metal	Door	-0.1	Neg.	Intact
38	Powerhouse Exterior Wall A	Metal	Door Frame	-0.1	Neg.	Intact
39	Boiler Room	Metal	Lintel b/w Boiler Room and Generator Room	>9.9	Pos.	Chipping

Lead Inspector/Risk Assessor: Jordan Reed

Substrate: SR = Sheetrock C = concrete B = Brick W = Wood PL = Plaster CB = Cinderblock M = Metal

Component: W = Wall F = Floor C = Ceiling Wd = Window WF = Window Frame WC = Window Casing WM = Window Mullion WS = Window Sill WSH = Window Sash D = Door DF = Door Frame DC = Door Casing DJ = Door Jamb H = Header CB = Covebase T = Trim CR = Chair Rail S = Stairs Ri = Riser Ru = Runner SM = Stair Mullion



ENVIRONMENTAL CONNECTION INC

A Vertical Technologies Corporation

Date: June 12, 2018
Client: Mott MacDonald
Building: WDC Powerhouse
Address: 1175 Dehirsch Avenue

Page: 4 of 4
Unit #: 1
Job#: 6-12-18-12-45
XRF Serial #: 1390
EC#: 18137-01

XRF LEAD BASED PAINT INSPECTION DATA SHEET

Sample #	Test Location/Room Equivalent	Substrate	Component	XRF Value	Classification (pos., neg., inc.)	Condition/ Comments
40	Generator Room Wall A	Concrete	Wall	>9.9	Pos.	Intact
41	Generator Room Wall B	Concrete	Wall	>9.9	Pos.	Intact
42	Generator Room Wall C	Concrete	Wall	>9.9	Pos.	Intact
43	Generator Room Wall D	Concrete	Wall	>9.9	Pos.	Intact
44	Generator Room Wall C	Metal	Louver	1.6	Pos.	Chipping
45	Generator Room	Metal	Louver Frame	2.7	Pos.	Chipping
46	Calibration	-	-	1.0	-	-
47	Calibration	-	-	1.0	-	-
48	Calibration	-	-	1.0	-	-
49						
50						
51						
52						

Lead Inspector/Risk Assessor: Jordan Reed

Substrate: SR = Sheetrock C = concrete B = Brick W = Wood PL = Plaster CB = Cinderblock M = Metal

Component: W = Wall F = Floor C = Ceiling Wd = Window WF = Window Frame WC = Window Casing WM = Window Mullion WS = Window Sill WSH = Window Sash D = Door DF = Door Frame DC = Door Casing DJ = Door Jamb H = Header CB = Covebase T = Trim CR = Chair Rail S = Stairs Ri = Riser Ru = Runner SM Stair Mullion

APPENDIX IV

POLYCHLORINATED BIPHENYL ANALYTICAL REPORTS AND CHAIN OF CUSTODY



EMSL Analytical, Inc.

200 Route 130 North, Cinnaminson, NJ 08077

Phone: (856) 303-2500 Fax: (856) 858-4571 Email: EnvChemistry2@emsl.com

Attn:

Jordan Reed
Environmental Connection, Inc.
120 North Warren Street
Trenton, NJ 08608

6/20/2018

Phone: (609) 392-4200
Fax:

The following analytical report covers the analysis performed on samples submitted to EMSL Analytical, Inc. on 6/12/2018. The results are tabulated on the attached data pages for the following client designated project:

18137-01; Hazardous Materials Testing

The reference number for these samples is EMSL Order #011804568. Please use this reference when calling about these samples. If you have any questions, please do not hesitate to contact me at (856) 303-2500.

Approved By:

Phillip Worby, Environmental Chemistry
Laboratory Director



The test results contained within this report meet the requirements of NELAP and/or the specific certification program that is applicable, unless otherwise noted.
NELAP Certifications: NJ 03036, NY 10872, PA 68-00367, CA ELAP 1877

The samples associated with this report were received in good condition unless otherwise noted. This report relates only to those items tested as received by the laboratory. The QC data associated with the sample results meet the recovery and precision requirements established by the NELAP, unless specifically indicated. All results for soil samples are reported on a dry weight basis, unless otherwise noted. This report may not be reproduced except in full and without written approval by EMSL Analytical, Inc.

**EMSL Analytical, Inc.**

200 Route 130 North, Cinnaminson, NJ 08077

Phone/Fax: (856) 303-2500 / (856) 858-4571

<http://www.EMSL.com>EnvChemistry2@emsl.com

EMSL Order: 011804568

CustomerID: ENVI65

CustomerPO:

ProjectID:

Attn: **Jordan Reed**
Environmental Connection, Inc.
120 North Warren Street
Trenton, NJ 08608

Phone: (609) 392-4200
 Fax:
 Received: 06/12/18 4:15 PM

Project: 18137-01; Hazardous Materials Testing

Analytical Results

Client Sample Description PCB-01
Caulk/metal bands
Collected: 6/12/2018
Lab ID: 011804568-0001

Method	Parameter	Result	RL	Units	Prep Date	Analyst	Analysis Date	Analyst
GC-SVOA								
3540C/8082A	Aroclor-1016	ND D	0.85	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1221	ND D	0.85	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1232	ND D	0.85	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1242	ND D	0.85	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1248	ND D	0.85	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1254	2.4 D	0.85	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1260	ND D	0.85	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1262	ND D	0.85	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1268	ND D	0.85	mg/Kg	6/18/2018	AC	6/19/2018	EH

Client Sample Description PCB-02
Window Caulk
Collected: 6/12/2018
Lab ID: 011804568-0002

Method	Parameter	Result	RL	Units	Prep Date	Analyst	Analysis Date	Analyst
GC-SVOA								
3540C/8082A	Aroclor-1016	ND D	0.95	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1221	ND D	0.95	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1232	ND D	0.95	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1242	ND D	0.95	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1248	ND D	0.95	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1254	2.1 D	0.95	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1260	ND D	0.95	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1262	ND D	0.95	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1268	ND D	0.95	mg/Kg	6/18/2018	AC	6/19/2018	EH

Client Sample Description PCB-03
Window Glazing
Collected: 6/12/2018
Lab ID: 011804568-0003

Method	Parameter	Result	RL	Units	Prep Date	Analyst	Analysis Date	Analyst
GC-SVOA								
3540C/8082A	Aroclor-1016	ND D	0.85	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1221	ND D	0.85	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1232	ND D	0.85	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1242	ND D	0.85	mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1248	ND D	0.85	mg/Kg	6/18/2018	AC	6/19/2018	EH

**EMSL Analytical, Inc.**

200 Route 130 North, Cinnaminson, NJ 08077

Phone/Fax: (856) 303-2500 / (856) 858-4571

<http://www.EMSL.com>EnvChemistry2@emsl.com

EMSL Order: 011804568

CustomerID: ENVI65

CustomerPO:

ProjectID:

Attn: **Jordan Reed**
Environmental Connection, Inc.
120 North Warren Street
Trenton, NJ 08608

Phone: (609) 392-4200
 Fax:
 Received: 06/12/18 4:15 PM

Project: 18137-01; Hazardous Materials Testing

Analytical Results

Client Sample Description PCB-03 **Collected:** 6/12/2018 **Lab ID:** 011804568-0003
 Window Glazing

Method	Parameter	Result	RL	Units	Prep Date	Analyst	Analysis Date	Analyst
GC-SVOA								
3540C/8082A	Aroclor-1254	ND D		0.85 mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1260	ND D		0.85 mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1262	ND D		0.85 mg/Kg	6/18/2018	AC	6/19/2018	EH
3540C/8082A	Aroclor-1268	ND D		0.85 mg/Kg	6/18/2018	AC	6/19/2018	EH

Definitions:

ND - indicates that the analyte was not detected at the reporting limit

RL - Reporting Limit (Analytical)

D - Dilution



ENVIRONMENTAL CONNECTION INC

A Vertical Technologies Corporation

Chain of Custody and Field Data Record

011804568

Client : Mott MacDonald
 Project : Hazardous Materials Testing
 Building : WDC Powerhouse

Date : 06-12-18
 Technician : J. Reed
 Project # : 18137-01

Sample Identification #	Location	Matrix	Date	Analysis Required (Specify Method if Known)	Quantity
1 2 3 PCB-01	CAULK ASSOC. w/ Metal brads	CAULK	06/12/18	PCB's 3540C/8082A	
PCB-02	WINDOW CAULK	CAULK	06/12/18	PCB's 3540C/8082A	
PCB-03	WINDOW GLAZING	GLAZING	06/12/18	PCB's 3540C/8082A	
			/ /	PCB's 3540C/8082A	
			/ /	PCB's 3540C/8082A	
			/ /	PCB's 3540C/8082A	
			/ /	PCB's 3540C/8082A	
			/ /	PCB's 3540C/8082A	
			/ /	PCB's 3540C/8082A	
			/ /	PCB's 3540C/8082A	
			/ /	PCB's 3540C/8082A	
			/ /	PCB's 3540C/8082A	

Relinquished by Jordan Reed Date 6/12/18 Time 4:00 pm
 Received by Jordan Reed Date 6/12/18 Time 4:15 pm
 Reason for Change of Custody 400p

NOTES: **1 Week Turn Around Time**

F:\Templates\Environmental\Form - Chain of Custody for Soil, Water, Bulk Materials

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

3RLL

1
2
3

OrderID: 011804568

Page 1 of 1

APPENDIX V
CERTIFICATIONS/ACCREDITATIONS

Certificate of Completion

Jordan Reed

for successfully completing the prescribed course of study in

**Pennsylvania Asbestos
Building Inspector Refresher Course**
under TSCA Title II

presented by
ACCESS TRAINING SERVICES, INC.
7921 River Road, Pennsauken, NJ 08110
(856) 665-3449

9/21/17

Course Date

N/A

Exam Date

9/21/18

Expiration Date

Not Provided

Social Security Number

ACC-0917-6-003

Certificate Number



Mark K. Schlager
Training Director

Lead Identification Permit

New Jersey Department of Health

JORDAN J REED



Permit No.: 032991
ID No.: 028807
Expires: 10/29/2019

Authorization Signature: *Christina Tan*
Christina Tan, MD, M.P.H., Assistant Commissioner

Inspector/Risk Assessor

New York State Department of Health Certificate of Asbestos Safety Training
 This form is the official record of successful completion of a New York State accredited asbestos safety training course.

Certificate No. **814022**

I - To be completed by Trainee		
Name of Trainee (print) <u>ROLAND C JONES</u>	NYS Depart. of Motor Vehicles ID (DMV ID) ¹ <u>935751745</u>	
Signature of Trainee <u>[Signature]</u>	Telephone Number <u>609 273 1396</u>	Date of Birth ¹ <u>[Redacted]</u>
Address <u>[Redacted]</u>	<u>[Redacted]</u>	<u>[Redacted]</u>
(Street or PO Box)	(City)	(State) (Zip Code)

II - To be completed by Training Sponsor	
Provider's Name <u>Big Apple Occupational Safety Inc</u>	Telephone Number <u>[Redacted]</u>
Address <u>505 Eighth Avenue # 2305</u>	
New York NY 10018	Course Location: <u>[Redacted]</u>
Zip Code <u>212-564-7656</u>	<u>www.baos.com</u>

Course Title: Asbestos Inspector Initial Refresher NYS DOH use only
 DOH Equivalency ²

Training Language: English Other: _____ Exam Grade/Date: 96 05/29/18

Dates of Training: From: 05/29/18 To: 05/29/18 Expires: 05/29/2019

I certify that the asbestos safety training course given on the above date complied with both 10 NYCRR Part 73 and TSCA Title II, was consistent with the curriculum and instructors approved by the New York State Department of Health, and the trainee receiving this certificate completed the training course and successfully passed the examination.

Training Director²: RADHA REDDY (Print) [Signature] (Signature) **STUDENT**

DOH-2832 (10/03) ¹ Optional Information ² DOH Equivalency signed by NYS DOH representative only

United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101048-0

EMSL Analytical, Inc.
Cinnaminson, 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



[Signature]
For the National Voluntary Laboratory Accreditation Program



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

EMSL Analytical, Inc.

200 Route 130 North
Cinnaminson, NJ 08077

Mr. Ben Ellis

Phone: 800-220-3675 Fax: 856-786-5973

Email: bellis@emsl.com

<http://www.emsl.com>

ASBESTOS FIBER ANALYSIS

NVLAP LAB CODE 101048-0

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

- | | |
|---|---|
| <input checked="" type="checkbox"/> INDUSTRIAL HYGIENE | Accreditation Expires: September 01, 2018 |
| <input checked="" type="checkbox"/> ENVIRONMENTAL LEAD | Accreditation Expires: September 01, 2018 |
| <input checked="" type="checkbox"/> ENVIRONMENTAL MICROBIOLOGY | Accreditation Expires: September 01, 2018 |
| <input type="checkbox"/> FOOD | Accreditation Expires: |
| <input type="checkbox"/> 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